Political agendas and policy alternatives for offshore wind energy in the Republic of Ireland 1999 – 2020: using process tracing and qualitative comparative analysis to test the Multiple Streams Framework hypothesis

Submitted by Jean-Pierre Roux, to the University of Exeter as a thesis for the degree of Doctor of Philosophy in Geography, September 2023.

I certify that all material in this dissertation which is not my own work has been identified and that any material that has previously been submitted and approved for the award of a degree by this or any other University has been acknowledged.

ABSTRACT

Offshore wind energy (OFW) may be a key component to net-zero power systems for many jurisdictions across the world. However, detailed study of why and how various actors in and around governments select it as an object of political effort and narrow down policy alternatives for its deployment is lacking. The Multiple Streams Framework (MSF) provides a general hypothesis that could explain how OFW moves on to (and off of) political agendas. This study uses a novel mixed methods approach, including process tracing and fussy set Qualitative Comparative Analysis (fsQCA), to test the MSF hypothesis and to discover causal mechanisms and configurations of necessary and/or sufficient conditions that move the attention of people in and around government towards (or away from) supporting the commercial deployment of OFW. For this purpose it draws on several cases from the Republic of Ireland from 1999 – 2020.

The process tracing discovers nine scope conditions which shape the political fate of OFW over a multi-decadal period. These include the existence/absence of national industry to benefit from OFW-related manufacturing and construction; the cost-differential between OFW and other indigenous energy sources (renewable and fossil fuels) and the availability of the latter; the size of the power system and its interconnection with neighbouring systems; grid limitations to the penetration of variable renewables and decadal expectations of penetration potential; the locations of electricity supply and demand centres and the available alternatives for grid expansion and reinforcement; long-term scenario planning for the power and energy systems and the available modelling tools and modellers; the level and trajectory of greenhouse gas emissions and public support for mitigation; and decadal energy or emissions targets. The configuration of these scope conditions inform the battle of ideas in policy and political networks and in turn the causal mechanisms that bring OFW on to agendas or push it off agendas.

The fsQCA results do not provide strong support for the MSF general hypothesis. Findings suggest that the coincidence of a policy window opening, the three streams being ready for coupling and a policy entrepreneur coupling the streams, is not necessary for OFW to enjoy political agenda status. This study identifies simpler combinations of conditions that are sufficient for OFW's agenda status. Having both the problem stream and the politics stream ripe for

coupling is sufficient for explaining agenda change in most cases. That is, if most policy makers (civil servants and their specialist advisors) agree that OFW is a solution to a policy problem (whether that be climate change or national energy security), and either the programme for government or the balance of influence between industry groups are not opposed to OFW, then OFW will make it on to the political agenda of multiple institutions. This may occur without significant policy entrepreneurship, existing policy solutions for its deployment, or indeed policy windows like general elections or other focus events.

This thesis makes three types of contributions to the body of knowledge. Methodologically, it offers a novel operationalization of MSF as a falsifiable hypothesis. Theoretically, it develops new frameworks of the policy process aimed at power generation technology deployment and the grid connection policy cycle, and new hypotheses for testing. Empirically, in the rich details of the narrative (including extensive appendices), it provides a history of the first two decades of offshore wind energy in the Republic of Ireland, spanning the period 1999 – 2020.

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Acknowledgements

With immense gratitude, I acknowledge…

1. The support from Marie Skłodowska-Curie Actions and their commitment to independent, inter-disciplinary social science research that connects young researchers across Europe and beyond. Without this generous financial support, I would not have considered pursuing research and further skills development mid-career.
2. The instigators of the MISTRAL-ITN programme, most notably Prof. Geraint Ellis, for designing a ground-breaking programme of research and training. The creative thought and effort you put into the MISTRAL-ITN programme enabled a radical pivot in my career.
3. The cohort of MISTRAL-ITN doctoral researchers. Your intellectual curiosity, energy and kindness inspired me. You provided a much needed intellectual and emotional community (and even a collaborator!) during the double-isolation of doctoral research and COVID lockdowns.
4. My supervisors at the University of Exeter, Prof. Patrick Devine-Wright and Dr Oscar Fitch-Roy, for the critical and thorough engagement and taking a genuine interest in my intellectual development.
5. The European Consortium for Political Research and in particular the lecturers who presented excellent summer and winter schools. All the new research skills I acquired during the PhD were thanks to you.
6. John McCann who lured me over to Ireland in the first year of the doctorate and sparked my interest in Irish electricity policy. I attribute most of what I know on the subject to you.
7. Pieter, Brenda and Chantal, for your lack of patience.
8. Finally, to Virginie who is ultimately to blame for all of this, and Eleanore for nudging me on to the next chapter.

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Abbreviations

ACF	Advocacy Coalition Framework
AER	Alternative Energy Requirement
BAU	Business As Usual
CAP	Climate Action Plan
CEF	Connecting Europe Facility
CER	Commission for Electricity Regulation
CRU	Commission for Regulating Utility
DAFF	Department of Agriculture Fisheries and Food
DCCAE	Department of Communications Climate Action and Environment
DCENR	Department of Communications Energy and Natural Resources
DCMNR	Department of Communication Marine and Natural Resources
DCNR	Department of Communications and Natural Resources
DECC	UK Department for Energy and Climate Change
DECLG	Department of Environment, Community and Local Government
DEHLG	Department of Environment, Heritage and Local Government
DHPLG	Department for Housing Planning and Local Development
DMNR	Department of Marine and Natural Resources
DSO	Distribution System Operator
EPA	Environmental Protection Agency
ESB	Electricity Supply Board
ESBN	ESB Networks (see ESB)
ESBNG	ESB National Grid (see ESB)
ESRI	Economic and Social Research Institutes
ETS	European Trading Scheme
fsQCA	fussy set Qualitative Comparative Analysis
GPA	Group Processing Approach
ITM	Irish TIMES Model (see TIMES)
IWEA	Irish Wind Energy Agency
MACC	Marginal Abatement Cost Curve
MPDM (Bill)	Marine Planning and Development Management Bill
MSP	Marine Spatial Planning
NECP	National Energy and Climate Plan
NMP	National Mitigation Plan
NMPF	National Marine Planning Framework
NOW Ireland	National Offshore Wind Association of Ireland
NPV	Net Present Value
NREAP	National Renewable Energy Action Plan
NSCOGI	North Seas Countries Offshore Grid Initiative
OFW	Offshore Wind energy
OREDP	Offshore Renewable Energy Development Plan
PCI	Project of Common Interest

PET	Punctuated Equilibrium Theory
PfG	Programme for Government
PFT	Policy Feedback Theory
PRIMES	Price-Induced Market Equilibrium System
PSO	Public Service Obligation
REDG	Renewable Energy Development Group
REFIT	Renewable Energy Feed-In Tariff
RESS	Renewable Electricity Support Scheme
ROI	Republic of Ireland
SEAI	Sustainable Energy Authority of Ireland
SEI	Sustainable Energy Ireland
SEM / I-SEM	Single Electricity Market / Integrated Single Electricity Market
SNSP	Synchronous-Non-Synchronous-Power
SO	System Operators
TD	Teachta Dála
TIMES	The Integrated MARKAL-EFOM System
TSO	Transmission System Operator
TYNDP	Ten Year Network Development Plan
UCC	University College Cork
UCD	University College Dublin

1. Introduction

The confluence of three intellectual interests shaped this study. Firstly, the increasing deployment of offshore wind energy globally and forecasts of its rapidly growing contribution to national and regional electricity generation fleets triggered my interest in the technology. Secondly, a research secondment to the Irish state agency for energy (the Sustainable Energy Authority of Ireland) in the first year of my doctoral programme triggered my interest in Irish energy policy and politics. It just so happened that offshore wind energy was becoming a 'hot topic' on the Irish political agenda at the time. Thirdly, an early attempt to 'orient' myself in the complexities of Irish politics (and demands from my supervisors to propose a novel contribution to academic knowledge) triggered my interest in recent debates on theories of the policy process, notably proposals to progress application of the Multiple Streams Framework (MSF), a frequently used but oft criticized explanatory framework for political agenda setting. Historical contingencies are therefore somewhat to blame for the confluence of these interests. In this chapter, I elaborate the rationale for building a doctoral research project from this confluence of interests and link it to a set of objectives, research questions and research methods.

Since 2010, global installed capacity of offshore wind energy (OFW) has increased rapidly from a low base (Wind Europe, 2020; Global Wind Energy Council, 2021). Several international institutions now forecast that OFW will make a significant contribution to reaching net zero by 2050 (Global Wind Energy Council, 2021; IRENA, 2021).[1] Technology-oriented politics are co-evolving at national and regional scales with the deployment of this technology (Fitch-Roy, 2016; Tabi and Wüstenhagen, 2017; Motta, 2018; R C Spijkerboer *et al*, 2020; Gibbs, 2021; Senter, 2021; Roux *et al*, 2022; MacKinnon*et al*, 2022; Nieuwenhout, 2022; Kusters, van Kann and Zuidema, 2023; Sornn-Friese, Sofev and Kondratenko, 2023). The distinctive characteristics of OFW spawn new institutions. It has require governments, system operators and/or utility regulators to adopt new legislation, policies and/or market regulations to enable commercial deployment. The commercial deployment of OFW has required interventions from governments in electricity markets, marine governance, and

[1] Refer to Appendix A for further details on the rise of OFW deployment globally and forecasts for future expansion.

electricity grid development and connection (Fitch-Roy, 2016; Mackinnon *et al.*, 2018; Aitong Li, 2022; Kusters, van Kann and Zuidema, 2023). However, despite a very recent increase in interest, the social sciences and humanities are lagging in documenting and analysing the nature and dynamics of this interplay between technology, politics and economics (Sovacool, 2014).

Historians of energy frequently make the observation that particular energy technologies or fuel sources have had profound effects in shaping human history (whether at global, national or regional scales), and in turn that the political, cultural, and economic contexts within which particular energy technologies or fuels emerge shape the nature and evolution of the technology (Baxter, Morzaria and Hirsch, 2013; Smil, 2016; Turnbull, 2021). The classic empirical example is the debate on the relationship between coal use and the industrial revolution in Britain (Nef, 1932, 1943; Wrigley, 1988; Clark and Jacks, 2007), but other fuel sources and electricity have also received significant examinations from broad historical perspectives (Nye, 1992; Yergin, 2012; Smil, 2017). This study followed somewhat in the above tradition (though not situated squarely in the disciplinary bounds of historiography).

Much has been written on the individual policy elements implicated in the deployment of OFW. For instance, a robust evidence base exists on the design of price support instruments for renewables, such as Renewable Feed-In Tariffs (REFITs) and auctions, in general (Del Río and Linares, 2014; Steen and Hansen, 2014; Jacobs, 2016; Fitch-Roy, Benson and Woodman, 2019) and for particular jurisdictions like Ireland (Devitt *et al.*, 2009; Diffney *et al.*, 2009; Clifford and Clancy, 2011; Foley *et al.*, 2013; O'Flaherty *et al.*, 2014; Cambridge Economic Policy Associates, 2017b, 2017a). Similarly, a voluminous literature exists on maritime law and planning approaches like Marine Spatial Planning (MSP), including how the implementation of MSP approaches have interacted with OFW deployment (Kannen *et al.*, 2013; Scarff, Fitzsimmons and Gray, 2015; Clarke and Flannery, 2020; Desmond and Butschek, 2020; R.C. Spijkerboer *et al.*, 2020; Quero García, García Sanabria and Chica Ruiz, 2021; Steins *et al.*, 2021).

But how does it 'all come together' politically for OFW? What makes people in and around government attend to OFW as an issue deserving significant political effort? After all, those with interests in technology deployment have, at different points in time, supported diverse alternatives for price support instruments, consenting approaches, grid connection, and targeted industrial policy, as long as some functional configuration crystalizes in a particular jurisdiction at a particular time to enable commercial deployment of the technology (Palmers and Shaw, 2002; Fitch-Roy, 2016; Mackinnon *et al.*, 2018). There are two temporally distinct elements to the aforementioned questions. How does offshore wind become an issue on a government's agenda in the first instance; at a 'pre-decision' or agenda setting phase? Secondly, how does a complex configuration of policy elements crystalize as a functional, adopted policy package? Much less has been written on this matter, on OFW as an object of political attention and effort.

Academic literature provides general pointers on the conditions or mechanisms by which offshore wind power become politicised. Actors may advocate for it as a solution to national decarbonisation efforts (Kern *et al.*, 2014; Banet, 2018; Motta, 2021; Do *et al.*, 2022; MacKinnon *et al.*, 2022), national energy insecurity (Kamp, 2006; Kern *et al.*, 2014), and/or regional (sub-national) economic development or re-industrialisation (Kamp, 2006; Fornahl *et al.*, 2012; Dawley, 2014; MacKinnon *et al.*, 2019) (Westgard-Cruice and Aoyama, 2021) (Normann, 2015)(MacKinnon *et al.*, 2022). In some cases increasing social opposition to deploying onshore wind energy (and related transmission infrastructure) contributes to a market and political pivot to offshore wind energy (Hays, 2005; Ernst & Young, 2015) (Kern *et al.*, 2014). In other instances, private sector actors in a liberalised power generation market instigate political responses as the first (often speculative) project in a jurisdiction moves through the project development cycle and test policy, regulations and/or legislation (Hayden, 2005; Motta, 2021).

However, the geographic spread of existing literature is sparse, whilst the empirical focus is often limited to temporally short periods and the technical content of individual policies (i.e. a single policy or type of policy instrument is the object of analysis). Extant literature does not offer rich accounts over decadal periods, taking a wider view on how offshore wind power functions as an object of political interest that implicates, changes and is changed by, several institutions and many different pieces of legislation, policies and regulations. This provides the first justification to offer an account of how OFW functions as an object of political attention and the conditions that elevate it on political agendas (or keep it off agendas) and drive political decision-making and policy development.

The aforementioned question I pose of OFW has been posed in a more general form by Kingdon in his seminal work ‘Agendas, alternatives and public policy’:

> “What makes people in and around government attend, at any given time, to some subjects and not to others? … We know more about how issues are disposed of than we know about how they came to be issues on the government agenda in the first place, how the alternatives from which decision makers chose were generated, and why some potential issues and some likely alternatives never came to be the focus of serious attention.” (Kingdon, 1995, pp. 1–2)

Kingdon’s explanation, the Multiple Streams Framework, has become popular amongst scholars of the policy process. There is now an active international research community that makes use of it to the extent that it is included in textbooks on policy studies (Weible and Sabatier, 2017). Several hundred peer reviewed articles have applied the framework across a wide range of different policy areas and different countries (Jones *et al.*, 2016).

However, this approach to explaining agenda setting and decision making on public policy has received substantial criticism. Sabatier argued that MSF has no explicit hypotheses and is so fluid in its structure and operationalization that falsification is difficult (Sabatier, 2007). Confirming Sabatier’s theoretical critique, Jones et al conclude from their meta-review of MSF literature that the approach had generated a ‘disturbingly incoherent’ research programme (Jones *et al.*, 2016). This is largely due to the lack of clarity and rigour with which most researchers apply the framework’s structural components and their relationship.

Recently, proponents of MSF, most notably Zohlnhöfer, Herweg and Zahariadis, set out to address some of these shortcomings directly (Herweg and Zohlnhöfer, no date; Zohlnhöfer and Rüb, 2016; Herweg, Zahariadis and Zohlnhöfer, 2017; Zohlnhöfer, Herweg and Zahariadis, 2022). Most notably, they formulate MSF as a general, falsifiable hypothesis:

> “Agenda change becomes more likely if (a) a policy window opens, (b) the streams are ready for coupling, and (c) a policy entrepreneur promotes the agenda change.” (Herweg, Zahariadis and Zohlnhöfer, 2017).

They clarify some of the MSF metaphors and make a few ‘best practice’ methodological recommendations for operationalising the framework.

It is the general hypothesis that arguably provides the most ambitious prospect for furthering theoretical progress within this tradition. To date, few studies have sought to test the general hypothesis and no theoretical work has sought to tease out the implications of divergent interpretations. This forms the second justification for this study.

Finally, the Republic of Ireland offers an excellent case study for exploring the two aforementioned justifications for this study. From the late 1990s, a few industrialists, policy makers and elected officials made noteworthy attempts at progressing the development of OFW in Irish waters; both attempting to bring offshore wind on to the political agenda and developing technology-specific policy solutions to support its deployment. In 2007, the technology received a surprising nudge on to the political agenda with the Greens entering a coalition government. However, by 2011, the government had failed to reform marine legislation, offer technology-specific price support, and neither had the regulator offered offshore wind projects a functional connection policy. Following the financial crisis, and a failed electricity export opportunity, OFW in Ireland was decisively off political agendas for several years. However, in 2019, the government announced an ambitious technology-specific target for 2030. By 2022, it had enacted an overhaul of marine planning legislation, and scheduled the first commercial scale auction for electricity from OFW, whilst the electricity regulator and system operator have taken the cue to adapt grid connection and development policies to prioritise offshore wind connection.

Frenetic, almost feverish, moments of activity interspersed by extended spells of political apathy and inaction. Taken over a sufficiently long timespan, Ireland offers an excellent case for considering the conditions that shift the technology on and off political agendas. In fact, one of the key findings of the study is that a robust understand of enabling conditions requires a rigorous assessment of extended periods of political *dis*interest. This study made the first detailed examination of how the political and economic context of a particular national jurisdiction, the Republic of Ireland, shaped the deployment of a particular energy technology over the period 1999 - 2020. More specifically, it asked questions that have been posed in general form elsewhere (Kingdon, 1995): What made people in and around government attend to OFW as an issue deserving significant political effort? How did offshore wind become an issue on the government's agenda in the first instance? Once 'on the agenda', how did a complex configuration of policy elements crystalize as a functional, adopted policy package?

The objectives of this research are twofold.

1. Firstly, to offer an account of how OFW made it on to the political agenda (or failed to) and how policies were adopted to support its deployment (or not) in the Republic of Ireland from 1999 to 2020.
2. Secondly, to offer more general explanations of how OFW functions as an object of political attention and the conditions that elevate it on political agendas (or keep it off agendas) and drive political decision-making on the issue.

The research questions aimed at reaching the aforementioned objectives are:

1. What causal mechanisms moved OFW on to the political agenda in Ireland between 1999 and 2020? Conversely, what causal mechanisms moved OFW off the political agenda? What were the configurations of conditions associated with OFW's agenda status and its non-agenda status?
2. How does OFW behave as a political object and interact with policy processes and institutions?
3. Does the empirical evidence support a general theory of agenda-setting as proposed by the 'Multiple Streams Framework'?

Several conceptual and methodological innovations developed in this study enables the formulation of robust implications from the Irish case for more general theory on the socio-political conditions that support or inhibit national and regional energy transitions, and a more abstract theory on political agenda setting (not restricted to the object of OFW). The study develops a novel operationalisation of the MSF to achieve this. This operationalisation fills a knowledge gap at the interface of theory and method by clarifying and developing different interpretations of the general hypothesis and operationalising the generic MSF concepts for OFW as a political object in a democracy with a liberalised electricity sector. The study also develops methodological innovations to test the general MSF hypothesis through both inductive process tracing and a temporal fuzzy set Qualitative Comparative Analysis (fsQCA). Process tracing enables theory building by uncovering and specifying generalizable causal mechanisms for agenda change (Trampusch and Palier, 2016), whilst QCA enables a deductive testing of the MSF general hypothesis as a configuration of necessary or sufficient conditions (Oana, Schneider and Thomann, 2021). These conceptual and methodological innovations taken together offer tools to support rigorous comparative analysis on this topic in the future.

Figure 1 presents a schematic that links the structure of the monograph to the objectives and research questions. Chapter 2 presents a literature review. Chapter 3 sets out a multi-method research design and operationalises the MSF for this purpose. Chapter 4 fulfils the first objective of the study with the process tracing case narrative. Chapter 5 presents the calibrated QCA dataset for the fsQCA and tests the MSF hypothesis through the fsQCA. Together, Chapter 4 and 5 answers research question 1. The discussion in Chapters 6 brings together the results from Chapters 4 and 5 to fulfil the second objective of the study and answer research questions 2 and 3.This study will interest those with an interest in Ireland's energy history, the future of OFW in Irish waters, and the national transition to a net-zero power system (Gallachóir, Bazilian and McKeogh, 2005; Flannery *et al.*, 2016; Gaffney, Deane and Gallachóir, 2017; Devine-Wright and Sherry-Brennan, 2019; Hanlon *et al.*, 2019; Ritchie *et al.*, 2020). In addition, the study links into several cognate thematic clusters of climate and energy social science and public policy literature. Firstly, the study results suggest (in general form) causal mechanisms through which renewable power generation technologies may come to political prominence (or fail to), along with the scope conditions that influence the functioning of such mechanisms. It also suggests alternative pathways through which government and state agencies develop and adopt, or fail to, various policy elements to drive commercial deployment of renewable power generation technologies. Secondly, the study tests a general hypothesis that a complex configuration of conditions explains the political agenda status of OFW. These findings contribute to debates about socio-technical transitions (Geels, no date;

Roberts *et al.*, 2018; Roberts and Geels, 2019; Sovacool *et al.*, 2020), energy transitions (Smil, 2016; Sovacool, 2016), social acceptance of renewables (Devine-Wright *et al.*, 2017; Wolsink, 2018, 2019), and theories of political agenda setting and the policy process (Kingdon, 1995; Herweg, Zahariadis and Zohlnhöfer, 2017).

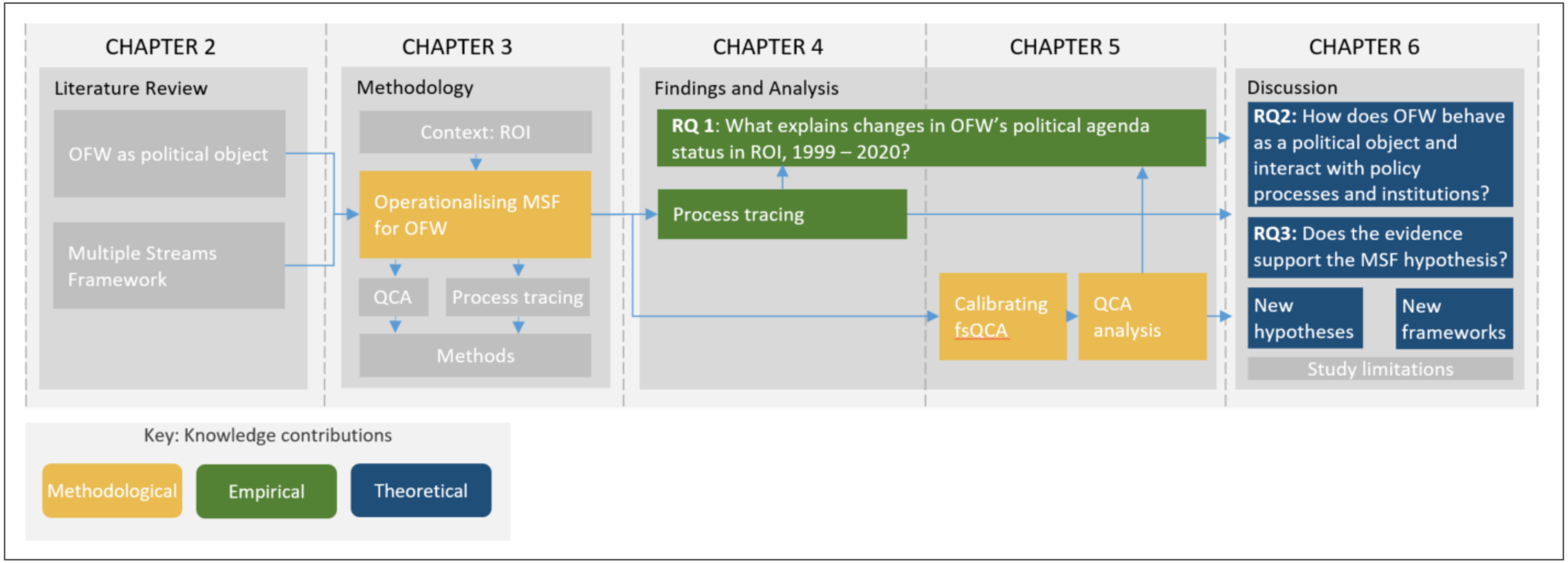

Figure 1: Diagram of thesis structure, linking to Research Questions (RQ) and knowledge contribution. ROI = Republic of Ireland, fsQCA = fuzzy set qualitative comparative analysis, OFW = offshore wind energy

2. Literature Review

The literature review consists of three sections. The first section situates OFW as an object of political interest. It considers literature that offer schematic answers to the questions posed in the introduction. The second section justifies this study's use of MSF over alternative theories of the policy process. The third section introduces the MSF in its most abstract form, accompanied by critical discussions on gaps in the theoretical literature that have implications for its use in this study.

2.1. Situating OFW as an object of political interest

There is currently no literature offering a historic account of OFW politics in the Republic of Ireland.[2] Nor are there studies testing a general hypothesis for political agenda setting on this issue. However, literature did provide a patchwork of empirical and conceptual findings that guided this study.[3]

What do we know about the factors that make people in and around governments pay attention to OFW as an issue deserving significant political effort? The literature confirms the general claim that getting OFW 'on the agenda' entails a battle of ideas, individual agency, and structural conditions that play out over several institutions and decision making forums. Several dominant narratives (or problem frames) have emerged and have been used by actors to legitimate political effort on this issue since the late 1990s. These legitimating narratives have been logically and temporally accretive; i.e. one or more reasons may add up to strengthen or weaken the case for political interest and support for OFW.

The first argument, often stated as self-evident in academic literature though sometimes demonstrated, concerns OFW as a solution to national and regional climate change and decarbonisation efforts (Kern *et al.*, 2014; Banet, 2018; Motta, 2021; Do *et al.*, 2022; MacKinnon *et al.*, 2022). In Europe, it has particularly been the setting and ratcheting up of successive decadal climate

[2] The first published article from this study features results from Chapter 4.1 - 4.1.7 and started to fill the stated gap in the literature (J.P. Roux *et al.*, 2022). However, I don't include this article in the literature review as it was an output of this study rather than an input.

[3] A SCOPUS search of "TITLE-ABS-KEY ("offshore wind") AND (LIMIT-TO (SUBJAREA , "soci"))" found 684 results. From these, a manual reading of abstracts identified 27 articles on the topic of offshore wind energy politics broadly defined. Further articles were added to this, largely by following key references.

change and/or renewable energy targets for the EU region and for individual Member States, for 2010, 2020 and 2030, that have brought various renewable energy technologies on to political agendas, either in a drive to support Research Development and Demonstration (RD&D) or commercial deployment since the late 1990s (Toke, 2011; Long, 2015; Reichardt and Rogge, 2016; Banet, 2018; MacKinnon *et al.*, 2019; O'Hanlon and Cummins, 2020). However, ambitious action on climate change has not historically implied targeted policy support for OFW (either in the RD&D or commercial deployment state), even where states have an abundant offshore wind resource (O'Hanlon and Cummins, 2020; Kusters, van Kann and Zuidema, 2023). OFW has often been in competition with other renewables to demonstrate that it is a necessary part of a low carbon (or more recently, net-zero) energy generation mix. Historically, policy makers in some jurisdictions have leaned towards a technology-neutral approach to attaining renewable energy or climate change targets at least cost. In such instances, sufficient availability of a cheaper renewable resource, such as onshore wind or hydropower, have undermined policy support for OFW (Kern *et al.*, 2014; Normann, 2015; MacKinnon *et al.*, 2022).

The second argument claims that OFW is a solution to national and/or regional energy security. Indeed, the 1970s oil crisis partially drove early interest in OFW in the UK and Denmark (Kamp, 2006; Kern *et al.*, 2014). Subsequently, Oil and Gas (O&G) price shocks have also proved to be moments where policy windows for OFW and other renewables may open. Fear and anticipation of future price shocks may maintain a sustained narrative of energy insecurity in countries without large reserves of fossil fuels, hydropower or nuclear. As is the case with the climate change narrative, energy insecurity (either as a pervading condition or in moments of crisis) has been a dominant argument for supporting OFW in the North Sea, but do not necessarily imply political agenda status for OFW in a particular jurisdiction.

Thirdly, OFW has entered some political agendas as a solution for regional (sub-national) economic development or re-industrialisation. In such instances, economic geographers have demonstrated that political support for OFW can be driven by long-term industrial path-dependency. In Denmark, Germany, the Netherlands, and China, longer industrial histories variously including wind turbine manufacturing, shipbuilding, and/or offshore O&G extraction have created path dependency and enabled new path creation for OFW (Kamp, 2006; Fornahl *et al.*, 2012; Dawley, 2014; MacKinnon *et al.*, 2019). In other jurisdictions like the US and UK, some have promised OFW as a solution to develop coastal communities that have suffered from decline in fisheries, tourism or other coastal/maritime industries unrelated to energy (Westgard-Cruice and Aoyama, 2021). In Norway, OFW entered the political agenda between 2007 – 2009 as a solution to anticipated industrial decline due to a potential sustained slump in O&G prices (Normann, 2015). Advocates sought to legitimate OFW as a diversification opportunity for the petro-maritime sector, addressing the challenge of 'life after oil' (MacKinnon *et al.*, 2022).

Finally, in some jurisdictions OFW has been proposed as a solution to increasing challenges to deploying onshore wind energy. For Denmark and Germany, OFW offered opportunities for continued growth as available land-based sites declined (Hays, 2005; Ernst & Young, 2015). In the UK, public opposition to onshore wind farms partially motivated policy makers to support OFW (Kern *et al.*, 2014).

Set against the above, there have also been counter-narratives aimed against policy support for OFW. The additional cost to electricity consumers and/or tax payers of technology-specific support for OFW have been a dominant counter-narrative, both at the RD&D and commercial deployment phase (Normann, 2015; MacKinnon *et al.*, 2022). A second counter-argument focuses on grid integration challenges, though the interplay between OFW technology politics and grid integration challenges has received less attention in academic literature (Tscherning, 2011; Kusters, van Kann and Zuidema, 2023). Indeed, from the early stages of OFW's commercial deployment in the North Sea, advocates have also pushed for the development of an offshore transmission grid, not merely aimed at bilateral electricity trade but at improved integration of offshore wind farms into European markets (Tscherning, 2011).

The factors that have made people in and around governments pay attention to OFW are place- and time-dependent. Combinations of economic, political and geographic conditions at the national (and sometime sub-national level for larger states like the US and China) may serve to elevate the importance of some legitimating narratives over others. MacKinnon emphasises the multi-decadal path dependency created by wind turbine manufacturing in Denmark and shipbuilding in Germany for the economic development / industrialisation rationale for OFW (MacKinnon *et al.*, 2019) whilst Westgard-Cruise highlights how political support for gas extraction in Northern Appalachia stymied support for OFW off the east coast of the US (Westgard-Cruice and Aoyama, 2021). MacKinnon demonstrates the intense framing struggle in the UK between 2012–15 as rising energy bills and austerity created a severe legitimation challenge for the continuation of political support for OFW. In response, industry and government actors developed concerted cost reduction policies and an associated narrative that have subsequently become dominant in addition to the preceding climate change and energy security narratives. Legitimating narratives may take years to build and remain stable for long periods, but are also subject to shifts following changes in underlying socio-economic conditions.

Case studies also highlight how early technology politics may be ad hoc reactions to private sector developers progressing the first projects in a particular jurisdiction. For instance, in the US the first projects instigated political responses at the state level as the projects moved through the development cycle and tested policy and legislation, particularly on site surveying and permitting (Hayden, 2005; Motta, 2021).

Literature also emphasises the agenda-setting power of several types of institutions over energy generation technologies. Kusters highlights that there are multiple arenas for agenda-setting for offshore energy systems and that incumbents have a greater ability to legitimize prioritization of certain technologies (Kusters, van Kann and Zuidema, 2023). Incumbents, like the national Transmission System Operator (TSO) and O&G industry, may 'lock-in' agendas across multiple related arenas. Policy makers, such as state agencies and the regulator, are often dependent on the TSO and industry's technical expertise in developing policy. Policy makers may deprioritise policy development on a particular matter where industrial newcomers and innovators don't have strong technical expertise or capacity to inform policy. Kern points out how industrial OFW interests in the UK galvanised around extant renewable energy trade bodies, but also established technology-specific associations and public–private networks as their interests were not fully represented by the renewables sector (Kern *et al.*, 2014).

Once ‘on the political agenda’, how are alternative policy solutions developed in support of OFW? The literature is in agreement that the commercial deployment of OFW, as an object of political interest, is not a single-policy issue. Commercial deployment of OFW in Europe has presented a range of governance issues that required polycentric governance involving various actors and several policy elements, sometimes termed a ‘policy mix’ (Reichardt and Rogge, 2016; Sornn-Friese, Sofev and Kondratenko, 2023).

Firstly, having a government issue a technology-specific vision that includes a long-term technology-specific deployment target (usually in GW) is itself a significant policy development (Reichardt and Rogge, 2016; A. Li, 2022; Do *et al.*, 2022; Kusters, van Kann and Zuidema, 2023). Furthermore, a package of policies that includes a technology-specific price support instrument, enabling marine planning and consenting legislation (both setting the terms for securing tenure of a site and consent for development), and grid connection policies have been prevalent in most coordinated policy mixes (Fitch-Roy, 2016; Do *et al.*, 2022). In addition, some countries have included targeted industrial policy in the national OFW policy mix (Dawley *et al.*, 2015; Banet, 2018) whilst some actors have advocated for improved interconnection policy and the alignment and integration of national markets at a regional (inter-national) level to facilitate deployment of OFW at scale (Tscherning, 2011; Dedecca, Hakvoort and Herder, 2019).

The norms and technical design terms of the various policy elements implicated in OFW deployment have also undergone significant shifts since the late 1990s. For instance, in the early 2000s EU member states developed and implemented a variety of different price support instruments for OFW and approaches to marine spatial planning and consenting (Palmers and Shaw, 2002). However, over time there has been some convergence between EU states on price support instruments that offer constrained allocation of sliding premium revenue support at a level set by a competitive process (Fitch-Roy, 2016). Analogously, there has been convergence between EU member states on approaches for obtaining seabed tenure, development rights and grid connection.

From the diversity of the policy elements implicated in OFW deployment complexity emerges. Disparate policy networks and institutions are implicated and activities may be more or less coordinated (horizontally), more or less centralised or devolved (vertically) across different scales of government. Comparing China and Japan, Li finds that devolution and inter-ministerial coordination are key drivers in the development of OFW policies, with the capacity of the national government to build political support networks across institutions affecting the sequencing of policy development (Aitong Li, 2022).

Pathways through which policy learning and innovation have diffused have also differed for different OFW policy elements and shifted over time (Fitch-Roy, 2016; Motta, 2018). For example, an international 'instrument constituency' has been an important driver in socialising policy innovation for renewable energy price support instruments like REFITs or auctions (Fitch-Roy, Benson and Woodman, 2019) whilst changes in EU state-aid law have also driven member states towards using auctions or competitive bidding processes in price support instruments (Fitch-Roy, 2016). Simultaneously EU policy appears to have had less of an influence on member states' approaches to seabed tenure allocation.

Finally, policy design choices for certain policy elements may have 'spill over' effects on the design of other policy elements within a national OFW policy package. For instance, it has been noted that a shift to an auction-based price support instrument may require greater centralization of tenure and development consenting (Del Río and Linares, 2014; Fitch-Roy, 2016). Indeed, in the Republic of Ireland, its first auction scheme (that mainly supported onshore wind generation) failed because of a lack of coordination with grid connection and planning consent policy (Gallachóir, Bazilian and McKeogh, 2005).

In closing, my literature search found no analysis of the history of OFW in the Republic of Ireland and no studies that test a general hypothesis for political agenda setting on the topic. However, literature does provide guidance on several factors we might expect to form part of an explanation for the Irish case and OFW agenda setting more generally.

2.2. Considering alternative theories of the policy process

The fourth edition of Theories of the Policy Process was the key reference text for choosing a framework/theory for this study (Weible and Sabatier, 2017). The volume provides overviews of the most established theories in the domain along with comparative discussions on their application. In assessing alternatives for this study, three criteria determined my choice.[4]

Firstly, the appropriateness of a framework/theory for a multi-method study design involving process tracing and QCA hypothesis testing within a single national jurisdiction. Secondly, the breadth of the framework to explain actions across the agenda setting and decision making phases of the policy cycle for several policy elements implicated in OFW deployment and the interaction of their respective processes. Thirdly, and related to the previous criterion, the resource and data requirements for rigorous application of the framework to multiple policy elements and policy subsystems over a multi-decadal period to test a hypothesis.

Some theories of the policy process are not suited for research within a single jurisdiction. Their derived models and hypotheses are explicitly comparative. For instance, policy innovation and diffusion models are designed for comparing relatively large numbers of jurisdictions (Berry and Berry, 2017). The predominant objective (and power) of such models are to estimate the probability that a jurisdiction will adopt a single policy, or estimate the innovativeness of a government based on the earliness of policy adoption, and then compare innovativeness or adoption probability across many jurisdictions.

Other theories lacked the breadth to consider multiple phases of the policy cycle and multiple policies from a capacious political and historical perspective. Of course, every theory provides only a partial depiction of the complexities of the policy process, but some have narrower foci than others. There was a clear trade-off between the prospective depth and breadth of explanations on offer. For instance, the Advocacy Coalition Framework (ACF) offers a framework through which to interrogate several theories regarding the actions of political

[4] Pre-screening criteria already determined the subset of theories I assessed. Weible and Sabatier include several of their own screening criteria for inclusion of theories in their volume. Firstly, the theories must be 'scientific'. That is, they must specify their assumptions, the conditions under which they apply, and posit certain relations. This implies underlying causal drivers that explain why certain relationships could exist and enables falsification. The abstract definition of conceptual relations enables comparative applications and growth in knowledge. The second important criterion is the existence of an active research community furthering work on a framework/theory. Weible and Sabatier include the most established theories (at least in the English language literature) with active communities that have been contributing to a particular policy process framework/theory for several decades (though they often draw from older literature, particular in the fields of political science and historic institutionalism).

coalitions, learning within and across coalitions, and ultimately policy change (Jenkins-Smith *et al.*, 2018). What distinguishes the ACF from other theories of the policy process is its focus on the structure of belief systems of individual actors and the belief systems and coordination strategies shared by actors in coalitions attempting to influence policies within a subsystem. It generates several hypotheses on the dynamics of coalitions, policy oriented learning, and policy change, largely based on the posited interactions of three-tiered belief systems within a particular policy subsystem. For this study, ACF-inspired hypotheses would have provided greater depth in understanding the interaction of coalitions and their respective belief systems. However, it would also have entailed sacrificing the breadth of the enquiry. It was apparent that a broad account of the conditions that determined OFW's agenda status and the form of proposed and enacted policies would not merely consist in understand the belief systems of the implicated actors. Certain belief systems and policy coalitions may be necessary to explain OFW's agenda status, but not sufficient. Policy Feedback Theory (PFT) offered an analogous promise of depth over breadth. The PFT literature offer an illuminating general account of the mechanisms through which enacted policies affect subsequent agenda setting and policy problem definition, government capacity, and the power of interest groups (Mettler and Sorelle, 2018). Certainly, a framework built around PFT would provide novel insights on OFW politics over a multi-decadal period. However, it was also apparent from the outset that feedback mechanisms were not the only mechanisms determining the agenda status of OFW in Ireland over the period in question.

Finally, the Irish case and available resources were unlikely to satisfy the data and analysis requirements of some theories. For instance, Punctuated Equilibrium Theory's (PET) predictive power largely emerges where it is possible to count hundreds of instances of clear proxies for government attention / agenda, such as hundreds of budgetary changes or hundreds of legislative hearings, over several decades (Baumgartner, Jones and Mortensen, 2017). Given that the policy elements implicated in OFW deployment (i.e. price support instruments, grid development and connection policies and marine planning legislation) are not as frequently enacted or standardised as some other proxies for government agendas, it does not lend itself to building the kind of dataset required for a PET-inspired systematic time series analysis.

From the alternatives presented in Weible and Sabatier's volume, the MSF stood out as the most appropriate for serving the objectives of this study, whilst generating a research question aimed at a more general contribution to the body of knowledge on theories of the policy process. MSF casts the net wide in defining its constitutive structural elements and their relations. This is because it explains agenda and policy change through the coincidence of several complex conditions, structured as the alignment between the emergence of political problems, the availability of policy solutions, the structure of the political system, and the actions of 'entrepreneurial' individuals. The complex configuration of generic factors enables inclusion of a wide array of possible observable implications that one might expect to find once MSF is linked to empirical literature on the current energy transition, OFW politics and the Irish context.

This enables the richness of the case to emerge, taken over an extended period. As Zohnhöfer et al have argued, MSF is well-suited for utilising process tracing in single cases with a general qualitative hypothesis and room for grounded theory (Zohlnhöfer, Herweg and Zahariadis, 2022). In this context, the framework serves merely to guide the discovery and classification of data, but does not tightly constrain the case narrative nor provide a coherent interpretation.

In addition, using it to guide data collection does not preclude the process tracing from identifying a wide array of mechanisms and relations highlighted by other policy process theories. For example, several points raised in the results and discussion increase understanding of how certain policy innovations implicated in the energy transition have diffused in the EU and how the core policy beliefs of advocacy coalitions influenced OFW's agenda status in the Irish case, and how such mechanisms may operate more generally.

2.3. Multiple streams framework – the general framework and hypothesis

Kingdon first developed the MSF to solve a 'puzzle' he observed in federal US politics:

> "What makes people in and around government attend, at any given time, to some subjects and not to others? … We know more about how issues are disposed of than we know about how they came to

> be issues on the government agenda in the first place, how the alternatives from which decision makers chose were generated, and why some potential issues and some likely alternatives never came to be the focus of serious attention. … We will try to understand why important people pay attention to one subject rather than another, how their agendas change from one time to another, and how they narrow their choices from a large set of alternatives to a very few." (Kingdon, 1995, pp. 1–2)

In proffering a general answer to these questions, Kingdon sought to account for several observations about processes of agenda setting and policy making, what some have subsequently termed assumptions (Herweg, Zahariadis and Zohlnhöfer, 2017):

1. *Ambiguity* is unavoidable and often intentionally employed in policy development. In the context of policy-making, problem definition is always vague and shifting, and many solutions are possible. More information may reduce some types of uncertainty, but it cannot mitigate ambiguity.
2. Policy makers operate under significant *time constraints*, which limits the alternatives to which attention can be given.
3. Given ambiguity and time constraints, policy makers' preference on specific policies are *intransitive and incomplete*. Consequently, their preferences emerge during interaction with experts and other actors.
4. In the political system, processes and jurisdictional boundaries are *unclear*. This leads to 'turf wars' between departments and agencies and principle-agent problems between members of the legislature and civil servants
5. The composition of decision-making bodies, venues or forums are *fluid*; changing depending on the decision to be made and high turnover of elected officials and civil servants.
6. Policy and political processes run largely *independent* of each other. Many political problems arise independent of preceding political developments or availability of policy solutions. Political processes are largely governed by a logic of *bargaining and group mobilization* between elected officials, parties and lobbyists. Policy solutions, however, are developed and gain prominence largely through a logic of *persuasion and gaining acceptance for ideas* within policymaking networks.

Kingdon’s seminal work did not include a hypothesis, but more recent developments offer the most succinct formulation of MSF’s explanation of agenda change (Zohlnhöfer and Rüb, 2016; Herweg, Zahariadis and Zohlnhöfer, 2017):

> “Agenda change becomes more likely if (a) a policy window opens, (b) the streams are ready for coupling, and (c) a policy entrepreneur promotes the agenda change.”

Before clarifying the meaning of each of the constitutive elements in the above hypothesis (henceforth ‘the general hypothesis’), it may be worth considering the structure of the hypothesis. Firstly, it is ultimately a claim that certain complex configurations of conditions increase the probability of agenda change. Conversely, other configurations of conditions decrease the probability of agenda change, although almost no MSF research has focused on non-occurrence. Secondly, at the highest level of conceptual abstraction, there are five structural elements to the hypothesis: three distinct streams, a policy window, and a policy entrepreneur. The MSF proposes that the activities of actors concerned with political agenda setting and public policy development occur within three, largely independent, ‘streams’ of activity: the problem stream, policy stream, and politics stream. The status of each stream may be more or less conducive (or ‘ripe’) for agenda change. A policy window can open (or close) in one or more of the streams at a point in time. A policy entrepreneur can ‘couple’ the streams to drive agenda change. Given its complex and probabilistic structure, no single case study can therefore prove or disprove it.[5] However, confirming and disconfirming instances, where more or less of the expected preceding conditions are associated with the occurrence or absence of agenda change, promises interesting theoretical discussion and progress.

In the subsequent sections, I describe each of the conceptual elements of the MSF in turn followed by critical discussions of its conceptual extension to account for the ‘decision-making’ phase of the policy cycle, and the general hypothesis.

[5] Given the number of conditions and the few limits on their possible configurations, it would take a large number of cases to build a robust case in favour of the hypothesis. Indeed, MSF-inspired analysis has failed to accumulate a comparative body of empirical evidence despite hundreds of empirical papers.

2.3.1. Problem stream

The *problem stream* concerns those processes through which certain conditions in society are interpreted or framed as problems deserving immediate attention by policy makers (Herweg, Zahariadis and Zohlnhöfer, 2017). MSF literature has paid particular attention to three types of mechanisms that bring conditions to policy makers' attention and influence their agendas: *focusing events*, *indicators* and *feedback*. *Focusing events* are sudden, relatively rare events with obvious actual and/or potential harms concentrated at a specific time and location for specific people. In some instances such events will simply "bowl over" other items on political agendas (Kingdon, 1995). The most recent example of such a Focusing event would be the Covid-19 pandemic. However, more often, the influence of a Focusing event on agenda-setting and the content of policy ideas vary widely based on the nature of the event and the structure of specific policy communities affected by the event (Birkland and DeYoung, 2012). For instance, controversial energy projects, oil spills or nuclear disasters serve as examples of Focusing events in the energy-related policy literature that may drive the framing of political problems and agenda status in diverse ways (Busenberg, 2000).

Indicators, tracked either on a regular basis or for specific occasions, offer policy makers information on the state of conditions in society. Significant deterioration of one or more indicators widely regarded as important (e.g. GDP, inflation, or greenhouse gas emissions) may trigger the framing of a problem. For instance, Normann demonstrates how the significant drop in oil prices in 2009 contributed to the elevation of offshore wind R&D on the political agenda in Norway (Normann, 2015). State investment in offshore wind R&D became a political topic when Norwegian offshore oil companies considered alternative projects to mitigate the risk of laying off workers due to the downturn in the oil price. Here the relatively sudden drop in oil price served as a focussing event, whilst the actual and projected oil price and potential number of job losses due to layoffs served as the key indicators of interest.

Finally, *feedback* from the implementation of existing programmes offer another key source of information that may drive the emergence of problems. In particular, the failure of implemented policies or programmes to reach the intended objectives may drive actors to highlight problems and advocate for new policy solutions. Feedback on policies may occur through formal channels such as monitoring and evaluation studies or public consultations commissioned by the government or other state agencies, or informal channels such as meetings between civil servants and affected parties.

Through Focusing events, indicators and feedback, policy makers become aware of, and/or construct, certain problems. However, they may decide not to do anything about it. The priority of a problem to policy makers are determined in relation to all other problems contending for their attention at a point in time. For politicians, the importance of problems may also relate to the perceived effect these will have on their (re) election (Herweg, Huß and Zohlnhöfer, 2015). In conclusions, in the 'problem stream' the MSF points to gathering data on Focusing events, indicators and feedback on policy-objective mismatches and how actors utilise these to frame and prioritise a political problem in need of a policy solution.

By implication, this study's interest is in understanding if and how certain Focusing events, indicators and feedback served to frame problems which policy makers 'coupled' with OFW as a potential solution. There is an implicit two-step logic to this. OFW first needs to be coupled as a solution to one or more accepted policy problems. The *lack* of OFW then becomes the policy problem that demands attention and further technology-specific policy solutions. I elaborate on the relationship between problem framing, policy windows and the coupling of solutions to problems in subsequent sections.

2.3.2. Policy stream

The *policy stream* includes those processes through which a policy community develops new policy ideas and 'soften up' alternatives. There is general agreement on the definition of a policy community as "a loose connection of civil servants, interest groups, academics, researchers and consultants (the so-called hidden participants), who engage in working out alternatives to the policy problems of a specific policy field" (Herweg, Zahariadis and Zohlnhöfer, 2017).

A key theoretical claim in MSF is that the policy stream exists largely separate to the problem and politics streams. This is for two reasons. Firstly, policy communities often develop solutions over time cycles that are out of sync with general election cycles, over much longer periods of time or to address other aims than what may be on the political agenda at a given point in time. Pre-existing solutions may be adopted or adapted ('policy surfing') for new problems; old solutions may chase new problems. Secondly, solutions are developed and come to be accepted by a policy community largely through a logic of persuasion. Policy ideas develop in a 'primordial soup' where policy makers attempt to persuade others that particular solutions are superior in terms of general 'criteria of survival' of technical feasibility, value acceptability, anticipated public acquiescence, and financial viability (Kingdon, 1995; Spohr, 2016). In the case of the EU and Member States, these broad criteria also accommodate compliance with EU law, which may significantly limit viable policy alternatives for Member States (Zohlnhöfer and Rüb, 2016).

The structure of the policy community shapes the process of narrowing down a large set of possible solutions for a given problem to a few alternatives or a single option preferred by a critical mass of policy makers (a process often referred to as 'softening up' policy alternatives). Small and highly integrated policy communities may tend towards a slow gestation of new ideas and faster adoption of incremental adaptations to older ideas, whereas larger, more competitive communities may be more likely to enable the rapid propulsion of new ideas but slow gestation of marginal adaptations (Durant and Diehl, no date). In some parliamentary democracies, political parties may also internalize policy communities, hence party politics may influence competition and coalitions in both the policy and politics streams (Herweg, Huß and Zohlnhöfer, 2015). International networks of experts that cluster around specific policy areas or instruments have also become more integrated with national policy communities, further altering the dynamics by which new ideas are introduced, refined and ultimately survive. This may be particularly true in policy areas where rapidly changing technological innovations are diffusing between jurisdictions (Lovell, 2016; Fitch-Roy, Benson and Woodman, 2019).

Because this study takes a technology-specific perspective on offshore wind power (as opposed to the norm of focusing on a particular policy), the theoretical implication is that there may be more than one policy community (or more than one policy stream) implicated in softening up several policies aimed at supporting deployment of the technology. MSF literature accounts for some structured interdependencies between policy areas and theorises 'spillover' dynamics through which activity in one policy area is significant for another (Ackrill and Kay, 2010). I develop this point further in operationalising the MSF in subsequent section of the literature review.

In the policy stream, MSF theory points to gathering diverse data that identifies the relevant policy community (its members and structure), the ideas and policy proposals generated, and the process of narrowing down and refining alternatives (Zohlnhöfer, Herweg and Zahariadis, 2022). An extended historical case may be well-served by gathering data through green papers, white papers, commissioned technical reports, draft and final bills and policies, and transcripts or proceedings of public hearings.

2.3.3. Politics stream

In MSF parlance, the *politics stream* concerns the overarching political system. In parliamentary democracies, governing parties or coalitions usually control legislature and the executive, and it is rare that a policy will be adopted without their consent (Herweg, Zahariadis and Zohlnhöfer, 2017). The primary concern within this stream is to take account of the effect of elections, the ideology or work programme of governing parties/coalitions, government perception of public opinion (or 'national mood'), and influence of interest groups on agendas and decision making.

The politics stream is distinguished from the policy stream both by institutions and by the dynamics of actor interactions which is largely governed by a logic of bargaining and coalition formation on the relevant decision-making forums. The ideology and/or the programme of work of the ruling party or coalition can be central in setting the political agenda, along with the government's perception of the 'public mood' on particular issues. Furthermore, the interests of key ministers can set the agendas for the departments under their steer, and their ability to negotiate and build coalitions with other members of the government can be influential in the government's agenda and policy adoption. The interests of senior civil servants and bureaucratic turf battles also play out within the politics stream to influence agendas and policies.

MSF accounts for the influence of interest groups in the politics stream. All other things being equal, an issue is more likely to make it on to the agenda, and a decision made, if influential interest groups are not opposed to it.

Finally, MSF takes account of the influence of ‘national mood’ on activities in the politics stream. The perceptions of government officials of what the majority of citizens think about certain issues (and sporadic ‘mood swings’) is influential in changing their own priorities and stance on policies. More recently, the increased usage of national opinion polls, sometimes commissioned by political parties, serves both as an illustration of the importance of the public mood for political agendas, as well as an empirical proxy for government’s perception of national mood alongside more direct sources of government officials’ perceptions.

2.3.4. Entrepreneurs

In its general explanation of agenda and policy change, MSF includes the difference that various ‘entrepreneurs’ make within and between the three streams. The most important actor is the policy entrepreneur, but recent refinements distinguish three key roles that roughly map on to the three streams.

The central role is that of policy entrepreneurs, originally defined as “advocates who are willing to invest their resources – time, energy, reputation, money – to promote a position in return for anticipated future gain in the form of material, purposive, or solidarity benefits” (Kingdon, 1995, p. 179). There is general agreement that policy entrepreneurs may hold a wide range of institutional positions inside or outside government and that there is significant indeterminacy between their position and their entrepreneurial activity. Two factors distinguish policy entrepreneurs. Firstly, policy *entrepreneurship,* as an activity, happens in the policy stream where members of the policy community soften up many different ideas to a few viable alternatives. Secondly, successful entrepreneurs ‘couple’ the streams when a window of opportunity opens; they link a policy solution to a political problem when the political context is favourable. Policy entrepreneurship may also entail the ability to commission the development of solutions in anticipation of a window, and brokering adaptations or compromises when a window is open (Kingdon, 1995; Ackrill and Kay, 2010). Kingdon identified three qualities that successful policy entrepreneurs possess (Kingdon, 1995). They have a claim to a hearing with relevant policy actors in virtue of their expertise, representation of powerful groups, or authoritative decision-making position. Secondly, they are known for their political connections or negotiation skills. Thirdly, they are persistent.

Recent literature distinguishes two further functions where personal agency is incorporated into the MSF explanation. Political entrepreneurs are elected leaders who work within the politics stream to build the necessary majority around a worked out policy proposal for enactment when a decision window is open (Herweg, Zahariadis and Zohlnhöfer, 2017). In some instances, astute politicians actively select policy solutions and policy entrepreneurs in preparation for anticipated windows (Ackrill and Kay, 2010). The success of political entrepreneurs depend largely on the balance of power within government or the legislature, though common strategies to win support for proposals include package deals, concessions and manipulation (Herweg, Huß and Zohlnhöfer, 2015; Zohlnhöfer, Herweg and Huß, 2016). Problem brokers are actors who "frame conditions as public problems and work to make policy makers accept these frames" (Knaggård, 2015, p. 452). Successful problem framing incorporates knowledge, values and emotions whilst persistence, access to policy makers, and credibility are important characteristics of successful problem brokers. A single actor can play one or more of these roles in practice.

2.3.5. Policy windows

Kingdon originally defined a policy window as "an opportunity for advocates of proposals to push their pet solutions, or to push attention to their special problems" (Kingdon, 1995). Kingdon argued that policy windows open infrequently and for short periods, and that the judgement of actors on whether a policy window is open (and considering all the other issues on their agenda) informs their decision on where to allocate their efforts.

An oft repeated theoretical claim is that policy windows can open due to changes in the politics or problem stream, but not due to changes in the policy stream (Kingdon, 1995; Herweg, Zahariadis and Zohlnhöfer, 2017; Dolan and Blum, 2023). There are several generic windows in the politics stream. For instance, in stable democracies election cycles introduce new governments eager to embark on new programmes and promised reforms, and occur on relatively predictable cycles. Incoming politicians may be interested in new ideas and novel policy proposals, or if they are astute may actively commission policy solutions in preparation for such windows of opportunity (Ackrill and Kay, 2010). Changes in government, and particularly coalition negotiations, offer prime opportunities for agenda setting. Changes in ministerial positions also offer opportunities for departmental agenda setting. Furthermore, some policy programmes have scheduled expiry dates and actors will anticipate the window for a requisite renewal or abandonment.

Windows in the problem stream may be more unpredictable. A window can open when a widely regarded indicator deteriorates, failures of policy implementation emerge (i.e. the government receives feedback on policy failure), or a focusing event occurs. When a window opens unpredictably, a solution often needs to be found at short notice that addresses the problem on the agenda, whereas if a window opens predictably it is likely that actors already have policy solutions and are more focused on using the window to frame problems that fit their preferred solutions (Zahariadis, 2003).

Herweg et al. distinguishes between opportunities to get an issue on the agenda, an 'agenda window', and opportunities to get policy adopted, a 'decision window' because of the distinguishable dynamics of each (Herweg, Huß and Zohlnhöfer, 2015).[6] During agenda setting, a large number of actors in- and outside of government tend to compete for attention for various proposals. On the other hand, political 'decision-making' requires a majority of elected officials on the relevant decision-making forum to support a particular proposal. Here institutional arrangements circumscribe whose support is needed and the means used to gain the necessary support.

Policy windows can also open when activity in one policy area 'spills over' to a different policy area or sets a powerful precedent within one policy area that drives future agendas and decisions (Kingdon, 1995; Ackrill and Kay, 2010). Landmark legislation may set a powerful new precedent that guides future decision making in a policy area, and brings new, sometimes unforeseen, issues on to the agenda. The power of the precedent lies both in introducing a new logic on which arguments for decisions are henceforth based, as well as the rise of a new political coalition that sustains promotion of the new logic. A

[6] I will use the term 'policy window' in general to include both an agenda window and a decision window, and use either of the latter two terms where the topic is more specific.

precedent in one policy area may also spill over into another policy area. This happens when an argument from analogy demonstrates that one policy area is similar to another in some ways, moving policymaking on a particular issue into the same category. Coalitions of actors that formed to promote a policy solution in one area may also be transferred to 'a new fight' incentivised by their previous success (Kingdon, 1995). Kingdon argued that open policy windows for such spillovers might often be of shorter duration because it coincides with the implementation of the original precedent-setting legislation which almost always reveals unforeseen challenges in implementation. Subsequent refinement distinguished the aforementioned as exogenous spillovers, from endogenous spillovers (Ackrill and Kay, 2010). The latter occurs when an issue spans more than one policy area and multiple institutions, and change in one policy area or institution necessitates or limits a decision on change in another policy area or institution implicated in the same issue. Certain institutions may gain temporal priority under ambiguity by creating reform pressures on, and shifting the receptivity of policy proposals for, other institutions. Ackrill demonstrates that endogenous spillovers can keep a policy window open while institutions contest and resolve control of the decision-making process (Ackrill and Kay, 2010), whilst Fitch-Roy demonstrates that an endogenous spillover can constrain available policy alternatives for policy entrepreneurship in related areas (Fitch-Roy, Benson and Mitchell, 2018).

Using the concept of policy windows raises analytic challenges (Béland, 2016; Herweg, Zahariadis and Zohlnhöfer, 2017). As the definition suggests, it is a construct with objective and subjective elements to it. For instance, general elections almost always present the opportunity for agenda change in generic terms. New parties contesting for government propose new priorities and policies to enact. It is therefore necessary to pay attention to such marked moments *a priori*, in the search for evidence. However, whether a particular general election presented a policy window for a particular issue, is another question altogether. Policy windows have a necessary subjective component. Actors in and around government have to make a judgement that there is an opportunity at a particular point in time to draw attention to a particular issue. Actors may differ in their judgements. It's therefore also necessary to pay attention to the judgements of actors in particular contexts to understand the nature of policy windows and how actors construct them from the state of the three streams (Béland, 2016). However, this raises research challenges in terms of having a sufficiently clear concept for the purposes of hypothesis testing over many cases. One challenge lies in identifying the true judgements of relevant actors, and deciding whose judgements of policy windows count when these are contested. There is also the deeper problem of applying the concept of a policy window in a consistent manner over diverse contexts. As Herweg et al argues, policy windows are only identified ex post. However, if this study is to undertake a robust hypothesis testing of MSF, such an epistemic fallacy would be impermissible; i.e. by first looking at moments of agenda or policy change and then classifying whatever preceded it as a policy window would simply beg the question. This kind of bias, implicit in many MSF studies, may be appropriate for exploratory or speculative studies, but not for hypothesis testing. For the latter, a study needs to articulate a sufficiently clear, if provisional, approximation of a policy window for a particular object of interest, in this case OFW. In the next Chapter, I explain how I operationalise the theoretical construct of policy windows for OFW and the Irish context.

2.3.6. The readiness of the streams

Alongside the analytic distinction of three streams of activity, MSF makes the theoretical claim that the *status* of the streams (at a particular point in time) affects the chances of agenda change. Agenda change become more likely if the streams are 'ripe' for an entrepreneur to 'couple' them.

Herweg et al and Zohlnhöfer et al define the problem stream as ripe for coupling whenever at least one problem broker manages to draw the attention of policy makers to a problematic condition, or at least one policy entrepreneur frames a condition as a problem that can be coupled with their favoured policy proposal (Herweg, Zahariadis and Zohlnhöfer, 2017; Zohlnhöfer, Herweg and Zahariadis, 2022). However, their definition appears lacking in two ways. Firstly, given that problem framing is by its nature contested, it may well be that several competing problem frames coexist in a particular policy area at the same time. Stream ripeness is therefore likely to be a matter of degree: the greater the number of policy makers who adopt a certain problem framing, or whose sustained attention is drawn by a particular problem, the riper the stream is. For example, if only civil servants in the department of energy are paying attention to certain indicators and feedback on policy implementation and use these to draw attention to a particular problem, but this problem framing is not shared by the TSO or the cabinet (government executive), then the problem stream may be relative *un*ripe, even if they manage to draw some attention to the problem. However, if civil servants, the TSO, and key independent research organisations converge on the same problem framing, then the problem stream is much riper for coupling. The problem stream is fully ripe when most of the relevant problem brokers or policy makers within a policy community adopt a similar problem frame.

Secondly, distinguishing empirically between a policy window opening in the problem stream and the stream being ripe is essential to a coherent testing of the MSF hypothesis, but most recent literature offer contradictory conceptions and hence operationalisations (Zohlnhöfer, Herweg and Zahariadis, 2022; Dolan and Blum, 2023).[7] For instance, Zohlnhofer et al recently argued that the problem stream being ripe is a prerequisite for a policy window opening in the problem stream, but conflates the empirical identification of the conditions: in both cases the observable implication is that some policy-makers' attention are drawn to a problem thanks to a focussing event, change in indicators or feedback *and* that they acknowledge a public policy solution is required for the problem. When the second part of this observation is elaborated on it often draws on the action of 'framing'. Elsewhere they claim that problem stream ripeness is easy to ascertain as policy makers generally don't find it difficult to frame certain conditions as policy problems. Empirical evidence for a policy window in the problem stream and stream readiness for coupling consist in a verbal or written statement by a policy maker framing a particular condition as a problem that requires a policy solution. Hence, the same piece of evidence will satisfy both conditions. This also risks conflating problem stream ripeness with (partial) coupling, the third condition in the general hypothesis (refer to Chapter 2.3.7) (Dolan and Blum, 2023). If sufficiently clear distinctions between windows, stream ripeness, and coupling cannot be made, the general hypothesis collapses. In Chapter 3, I offer a clearer distinction for the purposes of performing the QCA.

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[7] Policy windows opening and streams being ripe for coupling are two key sets of conditions around which the general MSF hypothesis is framed.

The policy stream is generally defined as ripe when there is at least one viable policy solution for a given problem. As noted in Chapter 2.3.2, MSF theory argues that policy alternatives are viable if they meet general criteria of survival from the perspective of actors in the relevant policy community. That is, policy makers believe that an alternative is technically feasible, consistent with their own values, entail tolerable financial costs, and is likely to be received well by the ultimate decision-makers (usually government). Viability, much like problem framing, is contested and there is no general agreement on the proportion of actors in the policy community that need to support a proposal for it to be classified as 'viable'. Clearly, unanimous support is not necessary. Zohlnhöfer argues that the policy stream is ripe when there is at least one policy solution for a given problem that is supported by 'many' or 'most' policy makers (Zohlnhöfer, Herweg and Zahariadis, 2022). However, there may also sometimes be veto players, particularly in smaller, integrated policy communities (Zohlnhöfer, Herweg and Zahariadis, 2021).

There are three potential challenges with the general definition of policy stream ripeness not considered by the literature reviewed. Firstly, ripeness may be a matter of degree if more than one policy is implicated in a particular problem framing. As Chapter 2.1 demonstrated, several diverse policies may be necessary to deploy OFW. If there is a viable solution for one policy, say a price support instrument, accepted by the entire policy community, the policy stream may still be quite *un*ripe if there is no viable alternative for the other facets of the problem, for instance grid connection and planning consent, accepted by different or partially overlapping policy communities.

The second challenge with policy stream ripeness is the ambiguity of when the softening up of a particular policy alternative is sufficiently advanced for it to count as a viable solution. Exactly how much of a policy solution's design terms need to be agreed before it counts as a worked-out solution? For instance, in some instances there may be 'off the shelf' policies that have been successfully implemented in other jurisdictions or in the past and where most of the design terms of the policy instrument, as well as underlying normative implications of these terms, are understood and accepted. All that may be necessary is to 'benchmark' a few of the terms to adapt it to a particular context before adoption. Renewable energy price support instruments like feed-in tariffs

(REFITs) serve as a relevant historical policy example for this study. Is the policy stream ripe when there is substantial agreement in the policy community that a REFIT is, in general, the type of solution that ought to be used in a given instance, or is the stream only ripe once there is substantial agreement on the rates for particular technologies within the REFIT, like OFW? Designated actors may not proceed with working out the exact design of certain terms until a technology or issue is already firmly on the agenda. Settlement on these two issues may be many months or even years apart.

Finally, the viability of particular solutions may not be stable over long periods of time, and may even change suddenly based on changes in government or other factors. This may not pose a challenge for exploratory or speculative studies over relatively short periods, but hypothesis testing over an extended period of time (or across several different jurisdictions) require a consistent application of the concept – across different temporal or jurisdictional cases. A policy solution that may have been considered viable by policy makers for many years may suddenly not be viable due to contextual changes in the wider political economy. Care needs to be taken in a historical case study such as this one that spans over two decades, to apply the concept in a transparent and consistent manner, particularly for QCA. It appears that the MSF literature has not yet developed sufficient general solutions for the above challenges. These need to be worked out carefully in operationalising the concept of stream ripeness. I develop this more in Chapter 2.1.

The ripeness of the politics stream is determined by combining the status of the three elements within it: the alignment of an issue to a government's ideology, election manifesto or programme for government; the government's perception of the public mood on a particular issue; and the position of influential interest groups. Judging the overall ripeness of the stream is complicated by the fact that these elements may point in different directions. A government may perceive a majority of the public as supportive of action on a particular issue, but key interest groups may be opposed. A government may be influenced by either or both of the aforementioned to differing degrees and act contrary to either or even both in some instances. MSF literature has not been explicit in how to theorise relations between, or weighting of, the different elements in determining stream ripeness (Herweg, Zahariadis and Zohlnhöfer, 2017).

Though clearly, if action on a particular issue aligns with government ideology, is perceived to have a supportive majority of the public, and does not face opposition from special interests, it is more likely to rise up the agenda than if one or more of the aforementioned are absent. Zohlnhöfer argues that the minimum requirement for political stream ripeness at the agenda setting phase is for a key policy maker (here referred to as a 'political entrepreneur'), such as a minister or active member of the legislature, to actively support an idea and signal willingness to build the necessary coalition to advance the idea to a decision point (Zohlnhöfer, 2016). This leaves much discretion in terms of operationalising the general concept of politics stream ripeness for empirical research. I develop this in detail in Chapters 3.3.2 and 3.5.4.

I note one further theoretical challenge with using the MSF, particularly for hypothesis testing. In practice it may be difficult to tell stream ripeness apart from a policy window opening. Recent theoretical debates offer several, sometimes incoherent, conceptual alternatives for distinguishing windows, stream readiness and coupling, and their relations (Herweg, Zahariadis and Zohlnhöfer, 2017; Zohlnhöfer, Herweg and Zahariadis, 2022; Dolan and Blum, 2023). My objective is not to offer a critical overview of this on-going debate, but in Chapter 2.3.6 I propose a novel interpretation that is most useful for operationalising MSF to test the general hypothesis.

2.3.7. Coupling of the streams

Given the construct of three largely independent streams, MSF posits that agenda change occurs when policy entrepreneurs 'couple' the streams during a policy window. MSF literature offers varying accounts of the mechanisms underlying the general coupling metaphor, including discursive and/or strategic action elements (Zahariadis, 2003; Béland, 2016; Winkel and Leipold, 2016; Herweg, Zahariadis and Zohlnhöfer, 2017; Dolan and Blum, 2023).

Some authors conceive coupling primarily as a discursive action that has a particular structure. Policy entrepreneurs make an argument (verbally or in writing) that links conditions in the problem, policy and politics streams. They may link one or more conditions in the problem stream (a focussing event, deterioration of indicators, and/or policy feedback) with conditions in the politics stream (the government manifesto, public mood, and/or stance of interest groups) with a policy solution. Of course it matters where and to whom such arguments are made. As Kingdon observed in his original characterisation of coupling:

> "[Persistent policy entrepreneurs] spend a great deal of time giving talks, writing position papers, sending letters to important people, drafting bills, testifying before congressional committees and executive branch commissions, and having lunch, all with the aim of pushing their ideas in whatever way and forum might further the cause." (Kingdon, 1995)

Other authors emphasise the (non-discursive) strategic actions that constitute coupling. For instance, policy entrepreneurs sometimes build political support for a large or costly proposal by shrinking the scope of the proposal, at least temporarily, so-called 'salami tactics' (Zahariadis, 2003). Policy entrepreneurs may commission research or analysis to make the case for a particular policy or set of policy alternatives (including some and excluding others) (Ackrill and Kay, 2010). They may fund media campaigns (Sanjurjo, 2020). Given the complexity of some policy issues, Dolan highlights that coupling is often a complex process consisting of policy entrepreneurs establishing and maintaining multiple, 'partial couplings' that over time form a configuration that links all three streams through strategies and arguments (Dolan and Blum, 2023).

It is clear that the discursive and strategic actions that constitute coupling offer the observational input for identifying entrepreneurship and entrepreneurial individuals. For the purposes of this study, both for guiding process tracing and hypothesis testing, it is therefore necessary to adopt a fairly inclusive but clear conception of coupling that takes account of the problem-solution logic underlying OFW as a political issue in the context of a complex energy transition.[8] I elaborate such a conception in Chapter 3.3.4.

[8] The finer conceptual distinctions between various types of coupling and entrepreneurship open a plethora of relations that may confuse clear analysis. As noted, some MSF theorists distinguish between problem brokers, policy entrepreneurs and political entrepreneurs, largely based on the assumed separation of the streams and the predominant activity of some actors within a particular stream. How then, does one distinguish between policy entrepreneurship, political entrepreneurship and problem brokering in practice, given that the empirical MSF literature confirms that these activities can be undertaken by various actors, regardless of institutional position inside or outside government? The question is further complicated by recent theorists' arguments that 'coupling the streams' involves a complex process that may include multiple partial couplings of two of the streams that taken together forms full coupling configurations. The aforementioned is combined with the empirical claim that actors may attempt coupling at any point in the policy cycle regardless of window opening. What is the kind of evidence that would distinguish 'problem brokering' from a 'partial coupling' in practice? What is the kind of evidence that distinguishes partial couplings from a full coupling configuration? A mere argument, made to a particular group of actors, linking a particular problem framing with a

2.3.8. Setting agendas and making decisions

Originally, MSF emerged from Kingdon's interest in the agenda setting, or 'pre-decision', phase of the policy cycle at the federal level in the USA. In this he conceives agenda setting as the process by which a set of conceivable subjects is reduced to those that make it on to the agenda. A key question then is to understand the conditions that explain agenda changes over time. The dependent variable in such analyses was the presence of a particular issue on the agenda of one or more political institutions.

Kingdon defined the governmental agenda as "the list of subjects or problems to which governmental officials, and people outside of government closely associated with those officials, are paying some serious attention at any given time" (Kingdon, 1995, p. 3). There may sometimes be a sense of a single governmental agenda that emerges (albeit informally) across a wide network of actors spanning many institutions, "The Agenda". However, in reality, there are multiple governmental agendas at any point in time, partially distinguishable along institutional lines (Herweg, Zahariadis and Zohlnhöfer, 2017). In a federal presidential system like the United States of America, there is the agenda of the executive (the President and Cabinet), and 'specialized agendas' of various federal departments and bureaus (sometimes called policy subsystems), as well as the agendas of the House of Representatives and the Senate. Analogous divisions are present in other democratic systems with divisions between the executive, the legislature (sometimes with a lower and upper house), various specialised line-departments and/or state agencies.

The concept of agenda status and agenda setting has not been theoretically contested. Empirical studies include a wide range of designs to both define what is meant by agenda status and how agenda status is identified. I present a detailed description of what it means for OFW to be 'on the agenda' in Ireland in the next chapter.

Several authors have extended MSF to offer general explanations for the so-called 'decision-making' phase of the policy cycle (Herweg, Huß and Zohlnhöfer, 2015; Zohlnhöfer, Herweg and Huß, 2016; Herweg, Zahariadis and

particular solution, may suffice as evidence for all of the above theoretical constructs. It appears that MSF-inspired literature has generated a rich set of conceptual distinctions that make no practical difference, or at the least, cannot be told or held apart in detailed empirical research.

Zohlnhöfer, 2017). Here the dependent variable is usually policy change or a policy output. Most recently, Herweg et al. have offered an extension of the framework that utilises all the MSF elements (and no more) and the basic logic of their relations to the 'decision making' phase of the policy cycle. They propose that there is a general MSF scheme for dividing the policy process in two phases between agenda setting and decision-making. They do this to answer questions such as why policy change fails to occur after a proposal makes it on the political agenda, or why the final policy decision differs from the original proposal. They also do this because they claim two different coupling processes occur. The first 'agenda coupling' consists of a policy entrepreneur putting a 'worked out proposal' on the political agenda in response to a particular problem and ready for decision-making. The second 'decision coupling' consists of political entrepreneurs (elected members of parliament) in the politics stream bargaining about the 'concrete design' of the worked-out proposal and securing the parliamentary majority to pass the legislation. Figure 2 depicts this schematic with the MSF structural elements.

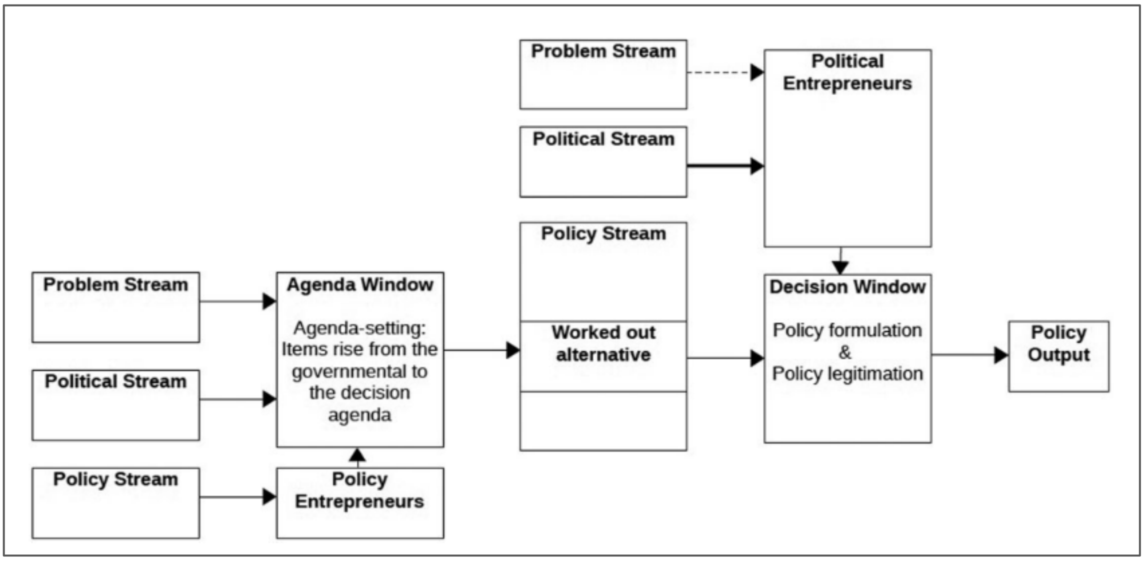

Figure 2: Herweg et al.'s model for distinguishing between the agenda setting and decision making phases of the policy process (Herweg, Huß and Zohlnhöfer, 2015)

This leads them to several general conclusions. Firstly, agenda setting involves a relatively large number of actors competing for attention, but the number of actors decreases during decision making as the institutional setting (usually parliament) constrains who can have a say, and the majorities needed. Secondly, the focus during decision making is how the necessary majority is built to adopt a proposal that has already been coupled to a particular problem.

Here the key actors are political entrepreneurs who hold the formal positions to exercise a vote, so the focus is on the politics stream. This in turn leads MSF theory to focus on the available tactics in securing a majority for a proposal (Zohlnhöfer and Rüb, 2016; Zohlnhöfer, Herweg and Huß, 2016; Zohlnhöfer, Herweg and Zahariadis, 2022).

The above discussion has two main implications for this study. Firstly, it is necessary to clearly define the dependent variable(s) of interest which are twofold: a) the presence of OFW on the political agenda, and b) the adoption of various policies to support the deployment of OFW. Secondly, it is necessary to explicitly define the agendas of interest and the associated policy proposals.

2.3.9. The general hypothesis

MSF enjoys wide and growing appeal among policy analysts. A meta-review found 311 peer reviewed articles applying the framework across 22 different policy areas and 65 different countries over the period 2000 – 2013 (Jones *et al.*, 2016).[9]

However, the approach has received substantial criticism. Jones et al conclude from their meta-review that the approach had generated a 'disturbingly incoherent' research programme (Jones *et al.*, 2016). They find that most of the applications of MSF do not specify its structural components with sufficient clarity nor utilise all five structural components and their posited relations. Few applications of MSF have an explicit research question and even fewer test a hypothesis. These meta-review findings bear out a previous criticism from Sabatier that MSF had no explicit hypotheses and its fluid structure and operationalization made falsification difficult" (Sabatier, 2007).[10]

[9] However, only five of these studies applied it to the domain of energy policy. In the next section of the literature review, I consider further literature applying MSF to the energy policy domain, published after 2013.

[10] Another sustained criticism focuses on stream independence. The construct of three largely independent streams that function according to different logics to influence agenda setting (and policy making) is central to MSF. Yet several scholars have questioned the basis for such constructs and the nature of the separation and the interactions between the streams. The most productive recent proponents of MSF, Zahariadis, Zohlnofer and Herweg, all offer the same general defence for the streams as a conceptual device: it is necessary to explain irrationality in policy making. Political agendas and policy proposals often do not follow on from clearly defined problems. Instead, sometimes, actors bring certain issues on to the agenda or fixate on particular policy proposals, after which they search for problems to provide a rationale for their preferred proposal. Largely separate streams of activity, identifiable through the different logics that govern them, are necessary conceptual devices to distinguish the development of political

Subsequently, proponents of MSF, most notably Zohlnhöfer, Herweg and Zahariadis, set out to address some of these shortcomings directly, and proposed an agenda of work that would address the other shortcomings (Zohlnhöfer and Rüb, 2016; Herweg, Zahariadis and Zohlnhöfer, 2017). Most notably, they outline several hypotheses that relate to individual elements of the framework and one general hypothesis for the relation between all the elements (Zohlnhöfer and Rüb, 2016; Herweg, Zahariadis and Zohlnhöfer, 2017). It is the general hypothesis that arguably provides the most alluring and ambitious prospect for furthering theoretical progress. To date, very few studies have sought to test it.

The structural logic of Herweg et al's general hypothesis lends itself to different interpretations. No theoretical work has yet been done on teasing out the implications of divergent interpretations. For instance, the hypothesis may be interpreted in mechanistic terms: as a range of generic causal mechanisms that function in particular contexts (under certain scope conditions). Alternatively, the hypothesis may be interpreted in set theoretic terms: as a complex configuration of conditions that are either necessary or sufficient for a particular outcome.

Given the gap in MSF theory, I proposed that a mechanistic interpretation would run as follows. MSF hypothesis is supported by process tracing results if an entire causal mechanism (with its constitutive parts) can be interpreted in terms of more abstract MSF concepts. MSF is further supported to the extent that the identified scope conditions can be abstracted to MSF concepts, as this enables generalisation of deterministic mechanisms; i.e. we may expect a causal mechanism to function in the same way across different cases where the scope conditions are the same (Beach and Pedersen, 2018).

If we adopt a set-theoretic interpretation, then we need to clarify whether the relation between the constituent elements and agenda change is one of necessity or sufficiency. Zohlnhöfer assumes the relation is one of necessity. He claims that the hypothesis "could be falsified by showing that agenda change has occurred although (at least) one of the streams was not ripe, or there was no policy-window or no policy-entrepreneur pushed for the change"

problems from the development of policy solutions (Zohlnhöfer and Rüb, 2016; Herweg, Zahariadis and Zohlnhöfer, 2017).

(Zohlnhöfer and Rüb, 2016, p. 6). This is a strong statement that each of the five structural elements are part of a necessary conjunction of conditions (or mechanisms). That is, any case where we have the outcome of interest, but any one of the structural elements are absent, we have infirmed the general hypothesis. However, I would argue that if many empirical studies showed that four of the five elements formed a necessary conjunction for agenda change it may still leave the theory in quite a strong position. Given that the hypothesis is ultimately about a complex configuration of conditions (or mechanisms), one might expect it to be confirmed or infirmed by degree at the structural level. The fewer of the elements are necessary, the more infirming the case may be for the general hypothesis. Alternatively, the hypothesis may also be interpreted as a statement of sufficiency. Though not as strong as a statement of necessity, this still constitutes a very substantial theoretical claim. It gives one confidence to infer that agenda change is forthcoming when all (or most – again a matter of degree) of the MSF elements are observed.

The noted ambiguities above is part of the reason why this study undertook a mixed-methods approach employing both process tracing, to discover causal mechanisms and scope conditions, and fsQCA, to discover configurations of complex conditions that may be either necessary or sufficient, for agenda change. I return to this in Chapter 3 (p. 41).

The work on MSF hypothesis development has also not yet paid attention to hypotheses for *no* agenda change. Indeed, most empirical studies that apply MSF (without stated hypotheses) do not seek to advance theory on no agenda change. One could, for example, flip Zohlnhöfer's interpretation around: agenda change becomes less likely if at least one of the streams was not ripe, or there was no policy-window or no policy-entrepreneur pushed for the change. However as theorists of complexity point out, causation is asymmetric. Clearly there is still a lot of work to be done in advancing the MSF along these lines. This is one of the novel contributions of this study: to elaborate and test alternative logical interpretations of the general hypothesis and explore explanations for no agenda change.

Table 1 presents a summary of the MSF general hypothesis and the constitutive conditions that make up the five high level elements.

In conclusion, MSF provides a general hypothesis for agenda setting that could enable rigorous comparative work across jurisdictions and policy domains. However, there is a knowledge gap in testing the hypothesis. Secondly, there is a related knowledge gap at the interface of theory and method which consists in clarifying and developing different interpretations of the general hypothesis and operationalising the generic MSF concepts for OFW as a political object in a democracy with a liberalised electricity sector.

Table 1: MSF general hypothesis adapted from Herweg et al. (2017).

General MSF explanation for agenda/policy change		
Agenda or policy change becomes more likely if A. A policy window opens,		
	in the problem stream when:	A1. a relevant indicator deteriorates OR
		A2. feedback points to mismatch between policy goals and effects of policy OR
		A3. a focusing event occurs
	in the politics stream when:	A4. Composition of government or parliament changes OR
		A5. National mood shifts
B. AND the streams are ready for coupling,		
	Problem stream ready when:	B1. Policy-makers (re)frame conditions as problem requiring policy solution
	Politics stream ready when:	B2. ideology of government or commitments in election manifesto aligns with action on issue OR
		B3. Government perceive public mood as supportive of action on issue
		AND B4. interest groups do not oppose the issue
	Policy stream ready when:	B5. the policy community has softened up a technically feasible and normatively acceptable policy solution
C. AND a policy entrepreneur promotes agenda change		
	when	C1. An actor persistently invests time, reputation, and/or money to promote a policy issue

3. Research design

In this chapter, I set out my research strategy, design, and methods for collecting and analysing data.

3.1. Mixed methods and philosophy of science

The research objectives and associated research questions (Chapter 1) required a 'multi-strategy' or 'mixed method' design (Robson and McCartan, 2016) that employs qualitative and quantitative methods. This assumes ontological and epistemic commitments broadly aligned with critical realism as a tradition within the philosophy of science (Vincent and O'Mahoney, 2017). A key hallmark of research within this tradition is to employ a range of methods to develop limited approximations of reality (i.e. 'domain specific' theories) that aim at causal explanations in an open system where research design cannot separate causal mechanisms from their contexts. In this tradition, this study uses the logic of abduction to propose causal mechanisms and their interaction with contexts to move OFW on/off political agendas and sustain agenda status (or lack thereof) for OFW.[11]

The MSF hypothesis proposes that a complex configuration of mechanisms make political agenda change more probable. However, there has been no rigorous empirical studies to test the general hypothesis (see Chapter 2.2). Furthermore and separate from MSF literature, there is limited guidance on the causal mechanisms that explains OFW's agenda status as a type of political object, although the literature does provide significant guidance on a few scope conditions associate with this (refer to Chapter 2.1). This study therefore does not merely presume the mechanisms proposed by MSF, nor their theorized structural configuration, but rather sets out two strategies to respectively build and test theory. The first strategy uses a form of inductive process tracing aimed at uncovering and specifying causal mechanisms; i.e. theory-building process tracing (Trampusch and Palier, 2016). The second strategy uses QCA to deductively test the MSF general hypothesis (Oana, Schneider and Thomann, 2021).

[11] Abduction involves re-describing observations (e.g. interviews, transcripts or other documents) in terms of theory in order to describe a sequence of causation that plausibly explains observed regularities in patterns of events (Vincent and O'Mahoney, 2017).

3.1.1. Inductive process tracing

Inductive process tracing aims at uncovering the causal mechanisms that moved OFW on to / off of the Irish political agenda at different points in time and distinguishes these from scope conditions that may have affected the functioning of such mechanisms. The process tracing consists of a detailed narrative that explains the occurrence of specific sets of events in a limited set of cases (George and Bennett, 2005), what Beach and Pedersen term 'case centric' process tracing (Beach and Pedersen, 2013). In addition, this empirical material is used to construct generalizable explanations of agenda change for OFW, 'theory building' process tracing in Beach and Pedersen's terminology. Inductive process tracing is a necessary strategy because, although the MSF hypothesises a general relationship between agenda change and a configuration of causes, it does not explain the potential mechanisms that may bring OFW on to political agendas. In fact, it is not even clear which of the MSF concepts function as mechanisms (e.g. a policy window opening) from those that may be scope conditions (e.g. politics stream ripeness).

More generally, inductive process tracing is necessary in order to 'take temporality seriously' in advancing explanation of both why and how certain events happen (Trampusch and Palier, 2016). In this study, the strength of process tracing is particularly evident during those relatively brief periods in time when there is a phase change in the agenda status of OFW; i.e. when OFW moves onto or off the political agenda. These periods of phase change (on/off or off/on) require a dynamic account of sequences of events at a relatively high temporal resolution in order to advance plausible explanations of causal mechanisms and contexts. In this, process tracing helps to distinguish causal mechanisms that "do something" from scope conditions that have to be present for mechanisms to function, but do not themselves do something (Beach, 2018).[12]

However, in this study process tracing is not a sufficient strategy to test a hypothesis. Here, process tracing only permits claims that we have confirming or disconfirming evidence of the operation of a causal mechanism in a particular instance (i.e. within-case inferences about causation) and the possibility of

[12] It may be that some hypothesised MSF-mechanisms function as scope conditions, but not mechanisms, or that some are neither scope conditions nor mechanisms.

proposing causal mechanisms for further comparative testing. Given the risk of equifinality at the mechanistic level, only speculative cross-case inferences can be made. Therefore, process tracing also does not enable statements about the sufficiency or necessity of potential causal, or complex conjunctions of causes (Beach, 2018). A second strategy is needed for this.

3.1.2. Fuzzy set QCA

The second strategy uses fsQCA to test whether hypothesized mechanisms are necessary and/or sufficient to explain OFW's agenda status in Ireland over the 21-year period of interest. In the QCA, I divide the single Irish case into 43 six-month time slices, each presenting a mini-case in the QCA where a complex configurations of conditions are associated with OFW either being on or off the political agenda (refer to Chapter 3.3 for more information). QCA enables a systematic comparison of cases where the relation between phenomena can be conceived in terms of set relations and causal complexity (Schneider and Wagemann, 2012). The theory of causation that QCA assumes is conjunctural – i.e. a particular condition may only have a certain effect on an outcome when considered alongside other conditions. It is also equifinal – i.e. an outcome may be associated with more than one mutually non-exclusive configuration of conditions. In other words, it may have more than one explanation, or as the saying goes, "many roads lead to Rome". Finally, causation is asymmetrical – i.e. the conditions associated with the non-occurrence of a phenomenon may not be the mirror image of the conditions associated with its occurrence. These ontological assumptions make it well suited for testing an MSF hypothesis as a complex configuration of conditions.

However, QCA is also insufficient to realise the objectives of the study. Whilst it can produce statements on the association between a complex configuration of conditions and an outcome, it cannot tell whether conditions are causal mechanisms or scope conditions, nor whether the conditions together produce a single mechanism, or whether they act in sequence or other more complex patterns (Beach, 2018). Hence the need for process tracing.

The combination of these two strategies, each extremely demanding in their own right, is rare. It is only recently that Beach demonstrated the value-add of such a dual strategy for robust, theoretical driven case-based research (Beach, 2018). In so doing, he illustrates that the possible ways of combining the strategies and the potential benefits that may arise from this is not yet widely known.

However, the different conception of causation that each strategy entails also require a careful explication of research design and interpretation of results; i.e. the type of causal claims each strategy warrants, and their relation to each other. Firstly, both QCA and process tracing entail a deterministic causality which renders some popular and traditional variance-based strategies for case selection redundant (Beach and Pedersen, 2018). For instance, case selection based on a 'least likely' or 'most likely' typology requires a probabilistic ontology to classify case selection that leads to contradictory rules for inference from mechanism-centred research design (Lijphard, 1971; Flyvbjerg, 2006; Beach and Pedersen, 2018). On the other hand, QCA and process tracing also have different case selection requirements. Because QCA entails a counterfactual causality it is necessary to have a sample that includes cases where the outcome (Y) is present and cases where the outcome is absent (~Y), and cases where each of the causal conditions (X_1, X_2, … etc) is present and cases where each of the causal conditions is not present (~X_1, ~X_2, … etc.). If the sample of compared cases is not sufficiently diverse (i.e. if membership of any of the causal or outcome sets are too 'skewed'), then we will have low confidence in statements that certain configurations of conditions are necessary or sufficient causes for the outcome. On the other hand, because process tracing entails a mechanistic causality, cases where neither the outcome nor causes are present are analytically irrelevant (any comparisons with such cases would make no sense), whilst comparing cases where only the cause is present (so-called 'deviant cases') may only serve to explain how causal mechanisms break down due to changing scope conditions.

In Chapter 3.2 I set out a justification for case selection that is ontologically coherent with both process tracing and QCA whilst serving the objectives of the study.

3.2. Case selection for process tracing

In this section, I provide distinct justifications for selecting a national jurisdiction and different cases within the jurisdiction.

I chose a single jurisdiction because of the extremely demanding data and analytic requirements of the dual, process tracing-QCA strategy (Beach and Pedersen, 2018). Choosing more cases across more than one national jurisdiction would have increased the external validity of the study (i.e. the ability to make stronger cross-case inferences) at the expense of internal validity (i.e. more superficial mechanistic evidence). Indeed, the norm in case-based research that only employs process tracing is to opt for two to three cases (Beach and Pedersen, 2018). This study includes *three cases within a single national jurisdiction* for process tracing which I explain below.

The availability and accessibility of empirical material was key for the choice of jurisdiction. This firstly limited the population to those jurisdictions where English was the first or dominant language of political discourse and where documents and other source materials could be easily accessed in English via digital repositories. Secondly, as a condition of my PhD funding I undertook a secondment with a non-academic programme partner in the first year of the PhD. This happened to be the Sustainable Energy Authority of Ireland, a government agency within the then Department of Communications Climate Action and Environment (DCCAE). My secondment provided access to key policy makers in and around the Irish government, including departmental staff, the energy regulator and system operators. Access to actors directly working on and in the policy domain of interest is an essential source of data for robust process tracing.

Furthermore, Ireland offered a sufficiently long history of political interest in OFW to generate an extensive historical record; ample opportunity to find fingerprints of potential causal mechanisms and shifting contextual conditions. In fact, OFW entered Irish political discourse in 1999. This enabled the selection of three temporally and spatially bound cases (Table 2). Two cases where the outcome (Y) was present (OFW moved on to the political agenda) and one where it was absent (OFW fell off the political agenda). Y and ~Y could be specified clearly (more on that in subsequent sections of this chapter).

However, the literature did not provide a restrictive or clear direction of the most likely cause (X) or causal mechanisms (M_1, M_2, etc…). In the remainder of this chapter, I operationalise the MSF hypothesis for OFW, but it is worth posing the challenge here in a general form: which of the generic MSF concepts may serve as causes, as causal mechanisms or as contextual or scope conditions? For example, should we hypothesise general elections as a cause (X = a policy window in the politics stream), and if so, what are the intervening mechanisms between X and Y? Should we consider a policy entrepreneur or a particular policy idea (policy stream ripeness) as the cause and a policy window as a mechanism (potentially one of many)? Are shifts in public concerns over climate change (potentially either a policy window or contributing to the ripeness of the political stream) a causal mechanism or merely an enabling scope condition? Given the availability and access to significant amounts of data and the many potential MSF-inspired hypotheses, I opted for *inductive* process tracing aimed at discovering what the causes and mechanisms actually were.

Given the gap in the MSF literature (refer to Chapter 2.3.9, p. 37), I propose a mechanistic interpretation of the MSF hypothesis as follows. If we can interpret all causal mechanisms in terms of MSF concepts, then the case supports a mechanistic interpretation of the MSF hypothesis. If one or more causal mechanisms cannot be interpreted in MSF concepts, then the case undermines the hypothesis. If we can interpret all the scope conditions in terms of MSF concepts, then it increases the generalisability of the MSF hypothesis as a causal mechanism. If we cannot interpret one or more scope conditions in terms of MSF concepts it may restrict the ability to generalise the MSF interpretation of the causal mechanism.

For the process tracing in this study, it is also necessary to distinguish between causal mechanisms and contextual conditions (or what is also called scoped conditions) (Beach and Pedersen, 2013). A causal mechanism can be defined "as a theory of a system of interlocking parts that transmits causal forces from X to Y", or as a process in a system capable of bringing about or preventing some change in the system. Scope or contextual conditions are the antecedent and persistent aspects of a setting in the presence of which a causal mechanism functions. Scope conditions set the contextual specificity of mechanisms. The same causal mechanism in two different contexts could produce different outcomes.

Table 2: Schematic for the three cases for inductive process tracing in the Republic of Ireland, 1999 - 2020

Case 1: $X \rightarrow M_1 \ldots \rightarrow Y$	1999–2007	OFW enters political debate but remains largely off the agenda. OFW moves on to the agenda following the general election
Case 2: $X \rightarrow M_1 \ldots \rightarrow \sim Y$	2007–2011	OFW appears to remain on the agenda for the government term. OFW moves off the agenda following the general election
Case 3: $X \rightarrow M_1 \ldots \rightarrow Y$	2011–2019	OFW appears largely off the agenda until approximately 2019, when it appears to move back on to the agenda

Because I did not specify X, it was not possible to classify the cases as either typical or deviant as per case-centric classifications (Beach and Pedersen, 2018). However, the literature review did provide a schematic of potential scope conditions that may serve to classify these cases. This may be of interest to future comparative studies aiming at stronger external validity (refer to Appendix A).

3.3. Operationalising the MSF for OWF and the Republic of Ireland

In this section, I operationalise the generic MSF for the policy issue of OFW and the context of the Republic of Ireland (ROI). This links the literature reviewed in Chapters 2.1 and 2.2 with additional information on the Irish context. The structure therefore follows the generic MSF elements in Table 1 and the outcome is summarised in the extension of this to non-metaphorical observable implications in Table 3. This is a necessary step for conducting a theory-driven QCA. It is also important, though not essential, for the process tracing as it specifies in more exact terms the kind of causal mechanisms we may expect to find if MSF were true. Although, as noted, given that this study uses inductive process tracing, it does not require the specification of a cause (or causes) in advance.

Table 3: Operationalising the MSF for Offshore Wind Energy (OFW) in the Republic of Ireland

General MSF explanation for agenda/policy change (Herweg, Zahariadis and Zohlnhöfer, 2017)		**Operationalizing for OFW in a parliamentary democracy with liberalised energy sector**
Agenda or policy change becomes more likely if A. A policy window opens,		**Examples of possible observable implications**
in problem stream when:	A1. a relevant indicator deteriorates OR	1. % renewable in energy in mix deteriorates / 2. CO_2e emissions increase / 3. Energy important dependence increases;
	A2. feedback points to mismatch between policy goals and effects of policy OR	1. Failure to meet renewable energy or CO_2 emission target / 2. Failure of price support instrument, grid connection policy, or marine planning legislation / 3. Non-compliance with relevant EU Directives
	A3. a focusing event occurs	Controversial energy projects, electricity blackouts, extreme weather events, spike O&G prices, spike in electricity prices, 2008-2011 banking and fiscal crises,
in politics stream when:	A5. Composition of government or parliament changes OR	General elections, turnover of ministerial positions in relevant ministries
	A6. National mood shifts	Opinion polls on climate change and energy
B. AND the streams are ready for coupling,		
Problem stream ready when:	B1. Policy-maker(s) (re)frames conditions as problem requiring policy solution	Many or most renewable energy policy-makers frame lack of OFW as problematic and requiring policy solution. Public statements by parliamentarians, Prime Ministers or relevant ministers on OFW and related policy instruments[13]
Politics stream ready when:	B2. ideology of government or commitments in election manifesto aligns with action on issue OR	Stance of ruling coalition on climate change, energy security, EU, fiscal policy (subsidies and liberalisation), and commitments in election manifestos and Programme for Government
	B3. Government perceive public mood as supportive of action on issue	Opinion polls on climate change and energy[14]
	AND B4. interest groups do not object to issue	Activities of wind energy industry associations, opposition groups to wind energy, environmental non-government organizations (NGOs) and energy and economic research institutes
Policy stream ready when:	B5. the policy community has softened up a technically feasible and normatively acceptable policy solution	Policy solution for: 1. Financial settlement (e.g. auctions, REFITs) / 2. Marine spatial planning, consenting, & seabed leasing / 3. Grid connection and development policy / 4. Interconnection
C. AND a policy entrepreneur promotes agenda change		
when	C1. An actor persistently invests time, reputation, and/or money to promote a policy	Actions of Prime Minister, relevant Ministers, Members of Parliament, senior civil servants, or senior management of TSO or regulator, or notable individuals in policy community

[13] In Ireland, the official title for an elected Member of Parliament is a Teachta Dála (abbreviated as TD or 'deputy') and for the Prime Minister is Taoiseach
[14] QCA only considers national mood (as measured through opinion poll data) as constituent of a policy window opening in the politics stream

3.3.1. Problem stream

Operationalizing the problem stream empirically requires checking whether indicators, focusing events or feedback drew policy makers' attention to a specific condition at a specific point in time (Zohlnhöfer, Herweg and Zahariadis, 2022). Hence, for this study, what are the indicators, Focusing events and feedback (on policy implementation) that may have drawn Irish policy makers' attention to OFW as a potential solution to policy problems since 1999?

The deterioration of *indicators* (especially those which policy makers widely regard as important) may trigger the framing of a problem. The ROI experienced a very high energy import dependency for most of the period of interest (Byrne Ó Cléirigh, 2020). This grew rapidly from 70% in the mid-1990s to around 90% where it plateaued until 2016, with the exploitation of the Corrib gas field returning it to 70%. Energy import dependence has long provided a reason for Ireland to take diverse measures to secure its energy supplies, including supporting the development of indigenous energy sources. The Irish government and research community have long tracked the country's energy security and translated it into strategic policy goals for the energy sector as a whole, and for the power sector as a subset of that (Fitz Gerald *et al.*, 2005; Department of Communications Marine and Natural Resources, 2007; Fitz Gerald, 2011). For the power sector such goals were aimed at a) enhancing the diversity of fuels used for power generation, whilst b) ensuring that electricity supply consistently meets demand. The indicators of interest that therefore relate most closely to concern for energy security are energy import dependence, the technological composition of the national fuel mix for electricity generation, and electricity supply and demand forecasts.

In linking the issue of OFW to the national electricity generation mix and supply and demand forecasts, it is also necessary to consider power-sector specific indicators that may be instrumental in problem framing for OFW. This is largely linked to the state of the electricity grid and its ability to transmit a high penetration of variable renewables on the system whilst delivering safe and secure power. To this end, the System Operator will set certain grid codes and regulations to ensure reliable and stable electricity transmission and distribution. This includes a cap on the proportion of electricity from variable sources to penetrate the grid at any given time. For instance, in 2010 the Irish system operator, Eirgrid, set a Synchronous-Non-Synchronous-Power (SNSP) goal in that by 2020 it would be able to operate the all-island grid with an SNSP of 75%, an ambitious increase from the grid's capacity in 2010 (Eirgrid and System Operator for Northern Ireland, 2010).[15] This both serves to facilitate the deployment of variable renewables, such as wind and solar, but also serves as a political and economic indicator that may constrain expectations and actions of many stakeholders in the renewable energy sector. The ability of policy entrepreneurs, therefore, to frame OFW as a solution to a particular problem may be heavily constrained by this. In turn, a government's ambition for deploying renewables may drive the system operator to develop system services to meet the ambition. Such an indicator may serve as a technical barrier or enabler to OFW face in gaining agenda status, but are not themselves indicators that frame problems for which OFW may serve as a solution.[16]

Secondly, performance against legislated energy and climate change targets may serve as indicators. Ireland has both influenced the development of, and have been required to comply with, EU climate change and energy directives. One key feature of the directives have been setting medium to long-term targets, either in terms of CO_2e emissions reductions or proportion of energy to be generated from renewable sources. For instance, EU Directive 2009/28/EC assigned Ireland a legally binding target of 16% renewable share of gross final energy consumption for 2020, with individual sectoral sub-targets of 40% for renewable electricity, 12% for renewable heat, and 10% for renewable transport (European Parliament Council of the European Union, 2009). Performance against such targets may become influential indicators (either in terms of tCO_2e or MW capacity from renewables), that may drive political problem framing and

[15] Synchronous-Non-Synchronous-Penetration is an indicator presented as a percentage. It is the maximum allowed proportion of variable renewable power on the power system at any moment.

[16] There are other indicators that may also serve as proxies for OFW's agenda status, but that are not indicators enabling problem framing in favour of OFW. For instance surveying work for potential offshore wind sites may require one or more licences, potentially from multiple state institutions, whilst gaining approval to occupy the seabed and constructing a wind farm requires further state sanctioned licences. Analogously, connecting any generation plant to the electricity grid requires a connection licence from the system operator. A build-up of licence applications and lack of timely processing may indicate that policy makers are not paying attention to the problems that OFW is facing. Therefore, in terms of testing the general MSF hypothesis, such indicators can serve as proof that OFW is on the agenda or may provide reasons why it is not on the agenda, rather than indicators that serve as proof of a policy problem to which OFW may be a solution.

open (or close) technology-specific policy windows for OFW at the national level. Whilst renewable energy (ito MW) and climate change (ito tCO_2e) targets have a demonstrably close connection politically, it is also worth considering them as separate indicators as policy decisions regarding the sectorial spread of emissions reductions in a given national economy is non-trivial.

Focusing events, by definition, reshuffle political agendas. What are the kind of Focusing events that may serve to bring OFW on to the political agenda (or push it off)? In the case of Ireland, there were a few energy-related controversies over the past two decades that stand out. Public opposition to the Corrib gas project, the Midlands wind energy export scheme, and transmission grid development became national political controversies that may have served as focusing events (individually or cumulatively) influencing the agenda status of OFW. Slevin demonstrates how the Corrib gas conflict laid bare to many members of the Irish public, civil society and some politicians the interdependence between the Irish state and private, international capital in the management of hydrocarbon resources (Slevin, 2019). This major controversy, that played out over the better part of a decade from the early 2000s, culminated in increased resistance to extractive activities more generally and a deep distrust in the state's ability to secure due benefit to the public from the selling natural resources (the terms of licencing) and address the concerns of affected communities (through the planning process). Brennan demonstrates how key drivers of opposition to the Midlands wind power export scheme was the perception that multinational companies and electricity consumers in the UK would benefit greatly, but that communities in the Midlands would see little to no benefit from the scheme whilst facing risks of health and environmental externalities (Brennan, Van Rensburg and Morris, 2017). The Natural Environment Research Council's public consultations concluded that the Midlands projects in particular had generated a level of ire among local communities at the 'top down' approach, where it was perceived by many communities and activists that the government was facilitating 'big business' at the expense of local communities' environmental interests (National Economic and Social Council, 2014). Brennan concluded that large-scale deployment of wind farms in Ireland specifically to export electricity to the UK may be, as of 2016, premature. The contingent connection between energy-related and non-energy related focusing events in the Irish context is underscored by the public opposition to Eirgrid's long-term grid development plan in the 2010s (Eirgrid, 2014b, p. 14). The TSO's detailed review of its own public consultation processes found that "a concatenation of issues" conspired to develop a profound anger at, and opposition to, many grid transmission infrastructure projects.[17]

Eirgrid's review illustrates a general point that past energy-related events, as well as non-energy issues (such as the handling of the financial crisis) can serve as focusing events that could have affected the timing and content of OFW policy in myriad ways. The mechanisms by which such events may have affected the status of OFW policies are multiple. For instance, there is some evidence from the UK that opposition to onshore wind can drive political prioritisation of offshore wind (Jones and Richard Eiser, 2010; Kern *et al.*, 2014). Conversely, OFW deployment shares some characteristics with offshore gas extraction and the Midlands export scheme. It is characterized by mega projects developed by large companies mostly foreign owned in the case of Ireland, potentially for export, and centrally facilitated by legislative reforms by the government and the coordinated direction of multiple state institutions towards a particular objective. It is conceivable that many of the ideological and some of the practical reasons Slevin and Brennan identified as driving public opposition or support to the Corrib gas and Midlands wind export projects, may also be mobilised in opposition or support of offshore wind deployment.

Furthermore, in the period of interest, one indisputable focusing event clearly 'bowled over' the Irish political agenda, dramatically reordering political priorities for many years. The banking and fiscal crises entered the political agenda roughly in 2008 with the bailout of Irish banks and culminated in the financial crisis in 2010 (Donovan and Antoin E Murphy, 2013). It is beyond the scope of this chapter to speculate how this may have affected the prospects of OFW, suffice to say that it clearly ought to be considered in the case study framework.

[17] In the concatenation of issues, Eirgrid includes "economic collapse, anger at government and state bodies; Corrib gas, hydraulic fracturing 'fracking'; the negative impacts of proposals for industrial scale wind farms in the Midlands in 2013 (Energy Bridge; Mainstream Energy etc) for export, and critically, the collapse in public trust in state institutions." (Eirgrid, 2014b, p. 14)

Finally, operationalising the concept of *feedback* within the problem stream to test the general hypothesis also requires non-trivial decisions of selection and interpretation, particularly for the QCA. The literature review highlighted several policy domains and even more individual policy elements that have been implicated in OFW deployment depending on the context of the jurisdiction (refer to Chapter 2.1). Implementation failures for any of these may serve to open (or close) a policy window for OFW. Firstly, a medium to long-term renewables target appear a logical precursor to OFW's political prospects. In the case of Ireland, an Energy White Paper in 2007 and 2015 respective set out high-level priorities and goals for timeframes beyond the current government term (Department of Communications Marine and Natural Resources, 2007; Department of Communication Environment and Natural Resources, 2015). More recently the 2019 Climate Action Plan set a technology-specific target of 3.5 GW of OFW by 2030 (Government of Ireland, 2019a). Feedback on failures to meet high level objectives may serve to open policy windows. However, it may fall to the TSO, the regulator and other line ministries alongside the ministry of energy to develop and implement a range of policies to meet high-level objectives or targets. Implementation of these may be more or less coordinated and feedback on these 'downstream' failures may equally serve as policy windows for OFW. As noted, some form of *price support instrument* is required to incentivise market-led investment in renewable generation infrastructure; some form of *grid connection policy* is required to regulate access to the distribution and transmission grid in a liberalised market; and some form of *marine planning legislation* is required to set the terms by which project developers gain the right to survey areas for prospective projects, occupy areas, and gain rights to construct and operate offshore wind farms on the state-owned seabed. Hence feedback on the failure of any of these may serve to open a policy window for OFW.[18]

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[18] These policies may not be technology-specific in their scope and other sectors and interests may drive their development, implementation and renewal. Any window that opens for the development of a price support instrument, grid connection policy or marine legislation provides an opportunity (and a risk) for OFW promoters and the need to engage with policy makers and requires policy makers to make a range of decisions around whether and how to include technology-specific considerations in the policy. In lieu of a technology-specific government target for OFW, feedback on such policy failures may not constitute a window of opportunity for OFW to make it on to the political agenda, but none the less requires actors with an interest in the technology to ensure their interests are represented and for policy makers to decide if and

The above discussion specifies the kind of observable implications we may expect to find when classifying case data in terms of focusing events, indicators and feedback on failure of particular pieces of legislation, policies or policy instruments.[19] This provides sufficient specificity to operationalise the general MSF for process tracing. The inductive process tracing strategy remains open to the contingencies of the case and the sequence of historical events to establish if and how indicators, Focusing events and/or feedback on particular policy failures served as causal mechanisms to get OFW on to the political agenda. However, QCA requires simplifying assumptions and a priori set definitions. Appendix A presents further detailed explanations of how I operationalised these concepts for the QCA.

In addition, it is necessary to distinguish clearly between a policy window opening in the problem stream and the problem stream being ready for coupling. I offer the following distinction. A policy window consists of several contextual conditions that constitute an opportunity for policy entrepreneurs. A policy window opens in the problem stream to the extent that policy entrepreneurs have some reason(s) for justifying action on a particular problem, based on focussing events, indicators or feedback. The scale or presence of opportunity, just like the opening of a window, is a matter of degree – a window may be shut, wide open, or almost shut at a particular point in time. It may be opening up or closing down. In less metaphorical words, fewer or more conditions that constitute an opportunity may be present. Reasons for action may stack up.[20]

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how to accommodate the technology within the broader goals of the policy/legislation. Alternatively, if OFW is already on the political agenda, it may serve to precipitate a change in any of the aforementioned.

[19] As a relatively small member-state of the EU, policies from the EU level may also diffuse to the Republic of Ireland through coercion, manipulation of national utility calculations, socialization and persuasion (Börzel and Risse, 2012). I conceptualise the influence of policy making at the European level and its implications for Ireland within the problem stream. When EU nations adopt a Directive at the regional level that apply to all member states, it creates a problem for Irish policy makers at develop the necessary national policies to comply with the Directive. The assumption is that such problems will translate into a change in indicators, feedback, or potentially even a Focusing event (though arguably more indirectly).

[20] Consider this example to clarify the distinction. A government may track the proportion of renewable energy generation's contribution to the national energy mix and find that it is not on track to meet the government's target. It may also receive feedback that its price support policy instrument for renewables has failed to deliver the intended increase in renewable energy generation. This deterioration of a relevant indicator and feedback on a policy failure supports

On the other hand, the problem stream is ripe for coupling to the extent that key policy makers in the energy policy subsystem frame the absence of OFW as a problem requiring urgent attention.[21] What distinguishes problem windows opening from stream ripeness is therefore 'the who' and the sequencing of activity. The problem stream is ripe to the degree that the relevant policy community acknowledges that urgent policy action is required on an issue. It is therefore necessary to specify who counts as important policy makers and provide at least some approximation of a critical mass within the specified policy community. I specify the Irish energy policy community in the next section (Chapter 3.3.2) and offer a precise definition of policy stream ripeness for the QCA analysis in Appendix A.

3.3.2. Politics stream

To operationalise the politics stream for this study, a summary of key features of Irish democracy, government and state is necessary (Citizens Information, no date; Government of Ireland, no date). This is particularly important as the study traces several policy elements, the development and implementation of which, diverge institutionally.

The Republic of Ireland is a parliamentary representative democracy. Legislative power is vested in the Irish parliament, the Oireachtas. Dáil Éireann (the 'Dáil' for short) is the Lower House of the Oireachtas. By law, a general

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problem framing. It provides some reasons to think that there is an opportunity for agenda/policy change (both for the actors at the time and for the researchers doing historical case work). However, for many complex reasons, policy makers may decide that this is either not a problem, or that it is not an urgent priority compared to the other problems they have and their available capacity. Extending the previous example to include a sudden and dramatic increase in the cost of an imported fossil fuel for the country in question (a focussing event). One more powerful condition is now present to support the problem statement that the country needs to prioritise policies to support renewables. However, in this particular case, problem brokers may still have various reasons for not framing these conditions as a problem that requires urgent policy intervention. The policy window has opened wider, but the problem stream is still not ready for coupling.

[21] Methodologically, a robust distinction between a policy window in the problem stream and the stream being ready for coupling is needed to enable the researcher to make an approximation that opportunities for agenda or policy change existed (i.e. the extent to which necessary conditions for problem framing were present) independent from evidence that actors framed a problem as deserving policy intervention at a particular point in time. This furthermore enables a distinction between the time that elapses between certain conditions changing and eventual problem formulation and prioritisation. However, actors generally do not have difficulty in selecting some conditions as a problem that suits their pet policy proposals or, in the case of elected officials, support their perceived chance of (re)election. One may therefore find evidence of some degree of problem stream ripeness regardless of whether a policy window is open or closed [41].

election to the Dáil must be held at least once every five years. Ireland is divided into 39 constituencies and each constituency must elect at least three deputies, called "Teachta Dála" (TD), to the Dáil. The Dáil currently has 158 deputies. Following a general election, TDs elect the Taoiseach (Prime Minister) and Government. Normally the Taoiseach is the leader of the largest party in the Dáil. If no single party has a majority in the Dáil, two or more parties may form a coalition government. Seanad Éireann (the 'Seanad' for short) is the Upper House of the Oireachtas and has 60 Senators. The Taoiseach nominates 11 Senators, the public elects 43 from panels of candidates representing specified vocational interests and 6 members are elected by university graduates of certain universities. The Government is not responsible to the Senate.[22]

The Government is the group of ministers responsible for the executive power of the State. The Taoiseach nominates the Tánaiste (the Deputy Prime Minister) and a Cabinet of between seven and 15 ministers responsible for the departments of government. Members of the Government must be either TDs or Senators, but no more than two Senators may be appointed to the Government. The Taoiseach, the Tánaiste and the Minister for Finance must be TDs. The Taoiseach also appoints an Attorney General to advise the Government on legal issues. The Attorney General is not a member of the Government but they traditionally attend Cabinet meetings.

The Taoiseach is the head of the Government, the spokesperson for the Government on major policy issues and chairs Cabinet meetings. He/She plays a major role in foreign relations, and is Ireland's representative on the European Council. The Taoiseach is, as Mitchell puts it, 'the boss both formally and in practice' in that he has the power to appoint and fire members of the cabinet, although he needs the support of coalition party leaders if he wants to fire cabinet members from other parties.[23]

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[22] However, Ministers have a right to attend the Senate and it is normal practice for the relevant Minister or Minister of State to be present when the House is dealing with their areas of responsibility.

[23] The Taoiseach acts as a channel of communication between the Government and the President. The President of Ireland is the head of State, elected directly by the people of Ireland for a seven-year term in office. Many of the powers of the President can only be exercised on

From 1989 to 2016, all Irish governments have been coalitions. From 1989 to 2017, Fianna Fáil (traditionally the strongest Irish party with the most terms in government) led eight of the twelve cabinets that have formed, all of them coalitions. Even the governments formed in 2016 and 2017, although not technically coalitions, were none the less minority governments with Fine Gael and independent cabinet ministers governing with the support of an external arrangement with Fianna Fáil (then the main opposition party).

As Mitchell argues, coalition government agreements, sometimes termed the Programme for Government (PfG), have become much more important over time in setting the agenda for the term of a coalition government, including the plan of work for senior civil servants (Mitchell, 2020). For instance, in an analysis of the implementation of the 2011 Fine Gael-Labour coalition's PfG, Costello et al found that 78% of all election pledges in the PfG were fulfilled at least in part, compared to 46% of other pledges (Costello et al 2016, 37). This study therefore takes the PfGs over the period 1999 – 2020 as a central data source for governments' agendas.

Government portfolio allocations are decided during the coalition negotiations and although fairly proportional, smaller coalition parties are often able to gain one 'extra' cabinet position. It also seems like coalition parties are often able to secure the portfolios central to their core policy concerns. For instance, the social welfare portfolio has gone to a Labour party minister in six of the eight coalitions the party has agreed to. More recently the Green Party has secured environment and energy policy portfolios for both of the coalitions it participated in.

There is a far reaching division of labour within the cabinet with the cabinet minister for a particular department holding considerable power to determine which policies from his/her apartment he/she brings to the cabinet for formal decision-making (Mitchell, 2020). In addition, special advisors to ministers and

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the advice of the Government. However, in limited areas the President has absolute discretion, such as referring a Bill to the Supreme Court for a judgement on its constitutionality. The President formally appoints the Toaiseach as nominated by the Dail, and appoints the Government and Attorney General as nominated by the Taoiseach. When a Bill, a proposal for legislation, has passed both Houses of the Oireachtas, the President signs it into law. In this study, the President is considered largely as a symbolic figurehead, though the process tracing remains open to identifying presidential influence on the topic of OFW if it is reflected in Oireachtas debates or key informant interviews.

cabinet sub-committees may further discuss and negotiate technical but contentious parts of policy proposals. The cabinet only tends to makes decisions on the 'broad principles' of policy proposals, with a particular eye on their 'political implications'.

The Constitution somewhat prescribes the cabinet decision-making 'style' by holding the cabinet collectively responsible for the functioning of the departments of state and requiring the Government to act as a collective authority. This normally denies ministers the right to record private dissent or public opposition to cabinet decisions, although there are historic exceptions (Farrell, 1993, 174). Bringing together both the departmental agenda setting power of ministers and the collective decision making power of the cabinet in the implementation of the PfG requires this study to consider data on the agendas of the cabinet and several ministers and their departments implicated in OFW policy making. This requires considering at least the departments with the mandates for marine planning, energy and climate change policy, noting that these portfolios may shift between governments, sometimes combining in the same department and sometimes not. It also requires paying close attention to the interplay between these departmental agendas and the cabinet, particularly whether cabinets sought to play a coordinating role at different points in time.

TDs have national and local responsibilities. Representing their constituents, a TD can ask questions in the Dáil that are important to their constituents. They can propose new legislation, even if they are not part of the government (referred to as 'Private Member's Bills'). They debate proposed legislation, examine drafts and suggest amendments. Finally, they vote on the legislation, which, if it passes, will go to the Senate to be debated and voted on. A TD can sit on a specialist committee, which can advise the Dáil on legislative, social, economic and financial issues, or examine the work of a particular government department, or examine draft legislation.

Oireachtas Committees conduct much of the work of the Dáil and Senate. Each House may form Committees for particular purposes. Select Committees have the power to take oral and written evidence and seek documents. Joint Committees are Select Committees of each House sitting and voting together. Committees often invite voluntary and community organisations and/or experts to make submissions to them on various issues and such organisations often ask to make submissions. Much of committee work, including presentation or submissions by external groups are on record. This therefore forms a key source of data on the agenda of the legislature and decision-making processes on key pieces of legislation, as well as the attempts of various groups to lobby government or in some instances the recommendations of policy makers.

The Oireachtas is the only institution of the Irish State that can make laws, called primary legislation. Legislation starts as a Bill and must pass through five stages in the Dail and Senate. A Bill may begin in either the Dáil or the Senate but usually commences in the Dáil. Bills for tax or spending by the Government (called “money bills”) or to amend the Constitution can only be commenced in the Dail. Bills are commenced by a Minister of State (Government Bills) or by a TD or Senator who is not part of the Government (Private Member’s Bills). A ‘general scheme’ of the Bill is often published and sometimes undergoes pre-legislative scrutiny by an Oireachtas Committee before it is put to the house where it was commenced. The Committee may invite representatives of affected groups to meet and discuss the Bill. After commencement, the Bill is put before the same House for a general debate. Members of the House may make suggestions for amendments and additions. The House decides if the Bill should pass this stage and move on to the Committee Stage. A Committee then debates each individual section of the Bill and proposes amendments to the relevant Minister who may accept or reject these subject to a committee vote. Once the committee completes its work, the Bill goes back to the House that commenced it and Members have limited opportunity to debate amendments from the committee stage before progressing to a vote. If it passes the vote it moves to the next House where it goes through the preceding stages again. Amendments made by the second house can be rejected by the first House. Although Ireland has a bicameral legislature, it should be noted that the Seanad can at most delay a bill for 90 days, with the Dáil ultimately holding the power to pass legislation.

Some Acts of the Oireachtas allow Minister, local authority, or another body, to make regulations or add details about how a particular provision under an Act will operate in practice. These regulations are secondary legislation. A Minister makes regulations by signing a Statutory Instrument (SI). The majority of laws that are introduced each year are SIs. Local authorities pass bye-laws to make regulations for their local authority areas. A Minister can sign a SI into law without needing to pass a Bill through the Houses of the Oireacthas, but the SI cannot exceed the powers that are granted by the governing Act under which it falls. The courts may strike down a law if the Minister has acted *ultra vires*. It is common for the Government to use SIs to transpose EU Directives into Irish law.

Most public policy-making in Ireland takes place within state departments where the responsible Minister has clear agenda setting power (Mitchell, 2020). Civil servants undertake the brunt of policy making. A Green Paper is a discussion document, usually written by civil servants, that outlines a policy issue along with various policy alternatives and their advantages and disadvantages. Generally, the responsible department hosts a public consultation through written submissions on proposed alternatives in a Green Paper. After this process is complete, it draws up a White Paper, which sets out the Government's policy on the issue. The relevant department then moves to implement the White Paper. Sometimes the aforementioned process occurs but the titles Green and White Papers are not used. Drafts for consultation may be called discussion documents, and the final policy may be called an action plan, a strategy, or something similar. The government may publish such policies but fail to implement all or part of it.

The Irish civil service carries out the work of Government and delivers public services. Civil servants are the permanent staff of departments of state. In addition to ‘running the country’ the civil service advises the Government on the implementation of policy and helps prepare and draft new policy and legislation. Civil servants therefore play a key role in providing feedback on the implementation of policy as well as drafting the content of new policy, some of which may be SI’s or Bills for the Oireachtas. Many policy ideas and alternatives are therefore discussed and narrowed down by civil servants before draft legislation reaches the Oireachtas. Civil servants play a key role in commissioning the analysis and research that underpins the drafting of policy. The Minister for a Department recommends the Secretary General for the department for a period of 7 years. Below the Secretary General, there are a number of Assistant Secretaries, who are each responsible for specific areas of work in the Department. In instances where civil servants draft policy, individual Principal Officers can often have a key role as the senior managers that oversee the operational teams tasked with the drafting of policy or commissioning of external consultants. Principal Officers often act as departmental representatives at Oireachtas Committees and can represent the department (and state) at European and international level.

The fact that Ireland has a liberalised electricity sector also adds institutional divisions of labour and power to decision-making. The 1999 Electricity Regulation Act 1999 established an independent electricity regulator, the Commission for Electricity Regulation, and gave it the power to grant licences to generate and supply electricity and to grant authorisations to construct generating stations and to provide access to the transmission or distribution system to holders of licences. Subsequent SIs have expanded the regulator's functions and it was renamed the Commission for Regulating Utilities (CRU) in 2017, including both energy and water utilities. Concerning energy, CRU's legal mandate now includes protecting the interests of energy customers, maintaining security of supply, and promoting competition in the generation and supply of electricity and supply of natural gas. CRU jointly regulates the all-island wholesale Single Electricity Market (SEM) with the Utility Regulator in Northern Ireland. The most immediate implication of this statutory responsibility for the deployment of OFW is that the regulator decides the grid connection policy (the terms for connection to, and use of, the transmission and distribution grid by generators), including the method for determining the split of the connection costs between the applicant and the system operator.

In 2001, CER issued a Transmission System Operator (TSO) Licence to EirGrid plc. Complex and protracted negotiations lasted several years to unbundle Eirgrid from the Electricity Supply Board (ESB). In 2006 Eirgrid formally assumed the function of TSO and Market Operator. Several SIs elaborate the statutory terms of Eirgrid's functions and relationship to the Minister, ESB and the regulator. Importantly, Eirgrid has the exclusive function to operate and, where necessary, develop a "safe, secure, reliable, economical and efficient" electricity transmission system, and to develop opportunities for interconnection with other systems (Government of Ireland, 2000). It also has to ensure the availability of all ancillary services, including system services, necessary to carry out this duty. In discharging its functions, it is required to minimize the overall costs of the generation, transmission, distribution and supply of electricity to final customers.

Importantly, the minister with the energy mandate retains the power to direct the regulator on the imposition of a Public Service Obligation (PSO) levied on final customers via the system operators in order to achieve certain obligations relating to security of supply, regularity, quality and price of supply, environmental protection and use of indigenous energy sources. The government uses the PSO to fund the additional cost of producing electricity from indigenous fuel or renewable forms of energy resulting from a competitive process established by the Minister of energy. Other than this, the Minister does not have formal power to direct the regulator or transmission system operator on particular matters of promoting renewables, grid development or connection policy.

In Ireland, interest groups can lobby policy makers inside and outside of the government off the record, including ministers and civil servants. In addition, state departments, the legislature and the regulator hosts formal public consultations on draft policies. If interest groups want to participate in such consultations they have to submit written responses to public consultations or present at public hearings on the record (in the case of the Oireachtas Committees). These submissions form a key source of data as interest groups make their positions on relevant policies public. I therefore pay attention to the written and oral submissions of interest groups to such consultations and forums, supplemented with key informant interviews to gain insight into advocacy that happened off the record.

Finally, the concept of ‘public mood’ needs to be operationalised for this study. Given the focus on OFW, it raises the question of the object of the public mood in question. Would this be a marked shift in public opinion on OFW, or some related matter? Here I follow more recent practice in MSF literature that makes extensive use of opinion poll data on relevant issues as a proxy for public mood (Zohlnhöfer, Herweg and Zahariadis, 2022). In this instance, there is very limited evidence on Irish public opinion on OFW in particular. Opinion surveys on this issue only commenced fairly recently (Cronin and Cummins, 2020; Cronin, Wolsztynski and Cummins, 2020). There is otherwise a smattering of remarks in the Oireacthas record, by a few TDs, which may serve as a signal that at least some of their constituents had a strong feeling on the matter. There are, however, two related issues where there is both a strong link to the fortunes of OFW and more substantial data. The first issue is public opinion on climate change and the governments' actions on the issue. In the case of Ireland, it is reasonable to assume that when a large majority of the public strongly supports more ambitious government action to fight climate change then a policy window will open more widely to support OFW. Conversely, when there is little or no public support for a government to take action on climate change, the opportunity to make the case for policy support for OFW will be more precarious. There is a strong record of public opinion data on climate change and related government policy for the Republic of Ireland from 2008 onwards. For the purposes of process tracing, opinion poll data can be triangulated with statements by TDs, Ministers and key informant interviews to analyse if and how these factored in as contextual conditions or even causal mechanisms in agenda setting. The QCA requires a more restricted approach and relies on the extensive history of Eurobarometer polls of Irish opinions on climate change and related policies. I provide an explanation of this approach in Appendix A.

In considering the above it is necessary to clarify the conceptual distinction between a policy window opening in the politics stream and the stream being ready for coupling. MSF theory claims that a policy window opens in the politics stream when either there is a change in government or a dramatic shift in public mood. By definition therefore, this study counts every general election and every ministerial change in a relevant department as a policy window, regardless of whether parties included OFW in their election manifestos for a particular general election, or regardless of a particular minister's stance on OFW when taking the reins of a relevant department.

The stream is ready for coupling when prioritisation of an issue is aligned with government ideology or election manifestos, and when policy makers perceive a supportive public mood on the issue and when interest groups do not oppose the issue's agenda status. Given the diverse sources of data being considered, the process tracing should clarify if and how such policy windows and stream ripeness contributed to OFW making it on to the Irish political agenda (and the adoption of policies). However, the QCA again requires more restrictive simplifying assumptions to define sets. Most importantly, the QCA for this study only calibrates changes in government and the balance of influence amongst interest groups for scoring cases on the readiness of the politics stream, whilst classifying public support for climate action as contributing to policy windows opening in the politics stream.

3.3.3. Policy stream

Operationalising the policy stream requires an initial mapping of the "loose connection" of civil servants, interest groups, academics, researchers and consultants who work out alternative solutions for OFW policy in the ROI. Analysis of the policy community in Ireland is simplified by the small scale of the country. However, given the long period of interest and the coincidence with the liberalisation of the energy sector, the cast of characters (both individuals and institutions) and their relative importance is expected to change over time. Below I provide a brief summary of the main institutions expected to be implicated in OFW policy in Ireland.

The Electricity Supply Board (ESB) occupied a central position in electricity policy as the state-owned, vertically integrated public utility responsible for generation, transmission and distribution until the 1999 Electricity Regulation Act (Gaffney, Deane and Gallachóir, 2017). Subsequently, its subsidiaries still maintained the locus for technical expertise on electricity and hence policy influence throughout its unbundling. In due course, the new TSO, Eirgrid, was unbundled from ESB National Grid and became another centre of electricity policy influence. Over time the independent electricity regulator, first the Commission of Electricity Regulation (CER) and later the Commission for Regulating Utilities (CRU), came to exercise significant influence through the powers vested in it by the 1999 Act. In the late 1990s the government also established Sustainable Energy Ireland (SEI) which subsequently became the Sustainable Energy Authority of Ireland (SEAI), a state agency accountable to the department with the energy mandate, with a mandate to commission analysis to provide the evidence base for certain policy alternatives. Alongside these institutions, the state department of energy convened partially formalised specialist working groups focused on particular discreet policy challenges associated with renewable energy deployment. Experts from academic and other institutions, most notably University College Dublin (UCD) and University College Cork (UCC), and the Economic and Social Research Institutes (ESRI) and SEAI constituted these groups alongside ESB and Eirgrid. ESRI appears to hold a sustained influence given its uncontested position as an ‘independent’ economic advisor to various governments on energy, economic and climate change matters. In addition, in 2009 the government initiated funding for an Irish energy systems modelling community headed by researchers at UCC whose expertise, over time, appeared to be largely uncontested in Ireland (at least, no comparable centres of energy systems modelling competence existed in Ireland). Over time, as the onshore wind industry expanded in Ireland, the Irish Wind Energy Agency (IWEA) became the uncontested advocate for sectoral interests developing substantial policy proposals to advocate governments with.

With a population of less than five million and a relatively young renewable energy policy community which only emerged in the late 1990s, it is therefore possible to form a comprehensive view of whose expertise mattered in the community, simply because there is unlikely to be much fragmentation and competition. In fact, it is the infrequent ruptures within the largely coherent Irish renewable policy community, when new ‘outsider’ specialists are brought in (usually through a new commissioning agent) or radical politicians try to circumvent a broad if implicit consensus position within the policy community, which sheds light on where influence mostly lies.

As noted in Chapter 2.3.6, operationalising the concept of policy stream readiness for OFW in ROI requires further specification. I define policy stream readiness by degree to the extent that widespread agreement is reached within the policy community on several policies necessary to support the deployment of OFW. These policies include a long-term target for OFW, a price support instrument for renewables, a connection policy for wind energy, and marine planning legislation that explicitly accommodates the peculiarities of OFW.

As noted, one key challenge is to define when exactly a policy alternative counts as a viable solution. Consider the following example. A policy community has largely agreed that the lack of OFW is a problem that requires some attention. For a price support instrument, an almost completely worked-out solution already exists; everyone is aware of the REFIT that they had developed and the government had implemented for onshore wind and the success of the

REFIT in delivering on the onshore wind target they had set. Most actors in the policy stream agree that, generally, a REFIT is the best alternative to reaching the renewables target, particular compared to the failures of the preceding auction scheme. In one sense then, a viable policy solution clearly exists. Adapting the extant REFIT for OFW will require minimal analysis and 'benchmarking' of some of the current REFIT terms (e.g. a reasonable REFIT rate for OFW given current market conditions). However, it is exactly the few outstanding terms of an offshore REFIT which may be the most politically contentious. Policy makers may agree that an OFW REFIT is technically feasible but disagree strongly on whether the impact of such a new higher REFIT rate for OFW on electricity consumers is justified – i.e. it may not be consistent with the values of the policy community, entailing intolerable financial costs, or rejection from ultimate decision-makers. According to MSF theory, the policy stream is not ripe for coupling in this instance as the policy community does not have a widely accepted solution for OFW. However, perhaps more pragmatically, the policy community has a policy solution (in the shape of a REFIT), the question is rather whether the balance of power in government is in favour of transferring additional costs on to electricity consumers.

If policy stream readiness is a precondition for agenda change (as per the general hypothesis), it appears that the alternative definitions may contribute to significantly varying results when testing the hypothesis. Defining readiness in the latter way may serve the hypothesis, and defining it the former way may undermine the hypothesis. For instance, it appears highly unlikely that a policy community would work out all the design specification for implementing a REFIT for OFW prior to that technology being on the political agenda, though the community may well have converged on a REFIT as a generally viable policy solution to support renewables. It would be far more reasonable to propose a REFIT as a general solution, but leave the detailed designed terms until there's political agreement in government that a cost premium is justifiable in principle; after agenda setting, but before decision making.

The process tracing remains open to the contingent sequence of events that constituted the ripening of the policy stream in Ireland at various points in time. This in turn offers useful empirical evidence for revisiting theoretical ambiguities. However, for the purposes of hypothesis testing the QCA requires a clear definition which I elaborate in Appendix A and which draws on the findings of the process tracing.

3.3.4. Entrepreneurs, entrepreneurship, and coupling

There is a two-part logic to operationalising the concept of policy entrepreneurship and coupling for OFW. Firstly, an actor needs to make an argument that OFW is a solution to at least one policy problem. For instance, OFW may (partially) solve the problem of national energy insecurity, or may solve the problem of meeting a climate change target. This may also entail making an argument that OFW is a better solution to a problem than other proffered solutions, or that it is necessary alongside other solutions. Once OFW's status as a solution to one or more problems is either widely established or assumed, the *absence* of the technology becomes the problem that requires a policy solution. Policy alternatives for a price support instrument, grid development/connection policy, and marine planning legislation then needs to be proposed to solve the latter problem. This two-part conception of OFW as both a policy solution (to other problems) and itself a policy problem in need of further policy solutions appears necessary to account for the messy reality.

There is a long history of governments adopting technology-specific renewable energy targets (such as a % of the total energy mix or a specific capacity amount). Targets may not in and of themselves be detailed policies, but may none the less be a substantial policy position for a government to take.

I therefore take either step as an instance of coupling:

- Promoting OFW as a solution to one or more policy problems, usually in the pursuit of getting a government to adopt a technology-specific target as instrumental to further policy development
- Promoting specific policy solutions for the deployment of OFW, including price support instruments, grid development and connection policy, and marine planning legislation

Based on this distinction, the QCA calibrates entrepreneurship as a matter of degree to the extent that coupling can be identified for each of the policy elements: targets, price support instruments, grid connection and marine planning legislation (refer to Appendix A).

The two-part distinction also appear necessary given the policy domain of interest, namely an *energy transition*. An energy transition, by definition, involves switching between different fuel sources, or in the case of renewable electricity, a new technology driven by a particular renewable source (Smil, 2016). The first issue, invariably, is to provide reasons why a particular technology (usually in the context of a mix of technologies) is the best alternative for switching from the status quo energy mix. Championing the inclusion of a particular technology as a necessary part of the energy transition may precede any policy entrepreneurship to propose particular policy alternatives to support the deployment of the technology. This may be particularly true for Ireland where it is doubtful that industrial or economic development rationales had a central legitimating function given the lack of prior relevant industrial sectors.

In the Irish case study, I identify entrepreneurial actors in numerous ways. Firstly, an Oireachtas record spanning over two decades provides strong evidence of the TDs who concerned themselves with the issue of OFW and the extent of their genuine policy interest in the matter (see for instance Figure 4). The transcripts of Oireachtas working groups also offer insight on other actors, not elected officials, proposing policy solutions for supporting offshore wind deployment. There is therefore significant data to identify political entrepreneurs, and to the extent that TDs did substantial work on policies, identify policy entrepreneurs too. Another way to trace potential policy entrepreneurs is through their commissioning of analysis to provide the evidence base for certain policies. This area is more opaque in some instances. Relevant line ministries and the TSO do not always publish the reports they commission. Often, particular civil servants may remain hidden behind departmental reports and consultations, never explicitly named. In the case of Ireland, I use many technical reports and consultations available online to piece together a relatively coherent account of where entrepreneurial actors made a difference and triangulate this with data from key informant interviews. The regulator is also obliged to publish all its consultations and responses, offering another extensive source of data. Finally, key informant interviews often reference key actors involved.

3.3.5. Setting agendas and making decisions on OFW

The structural distinctions between agendas are necessary to explain overall governmental agenda change, and perhaps eventually policy change, on an issue that may involve several government institution. For Ireland, I look at several different institutional agendas:

- the cabinet (the executive, also simply referred to as the government),
- specialized line ministries with mandates for energy or marine domains (represented on the cabinet by a Minister, but with distinct, and sometimes ambiguous sectorial agendas)
- the Oireachtas (the legislature); the primary forum for exchange between elected officials from the governing and opposition parties,
- The electricity regulator
- The transmission system operator

I construct the ‘agenda’ for each of the above in different ways. As a bare minimum, this study considers whether TDs discuss OFW in the Oireachtas, and whether the TDs are representing opposition parties or the government. Not all mentions of offshore wind may signal that it is genuinely an important issue to the relevant minister or civil servants in the department, but many questions and answers over an extended period of time can serve to identify how much time officials are actually spending on developing policies and legislation. Opposition parties, particularly shadow ministers, serve to highlight when a government is not paying attention to a particular matter. Repeated questions over a lack of policy on a particular matter, or delays in legislative reform also prove insightful. Where issues escalate from the ministerial or departmental agenda to the cabinet, more inferences are required. In some instances, policy statements (issued by the government) on an issue implicate the cabinet and signals its interest, and again lack of such statements can prove insightful. Key informant interviews, particularly of senior civil servants prove useful to understand the interplay between department work and the cabinet and the agendas of key civil servants, along with the allocated institutional capacity to follow through on relevant policy work.

Law obliges the regulator to conduct extensive consultations for all of its decisions, including grid connection policy. These along with written stakeholder responses form the key sources of data from which to reconstruct the extent to which connection of offshore wind to the grid proved a matter of policy importance and the stance of interest groups.

In discussing the empirical findings, I make judgements on how important exactly the issue of offshore wind deployment was to the relevant actors and institutions at particular points in time, by triangulating diverse sources of data. One contribution of this study is a clearer understanding of the interplay between the plurality of institutional agendas and what it looks like when offshore wind is on “*the* agenda” *tout court*.

Distinct, often legally defined, institutional mandates also influences how exactly offshore wind may feature on agendas in different ways. A government may, for instance, adopt a technology-specific target for deployment of offshore wind, which may affect different line departments in different ways. One department may have the mandate to issue a price support instrument, whilst another the mandate to reform marine planning. Whilst the government target may prove influential across all implicated departments, it may also enjoy variable agenda status in the respective departments. Furthermore, certain policies or instruments can be issued by an individual ministry or through the executive (cabinet) whilst others may have to pass through the legislature as a bill.

Offshore wind is on an institutional agenda when the institution allocates time and resources to consider how it may support the deployment of the technology within its legally prescribed mandate. When a senior representative of the institution makes a verifiable claim that it is considering a policy (-ies) vis-à-vis the deployment of OFW, then offshore wind is on the agenda.

When shifting to the ‘decision-making phase’ in the policy cycle, the agenda becomes more explicit in some instances. If new legislation is required, such as an overhaul of the Foreshore Acts 1933, the Oireachtas may debate it at length and the working out of the final text (and the discarded alternatives) is on the public record. When a non-legislative route is chosen for some policies, for instance the development of the Renewable Electricity Support Scheme (RESS) auctions, there is often also a published trail of departmental consultations, including draft and final Terms and Conditions. Where this is absent, such as with the Alternative Energy Requirement (AER) auction scheme in the late

1990s and early 2000s, key informant interviews are particularly important to fill the gap.

In conclusion, the operationalisation of the generic MSF across all of the structural elements for the issue of OFW in the ROI is summarised in Table 3. Further specifications for turning this into set definitions for the QCA is provided in the next section.

3.4. Justification for a Qualitative Comparative Analysis (QCA)

Almost no research within the MSF tradition has produced explicit hypotheses (Zohlnhöfer, Herweg and Zahariadis, 2022). Recently, several scholars have specified generic hypotheses for MSF-inspired work and called for more empirical studies to test these hypotheses for the sake of coherent knowledge accumulation (Herweg, Huß and Zohlnhöfer, 2015; Herweg, Wurster and Dümig, 2018). As noted, my study uses the MSF to loosely guide the collection of data for process tracing (refer to Chapter 2). In addition it sets out to test the general MSF hypothesis. To achieve the latter, I employ the set-theoretic QCA method. Figure 1 presents a schematic for how the QCA hypothesis testing contributes to the objectives of the study and interacts with the development of the in-depth case study research. In performing the QCA, this study moves from considering the history of Irish agenda setting for OFW as a few cases spanning several years, to analysing it as many, short-lived cases, each spanning six months. I essentially cut 21 years into many smaller time slices, each representing a (brief) case. In this section I justify this use of QCA to test the MSF hypothesis.

Since its development in the late 1980s, QCA has gained popularity due to its ability to combine certain features of qualitative and quantitative methods, particularly when dealing with a small or medium sized sample, along with increasingly sophisticated software applications (Berg-Schlosser *et al.*, 2009; Oana, Schneider and Thomann, 2021). QCA is a set-theoretic method that consists in a systematic comparison of cases where the relation between phenomena can be conceived in terms of set relations and causal complexity. In terms of set relations, a case's membership in one or more sets may be necessary and/or sufficient for its membership in the outcome set of interest. In terms of causal complexity, sets are combined with logical operators AND, OR and NOT, to analyse the complex configurations of conditions associated with a particular outcome (set).

The above characteristics strengthens the case for using QCA for interrogating MSF-inspired research questions or hypotheses. As noted, the MSF hypothesis can be interpreted structurally as claiming that certain complex configurations of conditions make agenda change more probable. By implication, some complex configurations of conditions do not make agenda change more probable, or make it less probable.[24] The necessity to consider all the logically possible configurations of conditions that MSF associates with the outcome of interest (and the lack thereof), means that the risk of frequent unintentional oversights is significant if a purely qualitative narrative-driven abduction is used. Software tools such as the packages SetMethods and QCA in R enable a rigorous set method analysis of complex regularities in a wide array of qualitative data over a very long period of time that simply is not possible with other qualitative methods.

The MSF hypothesis is probabilistic in nature, whilst QCA adopts a complex but deterministic causality. However, in its application, the heuristics employed and recommended by QCA best practice depart from strict mathematical definitions of necessity and sufficiency (Oana, Schneider and Thomann, 2021). For instance, the literature recommends that if 90% of cases in a sample display a relation where a certain condition is a superset of an outcome, we can attribute a relationship of *necessity* to it. In QCA terms, the consistency threshold above which a condition could be considered necessary should not be smaller than 0.9. Likewise, if 80% of cases in a sample display a relation where a certain condition is a subset of an outcome, we can attribute a relationship of *sufficiency* to it. In QCA term, the consistency threshold above which a condition could be considered sufficient should not be smaller than 0.8. R packages QCA and SetMethods enable advance calculations of parameters of fit that indicate the degree that data vary from perfect set relations, and enable researchers to assess the goodness and strength of set relations.

In addition, advances in QCA methodology have also delivered several proposals for incorporating temporality into QCA, whilst several empirical studies have demonstrated the advantages and limitations of such proposals (Caren and Panofsky, 2005; Schneider and Wagemann, 2006; Ragin and Strand, 2008; Baumgartner, 2009, 2013; Fischer and Maggetti, 2016; Paykani, Rafiey and Sajjadi, 2018). However, as Oana et al. and Beach point out, none of these available strategies can attain the level of complexity and sophistication in handling time that within-case process tracing can achieve and hence ‘grappling with the time dimension’ should be done at the within-case level

[24] It is an open question whether each condition in configuration is an individual causal mechanisms or whether some or all conditions combine into a single causal mechanism)

(Beach and Pedersen, 2013; Oana, Schneider and Thomann, 2021). Instead, they recommend set-theoretic multi-method (SMMR) research designs which is what this study does; triangulating detailed within-case qualitative data and analysis with QCA (more on this in Section 3.5.5).

I employ QCA as a way to rigorously test if MSF theory can explain the agenda status of OFW in the Republic of Ireland over a 21-year period. However, this does not imply that the design of the QCA itself needs to incorporate temporality in the calibration or definition of sets. Note, the formulation of the general MSF hypothesis is not temporal. Therefore, I propose aligning the temporal scope of individual cases with the expected temporality of agenda change associated with shifting condition. In performing the QCA, this study analyses many, short-lived cases, each spanning six months. This is both appropriate and optimal because the MSF hypothesis is essentially about a configuration of conditions associated with a particular outcome, a change in agenda, where both the outcome and some of the conditions may change at relatively short timeframes; i.e. over a period of months. Central to the MSF tradition is the general question: Why does issue X make it on to the political agenda at time T (and not sooner, or later)? The MSF literature often takes these timeframes over a period spanning several months to a few years. Cutting the Irish case into many short time slices enables a systematic comparison, utilising set-theoretic QCA. In the QCA, I define each case as a six-month time slice, starting on 1 January or 1 July each year for the duration of the case study. I adopt the case naming convention of [YYYY]S1 to name the semesters starting in January and [YYYY]S2 for the semesters starting in July. For instance, the first QCA case will be 1999S1 as that is where my historical research started and the last QCA case will be 2020S1 as that is where I end my historical research.

Decreasing the resolution of the time slices (say to year or more) risk losing key shifts in configurations between conditions and outcomes. As the intensive process tracing makes clear in Chapter 4, conditions within the streams often change in uncoordinated ways and at timeframes of less than a year. Conversely, increasing the resolution of time slices may make the analysis unwieldy and more prone to error and unjustifiable assumptions. Again, as the process tracing makes clear, the timing of many changes in conditions cannot be dated exactly over a history that goes back to 1999. Even when triangulating all the gathered data, certain key moments can only be dated approximately with a margin of error of a few months. Therefore, the results of the process tracing informed the decision to set the temporal resolution of the QCA cases at six months; the optimal balance between the state of the available data, and the theoretical requirements that testing the general MSF hypothesis impose.

This approach to testing the MSF hypothesis is novel. My literature search found only two studies from which I draw some ideas (Sager and Thomann, 2017; Kammermann, 2018). However, neither of these studies focus on the general MSF hypothesis in its entirety, nor energy-related agenda setting, nor a longitudinal comparison. The common practice in MSF-inspired empirical literature is to only present a qualitative narrative that describes a case (or cases) as the unfolding of events, usually over a period of only a few years, followed by a qualitative discussion which usually serves to confirm the MSF or accommodate some case peculiarities with conceptual refinements or additions. The standard qualitative narrative, even if great care is taken to trace the order of events very closely, is a very inexact way of hypothesis testing for MSF given the sheer number of conditions and possible configurations thereof that need to be considered amidst a changing context. It may be prone to oversights, cherry picking of facts to support ‘storytelling’, and confirmation bias. However, the QCA requirement for transparent and clear set definition and explicit rules for calibrating qualitative data to set membership scores, at the very least, drive transparent and consistent application of concepts, and inhibits unacceptably vague concepts and equivocations to some degree. Furthermore, once each condition/set for each time slice case has been quantitised, i.e. assigned a set membership value, QCA software packages in R enable much more complex assessments of the configuration of necessary and/or sufficient conditions associated with the outcome (and the opposite of the outcome). This in turn inhibits selective and or biased emphasis that may enter qualitative narratives. However, as the state of the art QCA textbooks note, there is also an iterative exchange between theory and theory-driven QCA analysis requiring significant flexibility and careful interpretation of results.

For this study, the QCA method therefore serves as a counterweight to the process tracing. As the analysis in Chapter 4.6 makes clear, it also presented me with several surprises in spite of my deep familiarity with the case data. This element of surprise drives a fruitful discussion in the reflective equilibrium between theoretical and empirical work. Furthermore the demanding requirements for transparent set definition, calibration, and analysis in QCA and the concomitant R code (available in the supplementary files folder) supports the review and replicability of work as well as the conduct of similar case studies in other jurisdictions, accelerating the building of a coherent body of knowledge.

3.5. Methods

In this section, I describe the research methods used to identify, collect and analyse data.

3.5.1. Data sources

The operationalised MSF as presented in Table 3 (p. 48), along with recent guidance on conducting MSF-inspired empirical work (Zohlnhöfer, Herweg and Zahariadis, 2022), guided my search for types of sources that would provide data for the possible observable implications of conditions A.1.1 – D.2.4. It led me to identify four categories of data sources, central to answering the research question:

1. Oireachtas transcripts,
2. Policies, regulations, legislation (draft and final versions) and associated consultations
3. Technical reports commissioned by government, regulator, system operators and other relevant policy-making institutions,
4. Interviews from key informant directly involved in policy making relevant to OFW

All of the above sources of data are primary sources, the preferred elements for historical research or the “nuts and bolts of history” as Danto puts it (Danto, 2008). It is a major strength of this study that it includes an extensive and diverse collection of primary sources. I will go through each in turn.

The Houses of the Oireachtas Service publishes a searchable digital archive of transcripts of Dail and Seanad debates, questions and answers, and committee proceedings. This is an invaluable source of information to track political discourse between elected representatives of particular constituencies and parties. It serves as data for what is on the legislative agenda (and what is not) as well as the evolution of ideas that characterise alternative policy positions and the coalitions that adopt these ideas. It is also an invaluable, if sporadic, source of data on the views of non-elected stakeholders, including the regulator, system operators, industry, research community and other experts in and around government. Whilst the Oireachtas transcripts offer an extensive record of the statements of elected officials on the topic of OFW, it only offers direct accounts from non-elected policy makers whenever such actors are invited (or summoned) to present at hearings, hosted by Oireachtas topical committees. There have been a few focused on renewable energy policy, including explicit discussion on OFW, over the period of interest.

Parliamentary debates often provide opportunity for elected officials (often referred to as deputies or TDs) in government to set out government policy, and for opposition parties to ask probing questions of the government or of particular departments. Debates are conducted live and whilst many government officials prepare speeches when they are required to provide detailed feedback on particular issues, the ensuing debates may surprise them and require answers on the spot to unknown (though sometimes anticipated) questions. With the creation of the digital Oireachtas database, elected officials have the option of posing questions in writing and the responding official or department are required to post their response in writing which is then published online by the Houses of the Oireachtas Service. This means that responding officials or departments can verify relevant facts and compile more informative answers (if they chose) before publishing it. Opposition TDs mostly ask questions based on queries they receive from their constituents, or based on their policy area of responsibility within the opposition party. These questions often focus on alternative proposals for controversial policies or legislation under development, perceived policy implementation failures or delay in implementing policies. Written questions and answers and live debates may also signal areas of implicit or explicit cross-party agreement. The questions and answers are limited in length and do not often provide extensive justifications for decisions. However, over time, the exchange between government and opposition TDs through debate and Q&A on a particular issue (such as OFW) serves as a way to track changes in government thinking on an issue, progress in policy development, and ultimately on policy implementation. Data from this source can provide supplementary information to policy documents and technical commissioned reports; including clarification of terms, political emphasis, justifications and progress on policy development and implementation.

In addition, public hearings on particular topics, usually hosted by a cross-party Joint Committee with members of the Dail and Seanad, tally to many hours of detailed presentation and discussion with non-elected policy makers, spread over weeks or months. Invited speakers at such public hearings on energy-related issues usually include the system operators, the regulator, key policy research organisations, and industry and other lobbyists. Importantly the hearings also include presentations from civil servants from line ministries tasked with commissioning policy analysis, developing the content of policies and ultimately implementing policy. This provides invaluable, if sporadic, updates on the detailed views of the policy community on a particular topic. It also provides the only forum where elected officials from opposition parties can engage directly with civil servants on the public record regarding policy development and implementation. These hearings reveal the sentiments of the participants, including tensions between the civil service and elected officials, or conflicting positions or agreement across a range of key policy making stakeholders. Such hearings are of course sporadic, but usually indicate a cross-party interest in a particular matter, with the eye on policy or legislative reform. It also gets into the substantial detail of proposed policies and serves to identify the problem framings, policy ideas and actions of policy entrepreneurs.

During Oireachtas proceedings, participants know that what they are saying/writing will constitute the public record. This may bias both questions and answers in certain systematic ways. In Dail debates, questions and answers, opposition parties will seek to foreground or frame the failures of a government, whilst government officials will seek to promote or frame its successes. Individuals may get certain facts wrong unintentionally (particularly in live exchanges), or may intentionally rely on ambiguity and evasion to avoid certain issues that do not serve their party interests. However, taking many exchanges on a given topic at frequent intervals (every few months) over a period of two decades provides a large source of information (414 retrieved documents) on policy windows, the state of the three streams and the activities of certain problem brokers, policy or political entrepreneurs.

Secondly, this study analysis draft and final policies (including regulations, policies and legislation) as source material (a total of 109 documents). As elaborated in Chapter 2.1, these include price support instruments, connection policy, marine planning legislation, and national renewable energy and climate change policies more generally (including energy white papers and climate change national ‘plans’ or ‘strategies). In all instances, the final policies embody the decisions made by policy makers. Often they also offer partial justifications for making such decisions and the wider context that informed the policy. In many instances, the responsible authorities also publish a draft policy for public consultation. This offers an invaluable comparison to trace how ideas evolved over the period of policy making. Often the first and final draft may be a year or more apart and contain substantial differences. In some cases, such as marine legislation or grid connection policy, the responsible authority is required to publish a draft along with the responses to the public consultation. In these instances, there is extensive written accounts of stakeholder’s position on draft policy and recommendations for alterations to the final policy. The study discovered relevant policies, legislation and regulations through extensive Google searches. Institutional websites host most of these in searchable databases, including the regulator, the system operators, and government departments. Some requests were made to institutions for policy documents that I could not find through online searches.

The Oireachtas record, policy documents and related consultations, taken together, offers a substantial but still incomplete account of the agenda setting and policymaking process. Civil servants, the system operators, the regulator, and certain other policy actors engage and consult each other in a sustained manner, through frequent meetings, off the public record (Civil servant 15pmi, 2022). However, opportunities (or obligations) to present on the public record may be infrequent. The Oireachtas record and policy drafts are especially patchy at revealing actions and ideas at the ‘pre-decision’ phase of agenda setting. This is predominantly when actors in the policy stream update each other ‘informally’ on developments in the field, discuss challenges and solutions, potential strategies for future agenda setting and policy development, and gaps in knowledge where further information is required to inform the development of viable and feasible alternatives.

This study uses two further categories of sources, often to gain more insight into these pre-decision periods. The first are reports commissioned by different policy makers that contain technical analysis, or the evidence base, underpinning possible policy alternatives. Many of these reports (40 documents in total) are available online or on request. These include studies commissioned or completed by the system operators, government departments and subsidiary government agencies (e.g. SEAI), independent research institutes (e.g. ESRI and the Marine Institute), and universities. It also includes outputs of technical working groups convened by government departments. Such sources are particularly insightful in tracking activity within the policy stream. The energy sector is a technologically complex and knowledge intensive area of policymaking. The costs of policy failures can be catastrophic and there is generally a strong norm (which emerged and expanded during the case study period) to generate a robust evidence base before making a policy decision. Research and analysis are costly activities in a resource-constrained environment that has seen significant and fast technological advances over the period of interest. Given the need for, and cost of, generating an up-to-date evidence base, such reports therefore both serve as a strong signal of the priorities of particular institutions as well as the ideas circulating within the policy stream. However, care needs to be taken when placing these reports in a timeline of events and linking them to ideas and individuals at a point in time. There may be significant, unstated, lags between ultimate (public) publication of a report, the completion of analysis, the commissioning date, and the period prior to commissioning when policy makers first started articulating the questions that formed the reason for the analysis.

Finally, 35 key informant interviews present an essential category of primary data for this study. Key informants directly involved in Irish renewable energy policy offer first-hand accounts of their own and other actors' ideas, activities and strategies. They can 'contextualize' or clarify ambiguous data from documents (the other sources used), fill in gaps in the written records, and/or confirm inferences drawn from the other sources. This is especially helpful for the 'pre-decision' phase of agenda setting or discussion forums where the agenda is not documented or accessible. Sometimes, especially when they have extensive professional experience working on Irish renewable energy policy and a reflexive and critical disposition, they can also offer deeper explanations of the causal mechanisms driving certain changes in agenda and policy. In Section 3.5.3 I provide further details on the key informants I interviews and how I interviewed them.

Arguably, the key risk to having a comprehensive account is the sampling of key informants and their ability and willingness to speak frankly on issues not on the public record.[25] This study put an immense effort into securing a diverse sample of high calibre key informants. The relatively small scale of the Irish state and the associated renewable energy policy community makes it easier to approach an ideal or comprehensive set of primary data. Although Ireland has to contend with all the same technological and associated regulatory and policy challenges of a liberalising and modernising power sector, the number of actors working on this is relatively small. Although there can be lively contestation on key socio-technical alternatives, the pool of implicated experts is small and they tend to having frequent and substantial interactions. This eases the task of the researcher somewhat in sampling key informants and reaching a point of 'saturation' where accounts from a diverse sample largely converge on key points of fact and interpretation. The most significant limitation imposed on the robustness of this study is therefore not the availability of primary data, but rather the interpretative limitations imposed by a limited theoretical point of view and the ability of the researcher to assimilate and analyse the sheer amount of available data.

3.5.2. Documentary analysis

In this section, I describe the documents I analysed (refer to Table 4) and the method for analysing them. A full inventory of all the documents analysed can be accessed in the Nvivo file in the supplementary files link to this thesis.

Table 4: Summary of source materials analyzed for case study

Type of document	***Number of documents***
Parliamentary records: Transcripts of Dail, Seanad and committee debates, and Q&As drawn from Oireachtas database key word search ("offshore wind" and related terms) between 1999 – 2020.	414

[25] Unlike historical research in the pre-digital age, there is an abundance of primary sources to reconstruct the case study and make robust inferences. The legal requirements to publish transcripts of most parliamentary proceedings, and the emergent norms (both legal and extra-legal) for public consultation on government policies are largely to thank for this abundance.

Policies: Party manifestos and Programmes for Government (24); Energy, climate and marine policies (incl. White Papers and Green Papers, Action Plans, RESS auctions and REFIT T&Cs) (31); legislation (draft bills and acts); grid connection and interconnection policy (incl. CER/CRU draft policy proposals and decisions, national policy statements and regional agreements) (45), European policies and legislation (e.g. Directives, Commission decisions, State Aid applications and decisions) (9)	109
Evidence base for policy alternatives: Studies commissioned by system operators, government departments and subsidiary government agencies (e.g. Sustainable Energy Authority of Ireland), independent research institutes (e.g. Economic & Social Science Research Institute, Marine Institute, universities), outputs of departmental working groups	40
Total documents analysed	**563**

This study conducts a thematic coding analysis of all of the above documents, including a combination of deductive and inductive coding (Boyatzis, 1998; Strauss and Corbin, 1998; Robson and McCartan, 2016). Table 5 provides a summary of the Nvivo codes with the associated count of files and references. The Nvivo project file is provided as a supplementary file for further interrogation of the coding framework and data sources. I deductively coded for all of the MSF concepts, as operationalised in Table 7; annual time codes (Code = 'Time'), enabling the temporal ordering of all coded data; and policy categories (Code = 'Policy Mix'). I coded inductively for 'Drivers of Change' to capture data that attribute certain changes in agenda or policy to one or more causal mechanisms. These may or may not be consistent with the MSF hypothesis, but serves as a means to group data on potentially important explanations in the Irish case that may or may not be easily interpreted through the MSF. This may further assist in articulating potential causal mechanisms. This code may also be classified as using a grounded theory approach, not in the overly prescriptive sense of the word, but more generally as a way to accommodate surprises that arise from interacting with the data (Robson and McCartan, 2016). Finally, the code 'Offshore projects of interest' gathers data on particular offshore wind projects that were central in the development of the sector and associated policy.

It is important to clarify the function of the thematic coding of source materials within the study research design. This study does not undertake a content analysis. In interpreting the theoretical import and implications of coded data for explaining the Irish case and testing the MSF hypothesis, there is little to no value in quasi-statistical methods used in content analysis such as counting word frequencies. Rather the thematic coding assist firstly in a careful and slow reading of source materials.

Table 5: Summary of codes used in thematic analysis in Nvivo

Codes

Search Project

Name	Files	References
A. Time	355	1825
B. Policy mix	299	1637
All island market	24	34
Climate change legislation, policies and action plans	25	51
Grid connection & development	111	584
Industrial policy	11	19
Interconnection - Export Import	93	204
Marine consenting & leasing	92	333
Marine Protected Areas	14	24
Miscelaneous energy policy	70	110
Price support instrument	108	223
System services	33	54
C. MSF	350	2895
Agenda window	177	623
Decision window	30	42
Policy entrepreneur	59	153
Policy stream ripeness	165	850
Politics stream ripeness	242	879
Problem stream ripeness	105	262
Spillovers	35	86
D. Drivers of change	165	490
E. Offshore projects of interest	34	79

Secondly, it assists in retrieving data grouped under a particular theme for reconsideration in the qualitative analysis. Given that interviews and document analysis occurred over a period of two years, the retrieval of sets of data coded under relevant themes become immensely valuable as the sheer amount of analysed data increases. Thus, for example, Nvivo enables the retrieval of all the statements from a particular policy entrepreneur, on particular policies over many years. Or, for example, it enables the retrieval of all the data on price support instruments along a time series spanning over 20 years. The ability to explore data through such matrix coding query enables the researcher to process more data, more coherently, and push the threshold of ‘data overload’. However, for the stated objectives of this study it is not necessary to utilise any further formalised or prescriptive methods of thematic analysis. Figure 3 presents the temporal spread of data in terms of the number of documents (‘files’) and individual references in documents coded to the calendar years in

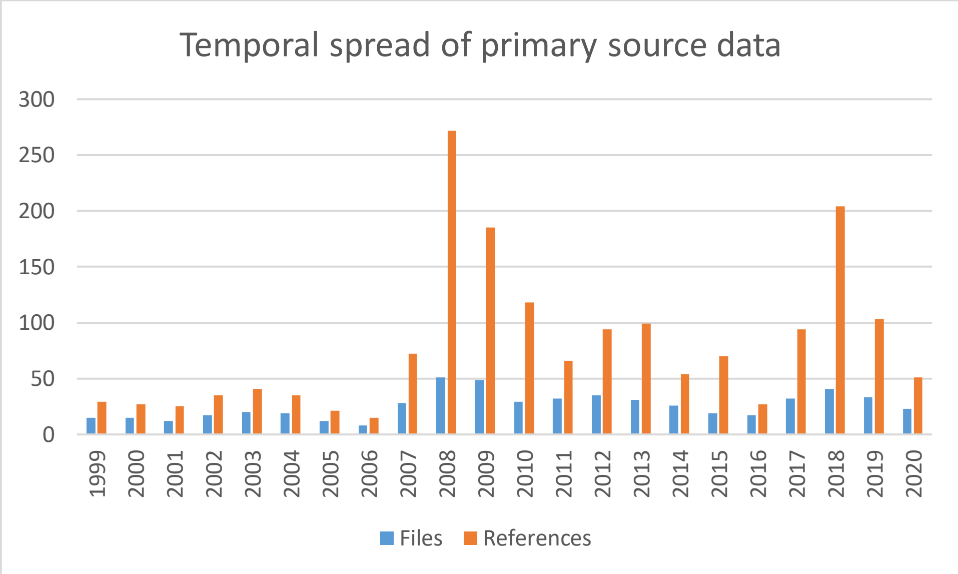


Figure 3: Number of files and individual references coded to calendar years in thematic analysis of source materials

the thematic analysis. Figure 4 presents the elected officials (deputies) who spoke on the topic of OFW most frequently, drawn from a subset of the data, the Oireachtas record. Such visualisations assist in getting a better 'sense' or 'feel' for the coded data. However, the brunt of the interpretative effort resides in a very close reading and qualitative interpretation of the content.

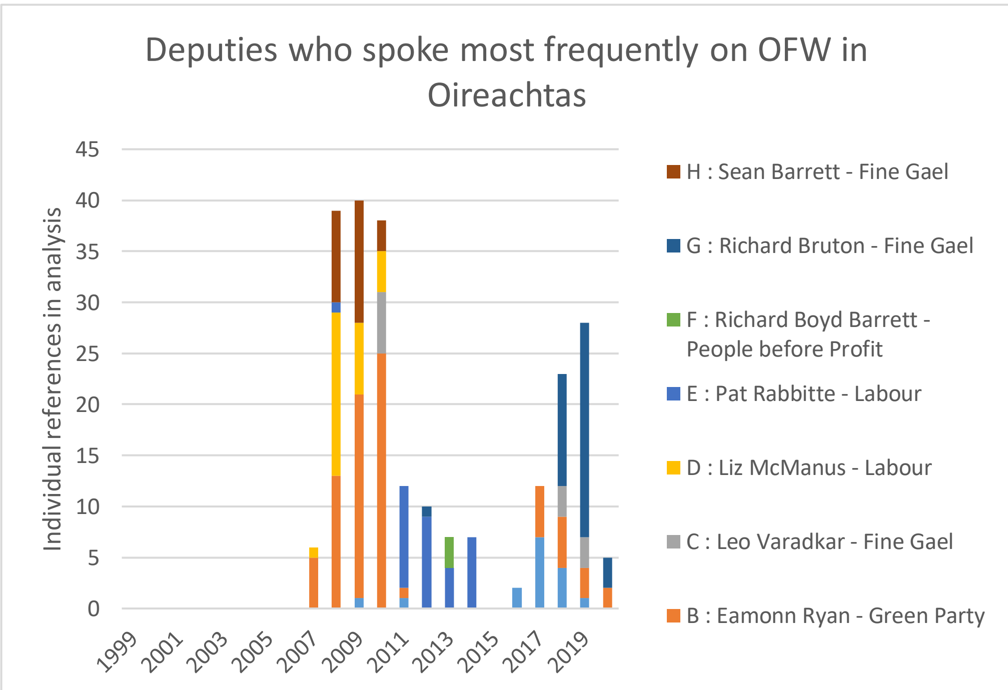


Figure 4: Number of references in thematic analysis to elected officials speaking most frequently on the topic of OFW in the Oireachtas. For all official remarks, refer to the coding framework in the Nvivo study file.

3.5.3. Key informant interviews

Interviewing individuals variously identified as ‘experts’ or ‘elites’ is central to my case study analysis. There is a long history in qualitative research of distinguishing “the influential, the prominent, and the well informed” as a functional category of informants that warrant category-specific methodological considerations(Dexter, 1970, p. 19). For political science research, definitions converge on individuals who have more influence on political outcomes than general members of the public (Richards, 1996).

Whilst the notion of ‘elites’ has enjoyed widespread usage in English (Anglo-American) literature, German literature historically employed the largely overlapping notion of ‘expert’ (Littig, 2009). Littig proposes a useful way to differentiate these notions based on the types of power individuals exercise and the types of knowledge they possess: “Elite have more formative power, because they occupy the positions in which the higher decisions legitimized by this form of power are taken. However, they do not necessarily have significant interpretive power because the experts – with their notions, concepts and relevance – have established themselves the opportunity of conferring or starting to confer meaning to decision and negotiation processes” (Littig, 2009, p. 108).

To some degree, I confer the status of ‘expert’ or ‘elite’ on some individuals in virtue of my research question and research goals. For my case study, expertise consists in an individual having technical, process and interpretative knowledge derived from their professional field of action as it relates to my research question. These include, for example, contributing to the development of specific Irish offshore wind projects, policies or regulations, or generating the evidence base that informed the political choices of interest to my case study research. At the same time, I identify potential experts through their professional, institutional position, for a particular temporal period, as the primary parameter of social recognition of the relevance of their knowledge. This construction of expertise also entails that I can be wrong. Some individuals do not judge themselves, or may not be regarded by others, as experts in relation to my research question. Such individuals may refuse an interview or direct me to another individual who they judge to have knowledge that is more relevant, or their account of certain issues may be contested by others.

I distinguish three types of expert knowledge that structure the aims of my interviews as well as the epistemic status of data derived from these (Bogner and Menz, 2020). Firstly, I employ some interviews, or part of an interview, for exploratory purposes. Here experts assist in my initial orientation within the largest possible context of the case study, helping me to clarify and specify my general hypotheses and ground my framework. These may also serve to highlight new and surprising hypotheses to me. Of course, I never state my hypothesis explicitly, and neither do key informants articulate their own explanations as hypotheses, but these are implicit in some exploratory exchanges. Secondly, I employ most interviews, or the largest part of any interview, to reconstruct and systematize information about particular historical decision points and processes in the case study. Here experts serve as informants, sources for information that would otherwise be inaccessible to me. They may assist in interpreting reports or documents, personalities in processes, providing information not recorded in written records, and access to individuals and networks. The focus here is to gather as much information in a comparative and systematized way in line with my framework and hypothesis. For the first two interview goals, experts do not primarily serve as the object of investigation, but as guides who possess special technical and process information. Thirdly, in some interviews, or part of an interview, the expert is the object of investigation. Here, the subjective dimensions of expert judgement, including their implicit heuristics, theories, maxims, and routines that shape the expert's orientation towards their own expertise and the field within which they act, become the object of the interview. The goal is to reconstruct a configuration of an expert's knowledge, which may have informed their action and the actions of others.

Alongside these three related goals of the expert interview, I also adopt an analytic structuring of experts' knowledge (Bogner and Menz, 2020). Experts possess technical knowledge, which provides a specific advantage to them within their field of professional activity through specialized application to a set of problems. They possess process knowledge of the context within which their technical knowledge is applied; direct involvement in specific processes, events, institutions, and decision-making venues. Lastly, they possess "fragmentary, inconsistent configurations of meaning and patterns of explanation" that Bogner & Menz term interpretative knowledge (Bogner and Menz, 2020, p. 53).

The above distinctions have epistemic implications for the data I derive from my interviews and practical implications for how I conduct interviews. For exploratory and systematizing interviews, more concerned with technical and process knowledge, process tracing techniques and data triangulation between interviews and other data sources offer well-established ways for a rigorous reconstruction of historical facts and processes. However, interpretative knowledge of experts may also have significant causal explanatory value in the context of a national low carbon energy transition, where expert judgements on the technical and political feasibility of certain socio-technical configurations in the context of deep uncertainty may disproportionately structure what counts as meaningful and relevant courses of action. Remaining open to this possibility commits me, to some degree, to ideational theories of change (Carter and Jacobs, 2014). In such instances, it becomes more difficult to triangulate data between interviews or with other sources of data to reconstruct a social objectivity.[26] Practically, it may be very difficult to distinguish between technical knowledge and interpretative knowledge during an interview, given the superior knowledge and power of my interview subjects on the topic of interest. Where I identify such instances in analysis and where it informs theory specification and explanation, I try to be explicit about the epistemic distinction in the results.

The challenges with accessing and interviewing elites and/or experts, along with heuristics to overcome some challenges are well documented (Dexter, 1970; Richards, 1996). Certain individuals or categories of individuals may refuse an interview or be inaccessible. Access tends to become more difficult the higher their social class, or the more widely acknowledged (and demanded) their expertise, whilst some may refuse interviews in general given their institutional position and professional code of ethics (explicit or implicit). Gatekeepers like secretaries, personal assistants, and public relations departments, may mediate access. Convincing intermediaries of the value of the interview to their superior, or using LinkedIn or events, like conferences, to access some elites or experts

[26] Implicit Bayesian logic tests may in some instances supplement interview data to link interpretative knowledge to theoretical hypotheses, but I do not make them an explicit part of my method.

directly is part and parcel of the process. High demand for their time and busy schedules are common, leading to strict prioritization, and reprioritization on short notice. Altruistic and instrumental motives for participation may also bias data, including the opportunity for interviewees to gain useful information, public relations value of cooperating with a well-known research institute, expanding their network, or psychosocial motives like lack of competent people to talk to, loneliness, or the need to influence a written record and interpretation of events they have been closely involved in.

I identified an initial list of key informants through publicly available information linking them directly to particular policies and processes of interest (e.g. through the record of Oireachtas debates and testimony at Oireachtas committee hearings, through written submissions to departmental consultations, and authorship of reports). In 2020, I also undertook a (virtual) research secondment to the Sustainable Energy Authority of Ireland, a state agency largely funded by the Department of Energy. This enabled better access to key civil servants within SEAI and the department for interviews. From these initial interviews, I 'snow balled' additional key informants through chain referrals. My sampling includes representatives from different government departments (civil servants and elected officials), the System Operators (Eirgrid and ESB Networks), the regulator (previously CER, now CRU), offshore wind developers and industry associations, and research institutions.

Table 6 provides a breakdown of the key informant interviews. I used Table 3 to generate a generic interview guide, which I tailored significantly to each key informant. Each interview was thus highly bespoke and carefully tailored to the key informant's work related to OFW policy. I conducted interviews via video or telephone, digitally recorded and transcribed verbatim using Trint. I coded interview transcripts in Nvivo according to the same thematic coding used for the documentary source materials.

*Table 6: Key informant interviews by participant profile, date and duration. * indicates multiple interviews with key informant (refer to Code in table).*

	Participant Profile	***Date***	***Duration***	***Code***
1	Elected Official	19/04/2021	00h49m	24pmi
2	Environmental NGO	21/02/2021	00h50m	11eni
3	Industry association (energy)	18/01/2021	00h36m	10iai
4	Industry association (energy)	29/01/2021	00h46m	14iai
6	Industry association (energy)	14/04/2021	00h48m	23idi
5	Industry association (energy)	29/04/2021	00h38m	25iai
7	Policy maker (civil service, energy)	14/01/2021	01h02m	09pmi
8	Policy maker (civil service, energy)	08/02/2021	00h37m	15pmi
9	Policy maker (civil service, energy)*	20/01/2021	01h07m	09pmi
10	Policy maker (civil service, energy)*	07/11/2022	01h18m	15pmi
11	Policy maker (civil service, energy)*	17/11/2022	01h06m	09pmi
12	Policy maker (civil service, planning)	25/06/2021	01h14m	29pmi
13	Policy maker (marine planning)	12/03/2021	00h40m	18pmi
14	Policy maker (civil service, North-South cooperation)	21/05/2021	00h59m	28pmi
15	Policy research (academic, economic)	17/05/2021	00h54m	27pri
16	Policy research (academic, electricity)	22/07/2020	00h32m	01pri
17	Policy research (academic, electricity)	02/11/2022	01h07m	30rpi
18	Policy research (academic, electricity)	04/11/2022	00h37m	31rpi
19	Policy research (academic, marine governance)	01/03/2021	01h03m	16pri
20	Policy research (government agency, energy)	18/08/2020	01h00m	02pri
21	Policy research (government agency, energy)	04/11/2020	00h55m	04rpi
22	Policy research (government agency, energy)	16/11/2020	00h58m	07rpi
23	Policy research (government agency, marine)	26/03/2021	01h03m	20rpi
24	Regulator (electricity)	10/11/2020	01h08m	06eri
25	Regulator (electricity)	01/04/2021	00h45m	19eri
26	Regulator (electricity)	24/03/2021	00h50m	21eri
27	Transmission System Operator	22/09/2020	01h06m	03soi
28	Transmission System Operator	10/03/2021	00h50m	17soi
29	Transmission System Operator	26/04/2021	00h55m	26soi
30	Transmission System Operator*	28/11/2022	01h06m	17soi
31	Wind farm developer/operator	11/11/2020	00h43m	05idi
32	Wind farm developer/operator	18/11/2020	00h56m	08idi
33	Wind farm developer/operator	29/01/2021	01h08m	12idi
34	Wind farm developer/operator	08/04/2021	00h53m	22pri
35	Wind farm developer/operator	11/11/2022	01h17m	32iai
	TOTAL DURATION OF INTERVIEWS		31h10m	

3.5.4. Qualitative Comparative Analysis method

In this section, I continue on from the justification provided in Chapter 3.4 to use a fsQCA to test the general MSF hypothesis, by a) giving an outline of the QCA methodological steps I follow, b) outlining the approach to hypothesis testing, and c) presenting the fsQCA set definitions and calibration anchors in detail.

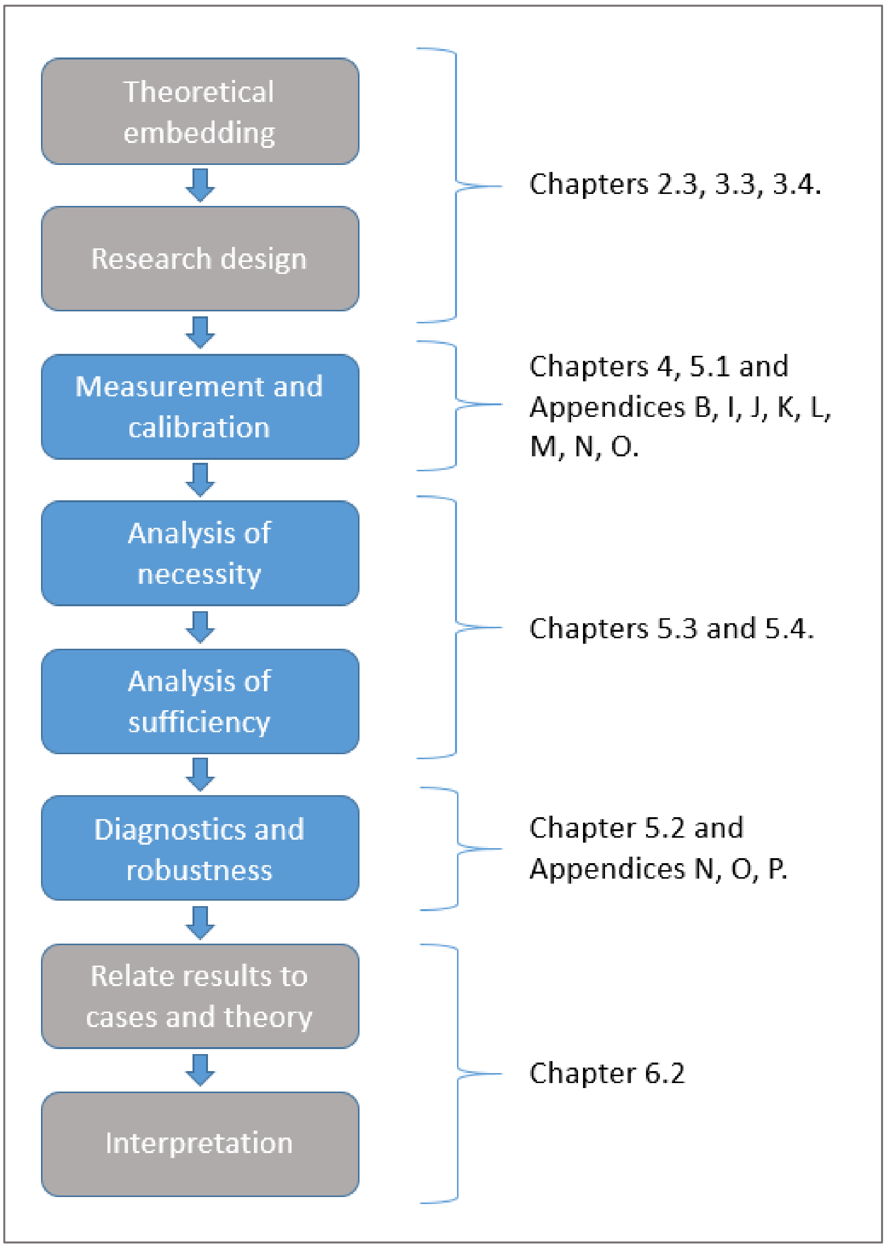


Figure 5: Workflow for conducting QCA in this study, derived from Oana et al (Oana, Schneider and Thomann, 2021).

For conducting this QCA I follow the workflow set out by Oana et al and depicted in Figure 5 (Oana, Schneider and Thomann, 2021). It is important to emphasise the iterative exchange between within-case data and the QCA in this workflow.

It is an open question in the MSF literature whether the set relations in the general hypothesis are of necessity or sufficiency. I consider both interpretations in the QCA.

Hypothesis (1) is a statement of necessity (commonly indicated by a '←'):

It is necessary for a policy window to open in the problem stream (WIND_PR) OR (+) politics stream (WIND_POL), AND (*) the problem stream (PRO_STR), AND (*) politics stream (POL_STR), AND policy stream (POLY_STR) to be ripe for coupling, AND a policy entrepreneur to promote agenda change (ENTR) for agenda change to occur (AC).

Hypothesis (1) in symbolic form:

1. (WIND_PR + WIND_POL) * PRO_STR * POL_STR * POLY_STR * ENTR ← AC

Alternatively, Hypothesis (2) is a statement of sufficiency (commonly indicated by a '→'):

2. (WIND_PR + WIND_POL) * PRO_STR * POL_STR * POLY_STR * ENTR → AC

I test the above hypotheses in two ways. I first run the QCA without specifying the above set relations. The analysis therefore considers each of the conditions (sets) separately and all possible combinations and whether any individual or combination of conditions hold necessary or sufficient relations to the outcome. This approach uses the individual causal mechanisms in the MSF, but does not specify their relations as per the general hypothesis. The set theoretic analysis is therefore blind to the theoretical expectations of the hypotheses, though it is constrained by the individual causal mechanisms calibrated. Hypothesis testing therefore entails seeing if the necessary and/or sufficient conditions that the QCA analysis of empirical data associate with agenda change and the opposite outcome (not-agenda change) are consistent with what we would expect from MSF theory. Over time, if the QCA finds configurations of conditions associated with agenda change consistent with or closely matching those we expect from the MSF hypotheses, such cases would serve to confirm either hypothesis. If we find the expected configurations (or something closely matching this) without agenda change occurring, these would be disconfirming cases for MSF. Secondly, I also manually combine the conditions as per the above hypotheses and consider the diagnostic results for necessity and sufficiency. The set theoretic analysis is therefore limited to consider the exact relation of conditions as per hypothesis (1) and (2) and whether either of these have the expected relation to the outcome. This second approach will simply tell us whether the empirical data support either hypothesis, whereas the first approach will also generate new set theoretic solutions for the outcome based on the data and counterfactuals.

Next, I explain how I define QCA sets, measurements, anchoring and calibration. In QCA, sets always represent concepts. I extend the MSF framework from Table 3 to define QCA sets. Fundamental sets are the logical building blocks of high-order MSF-inspired sets. These form the MSF conditions (or causal mechanisms). I utilize both crisp and fuzzy sets to capture the operationalised concepts from MSF. This is because for many of the MSF concepts, membership is a matter of degree. I use complex qualitative information from the case study for almost all set calibration and never use direct calibration. Table 7 summarizes all of the analytic work.

Appendix A provides extended justifications for set definitions and anchors, including the determination of set membership thresholds of inclusion and exclusion, degrees of set memberships, and the meaning of 'zero' based on qualitative data.

Table 7 represents a summary of all QCA set definitions and calibration anchors and their relation to the MSF concepts. Each of the fundamental sets relate to one fundamental condition (labelled A.1.1.1 – D.2.4). Some of these conditions, in isolation, stand for an MSF concept. For instance, B.1.1.1 stands for problem stream ripeness. However, in many instances, several conditions taken together represent a higher order MSF concept. For instance, A.1.1.1 – A.1.3.1 together stand for a policy window opening in the problem stream. In these instances, fundamental sets are added together using simple operators to form a new set that represents a higher-level MSF concept. Table 7 includes these higher-level sets as well and the operators used for determining their scores, based on their constituent sets (for example AVERAGE or MAXIMUM value). In some instances, there are two tiers of abstraction from a fundamental condition/set, with anchors and calibration based on the qualitative data, to the ultimate MSF concept/set, with calibration based on the logical operator (usually an averaging of constituent set scores).

Finally, in the QCA, the temporal lag between the outcome set, agenda change, and the condition sets need to be accounted for transparently. This requires clarifying two assumptions. Agenda change may follow rapidly on a favourable change in preceding conditions. It may take anything from a few to several months. Secondly, given that my time slices have arbitrary start dates (1 January and 1 July of each year), it may be that changes in conditions in one semester may be responsible for changes in agenda in the following semester. In testing the MSF hypothesis for agenda change, I therefore test how configurations of conditions in a particular semester is associated with agenda status in the same or the next semester. Policy development and adoption may take longer, and range from several months (in the case of a grid connection policy), to several years (in the case of marine planning legislation). However, given how few instances of policy change there are over the period of interest, the set membership is too skew to perform a robust QCA on policy change. The QCA therefore uses the detailed, within-case, qualitative data only to analyse the outcome of agenda status; i.e. whether OFW is on or off the agenda.

Table 7: MSF applied to QCA set definition and calibration

General MSF hypothesis for agenda and policy change:			Examples of possible observable implications	QCA Set Definition	Set Name	Set calibration anchors
Source: Herweg et al (2015), Refer to Chapter 2.2			*Refer to Chapter 2.4*	*Appendix B*	*R analysis*	*Appendix B*
Agenda or policy change becomes more likely if						
A) A policy window opens, AND ↓	A.1) Window opens in problem stream OR ↓	>>>			WIND_PR	AVERAGE (INDI, FB, EVENT)
		A.1.1) When a relevant indicator deteriorates OR	>>		INDI	AVERAGE (ENIMP, CO2, RET)
			A.1.1.1) Energy insecurity: energy import dependence increases significantly or remains at a level deemed as too high.	High energy import dependence	ENIMP	1 = import dependence >= 90%; 0.67 = import dependence 60-89%; 0.33 = import dependence 40-59%; 0 = import dependence <=40
			A.1.1.2) CO2e emissions reductions not tracking long-term target trajectory.	CO2e emissions far above allocation/target	CO2	1 = National GHG emissions far above target trajectory; 0.67 = emissions significantly, but not far, above target trajectory; 0.33 = emissions tracking (or almost) target trajectory; 0 = emissions below target trajectory
			A.1.1.3) MW or % of renewables in electricity mix not tracking long-term target trajectory.	Renewables below target trajectory	RET	1 = % or MW renewables far below target trajectory; 0.67 = % or MW renewable significantly below target trajectory; 0.33 = % or MW renewables tracking (or almost) target trajectory; 0 = % or MW renewables exceed target trajectory
		A.1.2) When feedback points to mismatch between policy goals and effects of policies OR	>>		FB	AVERAGE (FB_GRID, FB_MAR, FB_PRICE)
			A.1.2.1) Feedback on grid connection policy	Regulator hosts public consultation on connection policy	FB_GRID	1 = Consultation period is open; 0 = Consultation period is closed
			A.1.2.2) Feedback on marine planning legislation	Legislation does not enable licencing and consent for OFW development	FB_MAR	1 = Licencing and planning consent for OFW impossible; 0 = licencing and planning consent for OFW possible
			A.1.2.3) Feedback on renewable energy price support instrument	Price support instrument fails to support RE target attainment	FB_PRICE	1 = Extant instrument failing largely to support RE target; 0.67 = Extant instrument failing somewhat to support RE target; 0.33 = Extant instrument largely succeeding to support RE target; 0 = Extant instrument succeeding to support RE target

		A.1.3) When a focusing event occurs	A.1.3.1) Controversial energy projects; gas, wind generation, or transmission infrastructure projects, electricity prices or blackouts. The Irish financial crisis of 2010.	Focusing event strengthens case for OFW	EVENT	1 = Focusing event significantly strengthens case for OFW; 0.67 = Focusing event somewhat strengthens case for OFW; 0 = No Focusing event or Focusing event weakens case for OFW
	A.2) Window opens in politics stream	>>>			WIND_POL	MAX (CHG_GOV, MOOD)
		A.2.1) When there is a change in government OR	A.2.1.1) Elections or change in ministerial positions in any departments with mandate for energy, marine or planning policy	Change in government or relevant minister	CHG_GOV	1 = General election; 0.67 = Ministerial change in relevant department; 0 = No change
		A.2.2) When the national mood shifts	A.2.2.1) National mood shifts on climate change, or particular power generation or transmission technologies	High level of public support for more ambitious climate action	MOOD	1 = strong majority of the public think the government should do more to fight climate change 0.67 = a small majority of the public think the government should do more to fight climate change 0.33 = a large minority of the public think the government should do more to fight climate change 0 = a small minority of the public think the government should do more to fight climate change
B) The streams are ready for coupling, AND ↓	B.1) Problem stream ready for coupling:	B1.1 When policy community accepts condition(s) as problem requiring policy solution	B.1.1.1) Significant shifts by key policy makers in framing of problem that includes OFW as part of the solution; statements by system operator, energy specialists, civil servants and MPs that OFW is necessary to solving a particular policy problem	Most of the relevant policy community agrees that OFW is necessary to solve particular policy problems	PRO_STR	1 = Government, SO, civil servants, and influential advisors largely agree that OFW is necessary to solve a particular policy problem 0.67 = Two of the above agree 0.33 = Only one of the above claims that OFW is necessary to solve a policy problem 0 = No one in the policy community claims that OFW is necessary to solve a policy problem
	B.2) Politics stream ready for coupling:	>>			POL_STR	AVERAGE (GOV_PRG, INGRP)
		B.2.1) When the ideology of government, commitments in election manifesto or Programme for Government aligns with action on issue OR	B.2.1.1) Commitments in party election manifesto or Programme for Government (PfG) to support deployment of OFW. If no explicit commitment in PfG, then stance of government on OFW, or on climate change, energy security, EU, fiscal policy (subsidies and liberalisation).	PfG explicitly commits to supporting OFW	GOV_PRG	1 = PfG explicitly includes support for OFW 0.67 PfG does not explicitly include support, but general energy policy priorities of government aligned with potential support 0.33 = PfG does not explicitly include support, and general policy priorities of government do NOT aligne with potential support 0 = PfG, or government position stated elsewhere, specifically precludes OFW

		B.2.2) When government perceive public mood as supportive of action on issue	B.2.2.1) Government perceives public mood as supportive on climate change action, reducing energy insecurity, or OFW deployment	High level of public support for more ambitious climate action		1 = strong majority of the public think the government should do more to fight climate change 0.67 = a small majority of the public think the government should do more to fight climate change 0.33 = a large minority of the public think the government should do more to fight climate change 0 = a small minority of the public think the government should do more to fight climate change
		AND B.2.3) interest groups do not object to issue	B.2.3.1) Policy positions of wind power industry associations	Balance of support from interest groups in OFW's favour	INGRP	1 = Balance of influence from interest groups in OFW's favour 0 = Balance of influence from interest groups NOT in OFW's facour
	B.3) Policy stream ready for coupling:	B.3.1) When the policy community has softened up technically feasible and normatively acceptable policy solutions to support OFW	>>		POLY_STR	AVERAGE (SOL_PRICE, SOL_GRID, SOL_MAR)
			B.3.1.1) Price support instrument	A viable price support instrument for (onshore) wind and solar is available	SOL_PRICE	1 = viable price support insturment for wind/solar available 0 = viable price support instrument for wind/solar NOT available
			B.3.1.2) Grid connection policy	A viable grid connection policy for (onshore) wind and solar is available	SOL_GRID	1 = viable grid connection policy for wind/solar available 0 = viable grid connection policy for wind/solar NOT available
			B.3.1.3) Marine planning	Viable marine planning legislation is available	SOL_MAR	1 = viable marine planning legislation is available 0 = viable viable marine planning legislation is NOT available
C) A policy entrepreneur promotes the agenda change	when	C.1) at least one actor persistently invests time, reputation, and/or money to promote a particular policy alternative	>>		ENTRE	AVERAGE (ENTR_OFW, ENTR_PRICE, ENTR_GRID, ENTR_MAR)
			C.1.1) OFW promoted as solution to particular problems	Policy maker promotes OFW as solution to a policy problem	ENTR_OFW	1 = Policy maker promotes OFW as solution to a policy problem 0 = Policy maker does NOT promote OFW as solution to a policy problem
			C.1.2) Price support instrument	Policy maker promotes OFW-specific price support instrument	ENTR_PRICE	1 = Policy maker promotes OFW-specific price support instrument 0 = Policy maker does NOT promote OFW-specific price support instrument
			C.1.3) Grid connection policy	Policy maker promotes OFW-specific grid connection policy	ENTR_GRID	1 = Policy maker promotes OFW-specific grid connection policy 0 = Policy maker does NOT promote OFW-specific grid connection policy
			C.1.4) Marine planning	Policy maker promotes supportive legal framework for OFW	ENTR_MAR	1 = Policy maker promotes supportive legal framework for OFW 0 = Policy maker does NOT promote supportive legal framework for OFW

OUTOME						
Agenda change	D.1) OFW policy is frequently discussed or worked on by senior decision makers in the institution	>>			AG_CHG	1 = OFW is on the agenda of three or more of the relevant institutions 0.67 = OFW is on the agenda of two relevant institutions 0.33 = OFW is on the agenda of one relevant institution 0 = OFW is not on the agenda of any of the relevant institutions
		D.1.1) Departmental: Energy	Minister and civil servants work on policies within their mandate to support OFW and try to influence other institutional agendas	OFW is on the department of energy's agenda	AG_ENER	1 = OFW is on the institutional agenda 0 = OFW is not on the institutional agenda
		D.1.2) Departmental: Planning	Minister and civil servants work on policies to support OFW and try to influence other institutional agendas	OFW is on the department of marine planning's agenda	AG_MAR	1 = OFW is on the institutional agenda 0 = OFW is not on the institutional agenda
		D.1.3) Government: Cabinet	Cabinet, particularly Taoiseach and/or Tanaste, develops government policy on OFW and/or coordinate departments and other state institutions to progress work	OFW is on the cabinet agenda	AG_GOV	1 = OFW is on the institutional agenda 0 = OFW is not on the institutional agenda
		D.1.4) Legislature	OFW is discussed/debated in the Oireachtas; at least one Joint Committee works on relevant legislation, a bill is scheduled for reading	OFW is on the Oireachtas agenda	AG_PARL	1 = OFW is on the institutional agenda 0 = OFW is not on the institutional agenda
		D.1.5) Regulator	The regulator issues a consultation on OFW-specific policy or regulations, or participates in meetings with the department and system operators on the matter	OFW is on the regulator's agenda	AG_REG	1 = OFW is on the institutional agenda 0 = OFW is not on the institutional agenda
		D.1.6) System Operator	The system operator commissions technical studies to integrate OFW in the transmission system, or contributes to meetings with the department and regulator on the topic of OFW	OFW is on the system operator's agenda	AG_SO	1 = OFW is on the institutional agenda 0 = OFW is not on the institutional agenda
Policy change	D.2) New policy or legislation enabling or explicitly favouring the deployment of OFW adopted	>>			POL_CHG	MAX (CHG_TARG, CHG_PRICE, CHG_MAR, CHG_GRID)
		D.2.1) Technology-specific target	D.2.1) Government adopts a technology-specific target for OFW	Government adopts a technology-specific target for OFW	CHG_TARG	1 = Government adopts a technology-specific target for OFW 0 = Government does NOT adopt a technology-specific target for OFW
		D.2.2) Technology-specific price support instrument	D.2.2) The department issues a technology-specific price support instrument for OFW	Government issues a technology-specific price support instrument for OFW	CHG_PRICE	1 = Government adopts a technology-specific price support instrument for OFW 0 = Government adopts a technology-specific price support instrument for OFW

		D.2.3) Marine planning policy/legislation	D.2.3) Marine planning legislation or policy set out clear terms for OFW developers to gain necessary licences to survey marine environment, obtain planning permission, and leaseholds.	Marine planning legislation sets terms for OFW developers to gain necessary surveying licences, planning permission, and leasehold agreements	CHG_MAR	1 = Marine planning legislation sets terms for OFW developers to gain necessary surveying licences, planning permission, and leasehold agreements 0 = Marine planning legislation does NOT set terms for OFW developers to gain necessary surveying licences, planning permission, and leasehold agreements
		D.2.4) Grid connection/development policy	D.2.4) Grid development strategy includes OFW and connection policy offers fit-for-purpose terms for OFW	Grid connection policy offers technology-specific connection terms	CHG_GRID	1 = Grid connection policy offers technology-specific connection terms for OFW 0 = Grid connection policy does NOT offer technology-specific connection terms for OFW

3.5.5. Triangulation of data and methods

This study employs triangulation in two ways. Firstly, the triangulation of data from multiple sources. Secondly the triangulation of quantitative and qualitative methods (combining within-case data with a QCA). I address these in turn.

I approached the case study as a detective would a case – an analogy often used in historical research method guidance (Barzun and Graff, 1985). However, triangulation between different sources of data most often resembled the building of a puzzle, where the different data sources provided different pieces of the puzzle, which just happened to fit together largely coherently. This obtained at least in converging on agreement on the relevant body of facts and the scope of the enquiry. Below I provide a schematic of how the pieces of the puzzle came together.

This study commenced with the creation of 20 memos that summarised the data from the Oireachtas record. 414 documents, each containing the transcript of an exchange on the topic of OFW; some brief and some extended. All memos can be accessed in the supplementary files folder. Each memo provides a summary of the content of all the exchanges for one (annual) Oireachtas sitting, which usually commences at the beginning of September and ends at the end of July in the following calendar year. This informed the 'bare bones' of an initial case narrative. These memos were also used to construct a timeline of key events and a registry of potential key informants.

Next, the study compiled a registry of source documents through extensive Google searches. The nature of these documents have already been explained in Section 3.5.1 of this chapter and the registry can be accessed here [insert hyperlink]. The content of these documents served to 'flesh out' the bare bones case narrative, the timeline of key events, and the potential list of key informants.

Next, the study approached key informants for a first round of semi-structured interviews. The 'bare bones' case narrative served to inform a bespoke interview protocol with each key informant, depending on their engagement with the topic in question. The timeline served as a visual cue during the interviews to provide a light temporal and thematic structure for the discussion. Key informant interviews were essential in providing a) gap filling information on key events, ideas and decisions where the aforementioned documents were incomplete, b) suggest additions or amendments to the timeline and key policies to consider, and c) offer interpretations of the facts. Of course, not all key informants contributed to all three areas. Most key informants had only worked in one policy area or in one institution, and had not engaged with the issue of OFW for the entire 21-year period. Several key informants had a deep and extensive knowledge on the topic of renewable energy policy in Ireland for the better part of two decades. A few chose to articulate causal mechanisms or vignettes of a wider theory on agenda setting for OFW in the Irish context.

The three aforementioned steps were conducted across three rough iterations. Key informant interview data served to update the first draft of the narrative and expand the registry of relevant source documents, which in turn served to identify further key informants for a second round of interviews, and so on. There were almost no instances of disagreement on the central body of facts. Sometimes, there were explicit disagreements or implicit inconsistencies between the accounts of key informants on the relative importance of certain drivers of change (i.e. causal mechanisms) and/or the interpretation of certain sequences of events. For instance (as noted in Section 3.5.3), I interviewed informant 09pmi twice and 15pmi three times over the period of almost two years. The new and additional information provided by their respective accounts bear a lot of weight at certain points in the narrative; i.e. either of them was often the only informant ‘in the room’ and/or were key agents of change exercising influence over key decisions. Technically, I could not triangulate their accounts with any other first-hand accounts. However, revisiting multiple sources of data and returning to the key informant in an iterative manner to clarify and defend certain earlier claims in light of other contextual information as the study progressed served to increase the confidence in their accounts. In such instances triangulation amounted to coherence and consistency with a growing constellation of other source materials.

Following the analysis of all source materials as described in Section 3.5.2, the aforementioned were then combined in the final detailed account presented in the episodic result sections of Chapter 4.

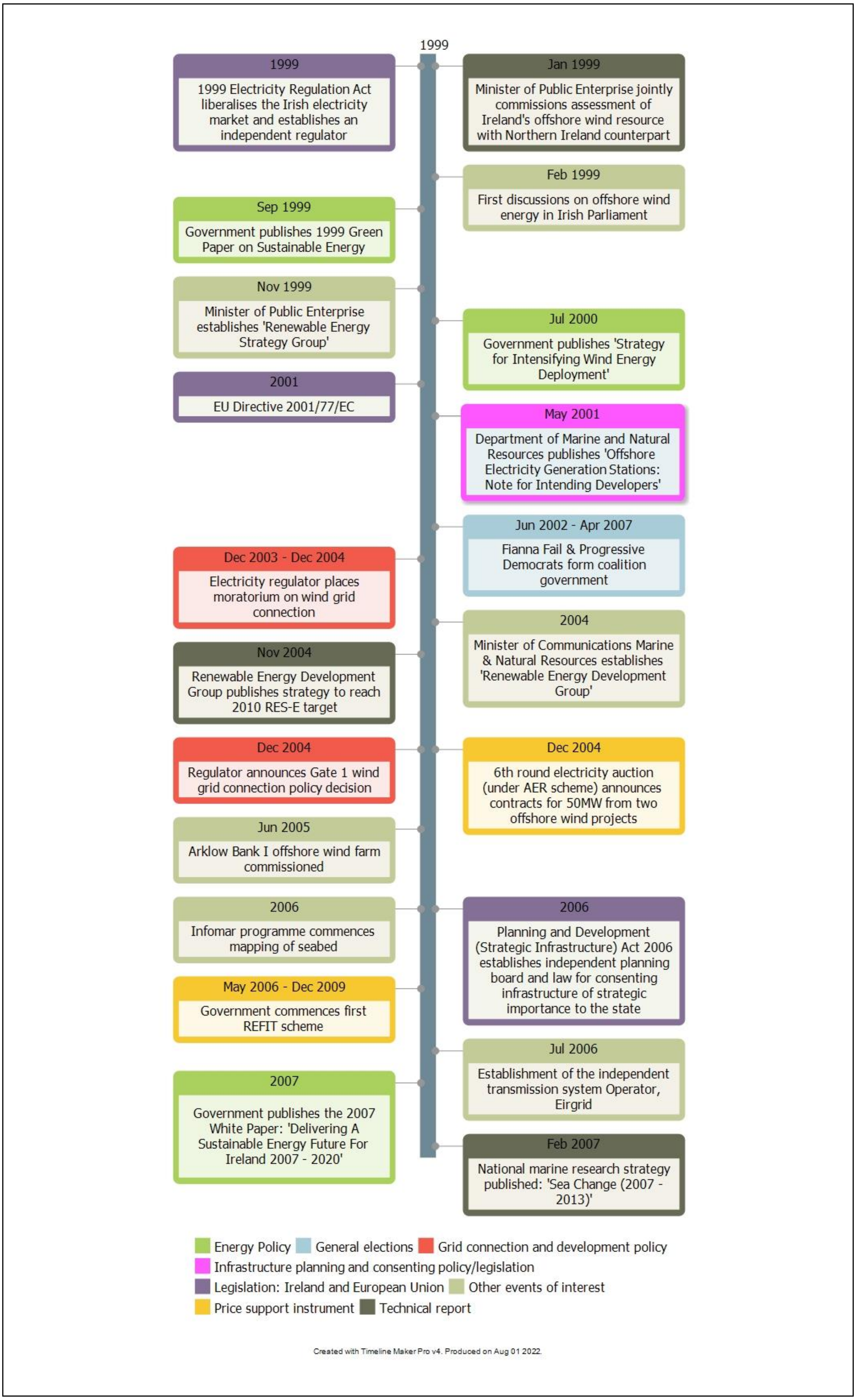
Next, I turn to methodological triangulation between the qualitative case narrative and the quantitative QCA. Here, Oana et al set out helpful best practice guidance (Oana, Schneider and Thomann, 2021). This revolves around two key steps in the QCA approach. Firstly, prior to conducting the QCA analytic moment, the study takes great care in defining sets and anchors, and the calibration of sets, taking both guidance from MSF theory and within-case data. I present my thinking on this transparently and extensively in Section 3.5.4 and Appendix A. This ensures a robust interpretation of the same qualitative data that informs the process tracing into QCA sets. Secondly, during the QCA analytic moment, where the analysis reveals so-called 'deviant cases' (that contravene identified relations of necessity or sufficiency), I return to the within-case data for these deviant cases. The objective is to re-assess within-case data to judge whether the deviancy is a matter of degree or kind, and inform a judgement both informed by theory and case data on what this means for the hypothesis in question. This triangulation forms a substantial part of the analysis in Chapter 4.6 and serves as some of the strongest theoretical contributions of this study.

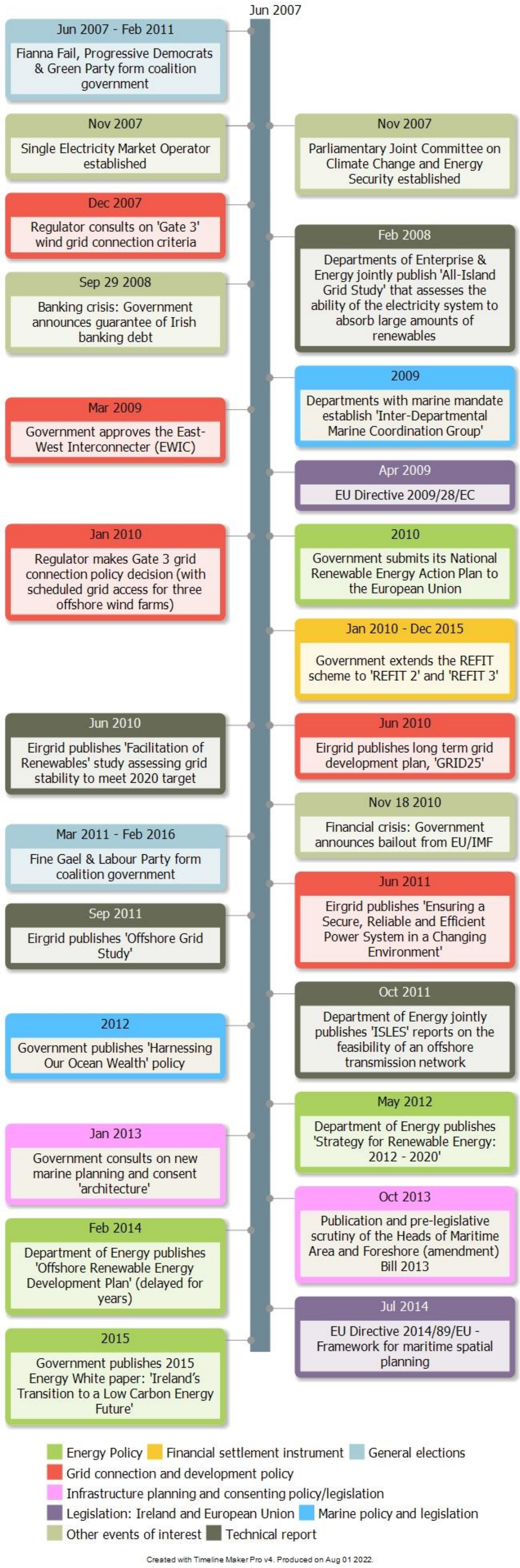
4. Agendas and policy alternatives to deploy OFW in Ireland from 1999 - 2020

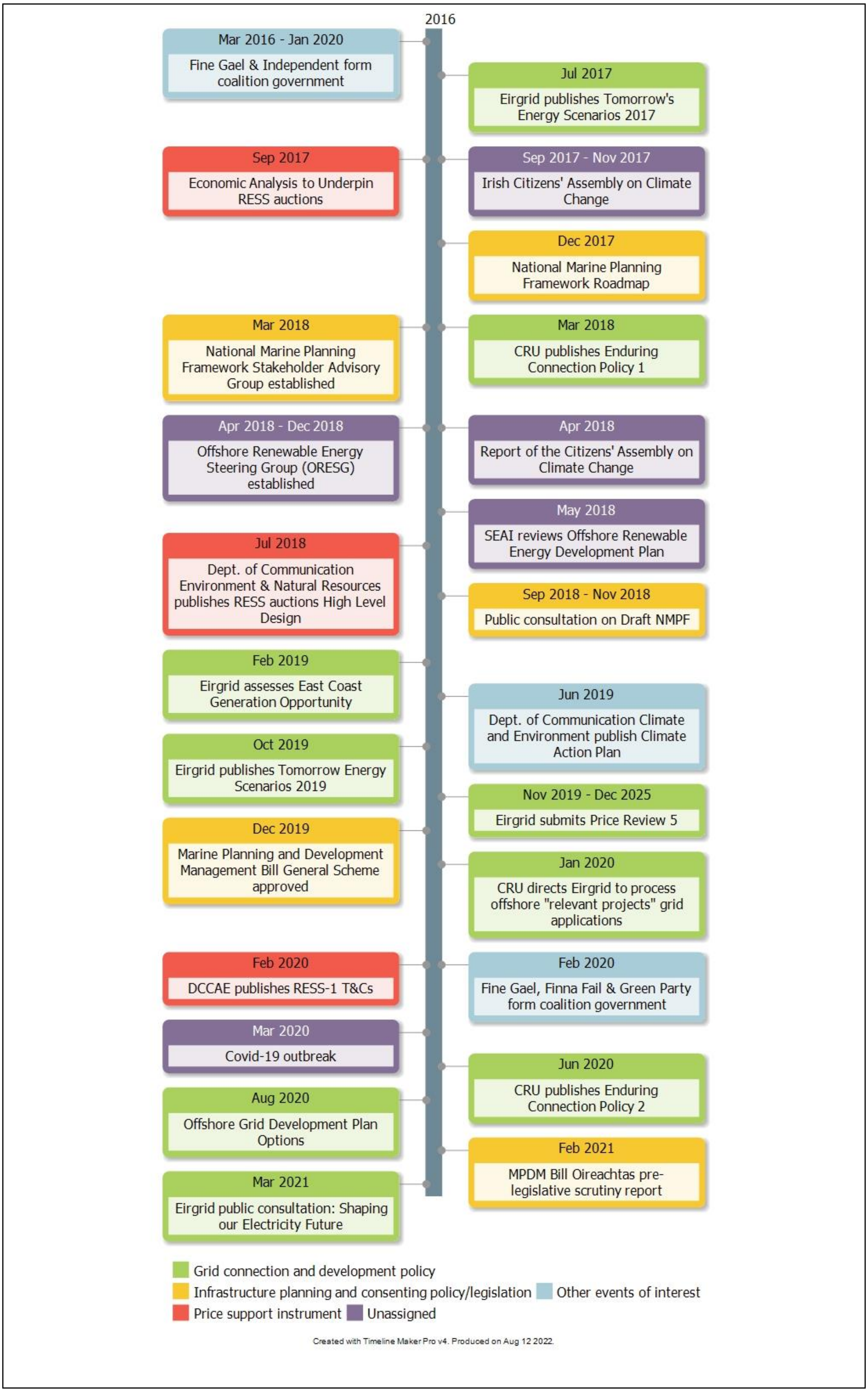
In this chapter, I present the empirical results of the study. I divide the empirical results into three cases, as per the rough timeline identified in Table 2 (p. 47). Case 1 commences with the first mention of OFW in the Oireachtas in 1999, as this forms a natural starting point for a historical account on the matter. Taken together, these narratives along with the extensive accompanying appendices address the first objective of this study. Figure 6 presents a timeline of key events drawn from the study data.

Within each case, I structure the narrative chronologically as far as possible, foregrounding the historical complexities as events unfolded. As a secondary ordering principle, sub-sections within the historical narrative graft very roughly on to the different policy elements in play (i.e. grid connection, prices support, and marine planning) and the streams of MSF, but only to the extent that it does not detract from the unfolding of events. Following each case narrative, present a process tracing summary result

Figure 6: Timeline of key events drawn from study data




Jun 2007
Jun 2007 - Feb 2011
Fianna Fail, Progressive Democrats & Green Party form coalition government
Nov 2007
Single Electricity Market Operator established
Nov 2007
Parliamentary Joint Committee on Climate Change and Energy Security established
Dec 2007
Regulator consults on 'Gate 3' wind grid connection criteria
Feb 2008
Departments of Enterprise & Energy jointly publish 'All-Island Grid Study' that assesses the ability of the electricity system to absorb large amounts of renewables
Sep 29 2008
Banking crisis: Government announces guarantee of Irish banking debt
2009
Departments with marine mandate establish 'Inter-Departmental Marine Coordination Group'
Mar 2009
Government approves the East-West Interconnecter (EWIC)
Apr 2009
EU Directive 2009/28/EC
Jan 2010
Regulator makes Gate 3 grid connection policy decision (with scheduled grid access for three offshore wind farms)
2010
Government submits its National Renewable Energy Action Plan to the European Union
Jan 2010 - Dec 2015
Government extends the REFIT scheme to 'REFIT 2' and 'REFIT 3'
Jun 2010
Eirgrid publishes 'Facilitation of Renewables' study assessing grid stability to meet 2020 target
Jun 2010
Eirgrid publishes long term grid development plan, 'GRID25'
Nov 18 2010
Financial crisis: Government announces bailout from EU/IMF
Mar 2011 - Feb 2016
Fine Gael & Labour Party form coalition government
Jun 2011
Eirgrid publishes 'Ensuring a Secure, Reliable and Efficient Power System in a Changing Environment'
Sep 2011
Eirgrid publishes 'Offshore Grid Study'
Oct 2011
Department of Energy jointly publishes 'ISLES' reports on the feasibility of an offshore transmission network
2012
Government publishes 'Harnessing Our Ocean Wealth' policy
May 2012
Department of Energy publishes 'Strategy for Renewable Energy: 2012 - 2020'
Jan 2013
Government consults on new marine planning and consent 'architecture'
Oct 2013
Publication and pre-legislative scrutiny of the Heads of Maritime Area and Foreshore (amendment) Bill 2013
Feb 2014
Department of Energy publishes 'Offshore Renewable Energy Development Plan' (delayed for years)
Jul 2014
EU Directive 2014/89/EU - Framework for maritime spatial planning
2015
Government publishes 2015 Energy White paper: 'Ireland's Transition to a Low Carbon Energy Future'
Energy Policy
Financial settlement instrument
General elections
Grid connection and development policy
Infrastructure planning and consenting policy/legislation
Legislation: Ireland and European Union
Marine policy and legislation
Other events of interest
Technical report
Created with Timeline Maker Pro v4. Produced on Aug 01 2022.


2016
Mar 2016 - Jan 2020
Fine Gael & Independent form coalition government
Jul 2017
Eirgrid publishes Tomorrow's Energy Scenarios 2017
Sep 2017
Economic Analysis to Underpin RESS auctions
Sep 2017 - Nov 2017
Irish Citizens' Assembly on Climate Change
Dec 2017
National Marine Planning Framework Roadmap
Mar 2018
National Marine Planning Framework Stakeholder Advisory Group established
Mar 2018
CRU publishes Enduring Connection Policy 1
Apr 2018 - Dec 2018
Offshore Renewable Energy Steering Group (ORESG) established
Apr 2018
Report of the Citizens' Assembly on Climate Change
May 2018
SEAI reviews Offshore Renewable Energy Development Plan
Jul 2018
Dept. of Communication Environment & Natural Resources publishes RESS auctions High Level Design
Sep 2018 - Nov 2018
Public consultation on Draft NMPF
Feb 2019
Eirgrid assesses East Coast Generation Opportunity
Jun 2019
Dept. of Communication Climate and Environment publish Climate Action Plan
Oct 2019
Eirgrid publishes Tomorrow Energy Scenarios 2019
Nov 2019 - Dec 2025
Eirgrid submits Price Review 5
Dec 2019
Marine Planning and Development Management Bill General Scheme approved
Jan 2020
CRU directs Eirgrid to process offshore "relevant projects" grid applications
Feb 2020
DCCAE publishes RESS-1 T&Cs
Feb 2020
Fine Gael, Finna Fail & Green Party form coalition government
Mar 2020
Covid-19 outbreak
Jun 2020
CRU publishes Enduring Connection Policy 2
Aug 2020
Offshore Grid Development Plan Options
Feb 2021
MPDM Bill Oireachtas pre-legislative scrutiny report
Mar 2021
Eirgrid public consultation: Shaping our Electricity Future
Grid connection and development policy
Infrastructure planning and consenting policy/legislation
Other events of interest
Price support instrument
Unassigned
Created with Timeline Maker Pro v4. Produced on Aug 12 2022.

4.1. Case 1: narrative

Two events prompted the first parliamentary discussions on offshore wind power by Irish lawmakers in 1999 (Roux, 2021a). Firstly, the governments of the Republic of Ireland and Northern Ireland jointly commissioned the first study to establish an atlas of the island's offshore wind resource. Secondly, several private-sector developers had submitted the first licence and lease applications to the Minister for Marine and Natural Resources to conduct surveys and construct offshore wind farms in Irish waters. The government drove the first issue, partially to establish closer ties with the newly devolved government of North Ireland (Civil servant 28pmi, 2021). The second issue raised concerns amongst opposition party deputies over the lack of legislation to secure the state's interest (as owner of the seabed) and to ensure environmental and social safeguards were in place.

Energy fell outside the terms of the Good Friday Agreement for North-South collaboration. Yet, key political actors on either side of the politically delicate North-South collaboration were convinced by the economic argument for an 'all-island' approach to managing energy (Civil servant 28pmi, 2021). The collaboration focussed largely on establishing a Single Electricity Market (SEM) for the island (Electricity Regulator 06eri, 2020), but offshore wind power was also briefly tethered to the North-South agenda. The Department of Economic Development in Northern Ireland, under the helm of Sir Reg Empey (then deputy leader of the Ulster Unionist Party in Northern Ireland), and the Department of Public Enterprise in the Republic of Ireland, under the helm of Mary O'Rourke, jointly commissioned a study to establish an atlas of the island's potential wind resource (Stennett, 2007).[27] In the Republic of Ireland, any issue aimed at greater North-South integration was sure to enjoy cross-party support in parliament. Several opposition parties urged the government for

[27] The study, entitled 'Assessment of Offshore Wind Resources in the Republic of Ireland and Northern Ireland', received financial support from the EU Interreg programme. It had three objectives: "Assess (a) the total, (b) the feasible and (c) the practical OFW resource in the Republic of Ireland and Northern Ireland; Improve and update knowledge and understanding of offshore wind technologies; Examine the technical, economic, legal and other factors that may affect the development of OFW in the Republic of Ireland and Northern Ireland."

a ‘comprehensive policy’ to support OFW (Civil servant 28pmi, 2021; Roux, 2021a, 2021b).[28]

The study established that the island of Ireland had a ‘practical’ offshore wind resource, at a minimum distance of 5km from the shore and at a water depth of 20m, of 19.5 TWh per annum, almost matching the annual demand of the Republic of Ireland (Sustainable Energy Ireland, 2002).[29] With further restrictive assumptions, OFW could provide 30% of the island’s electricity needs, largely from the sandbanks off the East Coast and close to the largest demand centres, Dublin and Belfast. The study also provided an indicative capital investment cost envelope for OFW at 30% – 70% above onshore wind power.[30]

4.1.1. The promise of offshore wind; the child of liberalisation

Project developers in the emerging private energy sector had not been waiting for a publicly commissioned report to put exact numbers on the evident offshore bounty.[31] By 1998, liberalisation of the Irish electricity sector and the unbundling of the state utility, the Electricity Supply Board (ESB), was very high on the legislative agenda. A few actors in the Irish energy sector, most notably Airtricity, advocated politicians across government and opposition parties to include clauses in the act that would give preferential market access to any supplier who could provide electricity from renewable sources to final customers (Wind energy project developer 12idi, 2021).[32]

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[28] Beyond the governing coalition of Fianna Fail and the Progressive Democrats, notable early interest came from the two Green Party deputies, John Gormley and Trevor Sargent, and Fine Gael deputy Richard Bruton.

[29] In 1999, the annual consumption of electricity in the Republic of Ireland was 21.1 TWh.

[30] The study also provided an indicative capital investment cost envelope for offshore wind power of €1,420 - €2,050 / kWh, and an O&M cost envelope of 1.1 to 2.4 c/kWh.

[31] Early offshore wind demonstration projects in Denmark, the Netherlands, Sweden and the UK had established the technical feasibility of moving turbines into shallow waters and the improved resource quality and project scale that a combination of the marine setting and larger turbines enabled. These demonstration projects suggested that significant economies of scale could be realised in the medium term.

[32] As one early private sector wind developer put it: “We had lost our money [because we failed to secure support from the government’s Alternative Energy Requirement scheme] … And we went back to investors and we said “If you give us more money, we're going to go with a different model. We're going to go a deregulated, no-subsidy route with our own customers.” At that point in time that wasn't available, but we reckoned that it was on the way because there was a European Directive that each country had to transpose into their local legislation to begin the process of deregulating the market for electricity. So we said we were going to use that opportunity, which wasn't just there, right. … Now, behind the scenes, we went to all the main political parties who were all represented on some parliamentary committee. And they were, you know, looking at this new legislation to deregulate the electricity industry. And we said to them “put in a clause to allow green electricity to be sold from the very beginning and that the

In July 1999 the Oireachtas passed the Irish Electricity Regulation Act.[33] It established an independent regulator for the electricity in the Republic of Ireland, the Commission for Electricity Regulation (henceforth 'the regulator'), and gave it the power to grant licences to generate electricity, supply electricity to customers, authorise the construction of generation stations, and provide access to the transmission or distribution system. Under the EU's principle of subsidiarity, the Act gave more detailed rules for how the ESB should be unbundled, and how Third Party Access to the Irish grid would be provided. The Act also created a legal basis for the category of "renewable, sustainable or alternative forms of energy" in the production of electricity.[34] Importantly, the Act provided special rules for regulating this category, tasking the Minister and the regulator with the promotion of the category, requiring that the system operator give priority to generating stations using any of these energy sources when selecting generating stations.

It was this selective opening of the Irish consumer market to suppliers who could generate electricity from renewables (or purchase electricity from renewable generators) that formed the basis of Airtricity's business model (Wind energy project developer 12idi, 2021). For Airtricity, and a few other project developers, the coincidence of a liberalising market, preferential access to consumers, and the technological advances in offshore wind led to a rapid escalation of ambition. As one developer put it:

> *"We were very small, like I mean, we were insane, really. It's the only way to describe it. When I joined the company, I think I was the 10th employee. … Basically, when I joined, they were opening their first wind farm, which is two [General Electric] 1.5 MW turbines onshore and they might have had another one that was like twelve 750 kW machines, something like that. So that was the sum total of [our] wind farms when I joined to do a 500 MW offshore project. So you have to be half mad sometimes."* (Wind energy project developer 08idi, 2020)

grid [operator] would have to take to power in that early stage." Now, of course, the big state utility didn't want that because it's just a nuisance to them... But the politicians said "Well, no, we like the sound of that. And if it can't be done technically or commercially, well no-one will be at a loss." So those clauses went into the legislation. And that allowed us then for our onshore projects to go this route where we did a merchant plant and were going to find customers, which is what we did. … we avoided government schemes and subsidy schemes… and this will lead into the offshore [project]… " [162]

[33] The central driver of this act was compliance with the EU Directive 96/92/EC.

[34] This category included wind, hydro, biomass, waste (including waste heat), biofuel, geothermal, fuel cells, tidal, solar, and wave.

4.1.2. First movers drive policy on marine consenting and grid connection

From late 1998 onwards, Airtricity and a few other private sector developers submitted the first licence and lease applications to the Department for Marine and Natural Resources (DMNR) under the Foreshore Act of 1933. Under the Act licences were required to conduct surveys for all manner of marine projects, whilst leases were required to specify the terms of occupation of the seabed and secure an income for the state as owner of the seabed. Opposition party deputies raised concerns over the lack of legislation to secure the state's interest (as owner of the seabed) and safeguard environmental and social concerns over the new technology.[35] Minister Frank Fahey, heading the DMNR, conceded that OFW developments posed 'a new challenge' to his department and a 'firm policy framework' had to be developed before issuing any leases (Roux, 2021b).

However, the government decided against the complex and time-consuming undertaking of developing a new marine planning bill. Instead, the DMNR issued a supplementary guidance note that set out the terms for licencing and leasing for prospective developers (Department of Marine and Natural Resources, 2001; Roux, 2021a). Refer to Appendix C for details on the content of this policy and the process of its issuance.

There is strong circumstantial evidence that the decision to continue with a departmental policy (supplementary to the extant Act), as opposed to legislation, was due to advocacy from Airtricity and other industry players (Wind energy project developer 08idi, 2020; Roux, 2021a; Wind energy project developer 12idi, 2021). This enabled the first developers to continue project development with minimal delay and minimal impositions from a centralized approach to marine planning. It also set the precedent of a developer-led approach to marine consenting that would come to have far-reaching implications for OFW development over the following decades. By October 2000, four companies held foreshore licenses for surveying sites. In January

[35] A few opposition deputies probed Fahey on the matter: "Does [the Minister] consider the Foreshore Act an adequate legislative mechanism for dealing with applications for the development of offshore wind farms? The framers of the Act in the 1930s can hardly have anticipated the development of wind farms offshore." Fahey conceded that "development of major commercial projects of this nature and situated on the foreshore away from the land posed a new challenge to my Department. It is also an area where there is very little international experience." (Roux, 2021b)

2002, Airtricity secured a 99 year lease to construct 200 turbines and a capacity of 520 MW on the Arklow Bank; the first lease for an offshore wind farm in Ireland.[36]

Whilst progressing their lease application, Airtricity also came up against challenges to secure an affordable grid connection for Arklow Bank (Roux, 2021c, 2021d). It took only a few months to obtain a transmission grid connection offer from ESB National Grid under its '70 business day offer' policy (ESB National Grid, 2003).[37] However, the connection costs (to be borne by the developer) proved exorbitant, undermining the financial viability of the project. Appendix D provides details on the connection policy in use at the time and how it developed in the context of a liberalising market and an increasing volume of (onshore) wind connection applications.

Airtricity lobbied government to support the connection of Arklow Bank through more preferential connection offer terms (Roux, 2021c, 2021d). However, the government (through the Department of Public Enterprise) refused to intervene. It noted that grid connection decisions were the sole preserve of the regulator and system operators. It also noted a wider issue in its considerations: the limitations on the Irish transmission grid to absorb wind power at such a scale. In this, elected officials were no doubt strongly advised by ESB NG (ESB National Grid, 2004b).

4.1.3. An Irish renewable energy policy community coalesces

The realisation of the vastness of the island's offshore wind resource and the necessity to respond to the first private sector project developers pushed offshore wind power on to the margins of political debate from 1999 onwards. However, two other factors unfolding at the same time, but not yet directly linked to offshore wind power, would come to exercise an attenuating influence over the technology's longer term political fortunes. Firstly, in 1999 the Irish

[36] Sure Partners (including Airtricity), Kish Consortium (including ESB), Harland and Wolff and Wind Farm Developments Limited secured licences. Airtricity secured the lease through a subsidiary, Sure Partners, for the Arklow Bank project. The Arklow Bank is a shallow sandbank that runs parallel along the east coast of Ireland past the town of Arklow.

[37] Grid connection policy in Ireland was evolving in the context of unbundling the vertically integrated state-owned monopoly, ESB, whilst liberalising the generation and supply markets as per the 1999 Act. ESB National Grid (ESB NG), a wholly owned subsidiary of ESB, became the Transmission System Operator (TSO), whilst ESB Networks (ESBN), also a wholly owned subsidiary of ESB, became the Distribution System Operator (DSO). Together I refer to these as the 'system operators'.

government, for the first time, started considering a coherent policy response to "secure a sustainable energy future" taking into account national energy security alongside climate change mitigation in the context of a liberalising market (Department of Public Enterprise, 1999). A policy community started to coalesce around this issue (Policy researcher 02pri, 2020). Secondly, the state utility ESB (in the process of being unbundled) and the fledgling regulator had to address challenges with connecting onshore wind power to the grid at an ever-increasing rate.

In 1999 the Department of Public Enterprise published Ireland's first Green Paper on Sustainable Energy (Department of Public Enterprise, 1999). The UN Framework Convention on Climate Change (UNFCCC) Kyoto Protocol and the European Commission's White Paper on Renewable Energy prompted the Green Paper. The Kyoto Protocol committed Ireland to limit the increase in greenhouse gas emissions to 13% above 1990 levels in the period 2008 – 2012. The Commission's White Paper set an indicative target of 12% for the contribution of renewable energy to European total energy supply by 2010 (European Commission, 1997). The Green Paper assessed sectoral trends and market failures and set out a range of policy measures and instruments to address these. It also set a very powerful framing of the challenge: how to attain a decadal national renewable energy target at least cost to consumers and taxpayers. The Green Paper also set an intermediary target of 500 MW of onshore wind by 2005.

Importantly, a new energy policy community, independent from the ESB, started informing the ideas underpinning the Green Paper and coalesced around implementing its recommendations (Policy researcher 01pri, 2020; Policy researcher 02pri, 2020; Policy researcher 27pri, 2021). This included setting the agenda and funding rationale for the new Irish Energy Information Centre, which would become Sustainable Energy Ireland (SEI) and later the Sustainable Energy Authority of Ireland (SEAI). Key members of this policy community included Prof. John FitzGerald, working with other economists at the Economic and Social Research Institute (ESRI), and Dr Brian O'Gallachoir, who headed the Irish Energy Information Centre and continued at University College Cork (UCC) with other energy system modellers. Both would go on to play key roles in advising subsequent governments on renewable energy and climate change policy.

Following the publication of the Green Paper, the Department of Public Enterprise and the successor departments with the energy mandate (under different governments) convened a series of technical working groups that formed the locus of the growing renewable energy policy community. The first of these was the Renewable Energy Strategy Group (RESG), convened in 2000 and taking its terms of reference directly from the Green Paper. The RESG started generating influential arguments and an evidence base that would link new policy solutions in the areas of price support instruments, grid connection policy, and system services (security) policy to decadal target attainment. Its central focus was to intensify the deployment of onshore wind power to meet the national target for 2005 and consider how to meet the 2010 target (Renewable Energy Strategy Group, 2000; Policy researcher 01pri, 2020). To this end, the RESG did not consider OFW necessary, nor did it consider the prospects of greater interconnection or electricity export schemes as an urgent policy issue. As a member of the working group puts it:

> *"[I]t was an interesting time... There was a huge enthusiasm about the opportunity for onshore wind energy at the time and that really was what flourished. Now, it became clear that the offshore resource was vast and was untouched, but from a policy perspective, it was very clear that the goal was to support the meeting of these renewable electricity targets that were set at different stages, at least cost. So there was never a direct link between, say, the development of renewable energy and industrial policy, or jobs policy. The core focus was to increase the amount of renewable energy and do it at least costs to the customers. … We did have a much more favourable wind energy climate than most of the rest of Europe. We didn't have the same level of concerted opposition as was prevalent in the U.K. for example. … So offshore wind was always considered something that had potential, but actually from a policy perspective, we can do it cheaper onshore. So why would we pay more to develop wind energy offshore?"* (Policy researcher 01pri, 2020)

Appendix E elaborates on some of the priorities of the renewable energy policy community over this period, 1999 – 2002. Most notably, this includes efforts to reform a price support instrument for renewables and alleviate grid-related constraints to facilitate higher renewable penetration.

From 1999 onwards, the nascent renewable energy policy community managed to transfer their overall problem framing to the government at the time. Although the government remained open to technology-specific support for OFW in principle, it had clearly adopted the 'target attainment at least cost' framing by 2002. This is most succinctly summarised by Minister O'Rourke in response to several questions from opposition deputies on whether the government would support the grid connection for Arklow Bank:

> *"I have pursued a policy of promotion of the generation of electricity from renewable energy technologies. This policy is grounded on issues of security of energy supply, fuel import substitution and reduction of emissions from fossil fuel electricity generation. To date, these efforts have been focused on developing the renewable energy industry onshore. In that respect progress has been very satisfactory and we are well on the way to achieving the challenging target of 500MW by 2005, which I set in the Green Paper on Sustainable Energy published in September 1999. ... It is in the context of developments onshore that I am currently considering the appropriate policy response to offshore wind."* (Roux, 2021c)

It was largely the development of Arklow Bank that pushed the government to decision-points on marine planning policy and grid connection for OFW. However, by the time the 2002 general elections arrived, the government position on a technology-specific price support instrument had not yet been settled.

4.1.4. Renewable energy, a rising 'side issue' but OFW noted

Following the 2002 General Elections, the incumbents Fianna Fail and the Progressive Democrats again formed a coalition government in June of that year. The new government had largely the same make-up as the previous (1997 – 2002), although some ministerial posts changed. Dermot Ahern would first take the ministerial position for the Department of Communications Marine and Natural Resources (DCMNR) until 2004, followed by Noel Dempsey for the remainder of the term.

OFW had skirted the periphery of two parties' election manifestos. Fianna Fail included a brief manifesto promise to "increase the opportunities" for offshore wind and wave energy (Fianna Fail and Progressive Democrats, 2002). The Green Party made a similarly brief commitment to modernise the transmission grid to enable the harnessing of offshore wind power (Green Party, 2002). However, overall, renewable energy and electricity policy was not a central concern for the new coalition government (Civil servant 15pmi, 2021; Civil servant 29pmi, 2021).

Over the government's term, both Ahern and Dempsey maintained sufficient interest in expanding renewables, particularly with the eye on meeting the 2010 RES-E target, to enable civil servants to progress policy development. However, another issue formed the top energy-related priority for government: bringing gas from the Corrib gas field ashore by 2004. As planning and work on the Corrib pipeline progressed, it would become a massive controversy. By the time Dempsey became Minister for DMNR, the Corrib pipeline consumed most of his time (Civil servant 09pmi, 2021a). Within the cabinet, government still considered renewable energy policy a 'side issue' but the framing of energy-related discussions within the cabinet had started changing (Civil servant 29pmi, 2021).

Several opposition parties, including Fine Gael, the Green Party, and Labour, supported more ambitious policies for deployment of both onshore and offshore wind and urged the ruling coalition in that direction (Roux, 2021d, 2021e, 2021f). This included more favourable terms for price support and connection policy.[38]

4.1.5. Policy makers soften up a policy position on OFW

Around the same time that Airtricity secured its lease on Arklow Bank in early 2002, Sustainable Energy Ireland (SEI) commissioned a cost benefit analysis of government policy options for supporting offshore wind power (Sustainable Energy Ireland, 2002). There is circumstantial evidence that it was largely due to Airtricity's lobbying that the policy community allocated some, if marginal, interest to the this issue (Policy researcher 01pri, 2020).

[38] In the legislature, opposition party deputies relished drawing attention to the government's failure to implement a working price support instrument for wind power. By 2003, the government was promoting the launch of the sixth power auction, AER-VI, whilst only a minority of projects had been built under AER-III and none under AER-V. A question from Steven Coveney, then opposition deputy for Fine Gael, is illustrative of the broader narrative: "Why did the Minister choose to introduce such low price cap figures under AER VI? A comparison with other European countries shows that in Scotland the price cap figure is 30% to 40% higher than in Ireland. Spain has a figure which is 20% or 30% higher and both Germany and France have significantly higher figures. Will the Minister agree that all the countries that have made significant progress have significantly higher price cap figures for the support systems for renewable energy? What makes the Minister so confident that AER VI will succeed when it seems clear that the price cap figure is too low and the number of contracts that he will allocate is also too low for the targets he has set?" [181]

The analysis offers insights on the renewable energy policy community's thinking on what constituted an acceptable policy response to OFW. The comparative analysis considered cost and benefits to the state of subsidizing a demonstration programme and a commercial deployment programme. It also considered potential barriers to commercial deployment, including high capital costs, perceptions of a lack of sufficient debt finance, uncertainties regarding the future structure of the Irish electricity market and the anticipated inability of the transmission system to accommodate increased levels of intermittent generation.

The analysis modelled the costs and benefits of providing grant and an AER-type support mechanism for demonstration projects consisting of 5 MW, 25 MW or 50 MW. A demonstration programme based on 5 MW project(s) would be too small to either develop sufficient marketplace confidence or incorporate economies of scale. The analysis argued that one or more demonstration project(s) of either 25 MW or 50 MW, using proven technologies, would help to increase marketplace confidence in the sector and would act as useful learning experience prior to larger scale deployment.

Some offshore wind developers argued that 25 MW projects would not be viable due to their small scale – some believed that 100 MW or even 200 MW were appropriate scales for the first projects in Ireland. Notwithstanding the fact that a market mechanism to support large scale projects would lower the off-take risk associated with OFW development, the report argued that banks would be reluctant to provide debt finance for large projects (in the 100s of MW range) in the absence of the earlier development of smaller scale project(s).

At that point, the report found very little definitive cost data for OFW, but estimated it would be 30 – 70% more expensive than its onshore counterpart. It concluded that the large scale deployment of OFW in Ireland would require a state-funded mechanism to provide a premium price for generation, but that this would be a relatively expensive way for Ireland to meet a climate change target.[39]

[39] Based on the investment cost for the latest development in Denmark, the indicative cost per annum to the State of providing AER type support for 500 MW of OFW in Ireland would be €81.4 million. This would avoid 1.2 million tonnes of CO_2 emissions per annum at a cost of €26

The report put forward the position that the most important objective for the state were to support a demonstration programme that would provide a learning experience for key players in the sector and increase their levels of confidence in OFW. This would have to be done through a technology-specific price support that would ensure a premium price for electricity sales from OFW.

The report also highlighted that greater interconnection between the Ireland and neighbouring transmission systems would provide an opportunity to develop the OFW as a significant export industry in the medium to long-term. However, it noted that the cost of interconnection and grid reinforcement could be prohibitive for the export opportunity.

The report’s recommendation proved a significant setback for the early developers of OFW in Ireland. The report proved influential in anchoring government’s stance on OFW compared to onshore wind, particularly concerning price support. The DCMNR opted against supporting large-scale deployment or relatively large demonstration projects for target attainment. Instead, the government opted for supporting the smallest possible demonstration projects thought to offer a sufficient scale for learning.

In 2004, AER-VI included a technology-specific auction of 50MW for OFW, in line with the modelled demonstration scenario of the SEI report. In determining the auction rules, the government was concerned that adding non-price requirements would undermine competition. By that point eleven foreshore licences had been issued for offshore wind project developers to commence surveying. However, only Airtricity had secured a lease and a grid connection offer, and one other project on the Codling Bank was at ‘negotiation stage’ for their lease. The government opted against requiring a delivery bond, grid connection offer, a foreshore lease or planning consent in order to realise a sufficient level of competition. If most or all of these were required, it was likely that only Airtricity would have been in a position to qualify. The AER-VI offshore auction elicited eight bids. Two 25 MW projects were selected winners. Airtricity, by then the only developer with a substantially progressed project, commented ruefully on their auction loss:

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per tonne on an NPV basis. This level of deployment would earn the State €5.8 million per annum in royalties and avoid the annual importation of €51.3 million of fuel oil (40,000 tonnes).

"The company that won didn't even have a met mast in the sea... I don't even know if they had a general location. I'm not even joking. [They] knew nothing about offshore construction. Had no wind energy data. Nothing, literally nothing. And the only requirement to win on the AER was price. So if you know nothing about the cost of offshore construction, chances are you're going to get your price wrong, aren't you? We knew something about offshore construction and we put in the right price. We were last!"
(Wind energy project developer 08idi, 2020)

Neither of the two auction winners progressed their projects, and the auction offers lapsed several years later. Ultimately, the flawed AER-IV auction didn't serve any positive learning on the deployment of OFW in Irish waters. Airtricity's strategy reverted to a merchant route to finance Arklow Bank, which it finally executed as a 25MW demonstration project, Ireland's first offshore wind farm.[40]

4.1.6. The renewable energy policy community crystalizes a longer-term agenda

The failure of the AER-VI auction had put the nail in the coffin of OFW's prospects for the foreseeable future. At the same time, the renewable energy policy community that had started coalescing around the 1999 Green Paper had by now crystalised and was about to set the policy agenda for 2010 and eventually 2020.

In December 2003, the DCMNR published a consultation document for a new renewable energy policy for Ireland. Another key working group, the Renewable Energy Development Group (REDG), formed under the auspices of the DCMNR consisting of key stakeholders in the electricity sector, including the system operators, the regulator, the academic researchers and policy makers (Department of Communication Marine and Natural Resources, 2004). One of the first objectives of this group was to determine how Ireland would meet the RES-E 2010 target of 13.2% renewables. The focus of the group and the standing of its recommendations demonstrated the agenda that would occupy policy makers for several years. As the group's first report notes upfront:

"The RE industry in Ireland has had to contend with a number of serious challenges that have significantly hindered the deployment of RE capacity in recent years. These constraints include inter alia:

[40] They hit on a serendipitous solution to construct Arklow Bank as a demonstration project. General Electric happened to be looking for offshore sites to test its new 3 MW turbine, then the largest turbine in the world. It agreed to supply and maintain seven turbines for Arklow Bank from which Airtricity would purchase the electricity. If certain testing conditions were met, Airtricity would eventually purchase the turbines.

- *A moratorium on grid connections that has led to a lengthy queue for connections;*
- *Uncertainty about the future structure of the Irish electricity market;*
- *Difficulties with AER contracts and with the AER instrument, including timelines for State Aids clearance;*
- *Compliance issues with respect to a new grid code for wind energy generators;*
- *Planning timelines for RE projects;*
- *Availability and cost of finance for RE projects in Ireland.*

> *These challenges pose a very real threat to the attainment of the 13.2% target by 2010. One realistic view is that unless a series of well thought out measures is specifically designed and implemented to tackle these challenges soon, it is likely that Ireland will fall short of the 2010 target … Failure to overcome these challenges now will also have serious repercussions for the deployment of RE in Ireland in the longer term. … RE policy must be formulated to address the complexities inherent in the current situation, the realities of making difficult decisions in a short time period, and the requirement to deliver both short-term (2010) and longer term objectives."*
> (Department of Communication Marine and Natural Resources, 2004)

Growing from the original RESG (refer to Chapter 4.1.3), a stable renewable energy policy community was crystalising and grafting on to the DCMNR. Any proposals to offer technology-specific support to OFW (or any other renewable generation technology), whether that be price support or grid connection, would have to enjoy widespread support within this community. Centrally, it would have to demonstrate that it was a necessary element to meeting the 2010 target, to enjoy any attention.

The liberalised generation market had by 2004 already developed a sufficient pipeline of projects (largely onshore wind power) to meet the 2010 target (Policy researcher 01pri, 2020). This afforded policy makers the freedom to take a market-led, technology-neutral approach to supporting generation capacity which would *de facto* be calibrated to supporting the cheapest available alternative, namely onshore wind.[41] Diversification of the renewables mix was

[41] By November 2004, REDG included a capacity gap estimate for 2010 of 1,433 MW, based on the highest electricity demand scenario identified by the ESBNG. At this time, wind energy developers had already submitted 124 grid connection applications totalling 1,914 MW of wind capacity. Policy makers weighed the oversupply of onshore wind connection applications with their judgements on the status of different technologies and related supply chains to propose a mix generation technologies to meet the target. This included 110 MW of offshore wind. Whilst 110 MW of offshore appears a significant amount at first glance (equivalent to one large commercial scale project), some interpretation of this figure is required. The estimated mix also

not yet a priority, given the low penetration of renewables and the surfeit of cheaper onshore wind potential. Renewable energy target attainment at least cost was the dominant paradigm.

The first priority was to work out new solutions for connecting wind power to the grid connection and aligning this with a viable and acceptable price support instrument. Although neither of these would be directly concerned with supporting OFW, both policy solutions would establish a path dependency that would come to influence the deployment of OFW over the medium term.

In 2004, the regulator and system operators established new regulatory precedents for the connection of onshore wind power that would (unintentionally) set a connection regime that would endure for over a decade. Appendix F provides a detailed account of these regulations and the rationale for the dramatic shift that emerged over the period 2003 – 2006. A summary of its implications for the connection of OFW is provided below.

During the early 2000s, ESB NG had failed to allocate sufficient resources to assess the impacts of higher penetration of wind farms on the Irish grid (Gallachóir, Bazilian and McKeogh, 2005). Then, in 2003, grid connection applications from wind farms grew at an unprecedented rate. This prompted the TSO to seek a moratorium on issuing further wind connection offers, which the regulator granted in December 2003 (ESB National Grid, 2003; Reeves, 2003).

The moratorium coupled with expectations of the connection policy that would follow triggered an acceleration in connection applications from project developers, and a massive backlog in processing applications. Following a controversy that lasted approximately a year, the ESB NG proposed a new approach to assessing and connecting significant amounts of geographically distributed wind capacity to the grid. It proposed the concept of a Group Processing Approach (GPA) to the renewables industry (ESB National Grid, 2004a). The proposal was to process all renewable grid connection applications completed by a specified date in a group (called a 'Gate'). ESB NG would divide

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included 1 MW of tidal power and 66 MW of bioenergy. When read alongside statements by the Minister and key informants involved in the work, it's clear that the policy community was open to listing various technologies, particularly marine energy (at this stage tidal and offshore wind), as the 'pipeline of projects' that could meet a target, without intending to pick technological winners through technology-specific policy instruments.

applications within the Gate into groups and subgroups, based on geographic location and level of grid interaction. ESB NG would then study these respective clusters of geographically proximate projects to determine the optimal transmission network reinforcements required for each group. Depending on the optimal connection, either ESBN (in the case of connections to the distribution network) or ESB NG (in the case of connections to the transmission network) would issue a connection offer to individual applicants within a group/subgroup. Individual application connection charges would be proportional to the cost of connecting the group.

Aligning the GPA with the regulator's statutory obligations proved complex. Selecting the size of the gate, criteria for inclusion in the gate, criteria for making exceptions to the GPA, deciding the order in which to process group and subgroup clusters, and the timing of individual connection offers all risked legal challenge from market participants. In December 2004, following extensive consultation, the regulator published its policy decision for the first gate of the new GPA (Commission for Electricity Regulation, 2004). The Gate 1 policy, as it was called, favoured balancing short-term efficiency in dealing with the crises brought on by the moratorium with a measure of fairness to applicants, whilst deferring some decisions to a second gate.

The regulator's decision in favour of a GPA with sequential gates essentially created a single queue for all wind projects based on the completion date of their connection application. This set a powerful precedent and raised the expectation in the market that future gates would be determined in the same or similar ways. Given that there were very low barriers to submitting grid connection applications, these continued to grow rapidly for small onshore wind projects. All renewable applications, onshore and offshore wind, would be considered based on the date of their complete applications, and applications would be processed in batches. Given the head start onshore wind had in Ireland, any offshore projects would have to line up behind many smaller onshore projects.[42]

[42] By December 2004, when the CER issued its decision on a new policy to process wind applications, the build-up had grown to 1,640 applications being checked or being processed, totalling 2,494 MW (Commission for Electricity Regulation, 2004; ESB National Grid, 2004a).

In 2006 the regulator issued its decision on Gate 2 of the GPA, with a sufficiently large group to reach the 2010 RES-E target. It followed similar terms to Gate 1, reinforcing the primacy of the application date queue as the *de facto* interpretation of its fiduciary duty of non-discrimination between market participants. It tempered this approach with a concern for system stability. The CER considered fairness in terms of non-discrimination between applicants, continuing with the precedent set in Gate 1. It considered system stability in terms of prioritising those projects that required the least system reinforcements and could be connected to the system most efficiently.

The GPA and successive gates set a powerful precedent. Henceforth, a technology-specific grid connection policy for OFW would entail justifying why OFW applications had to jump the established queue, or why a new queue had to be made especially for this technology. Such justification would have to be consistent with the Electricity Regulation Act, the state of the Irish wind market, and the state of the (onshore) grid, or risk legal challenge from onshore developers.

At the same time as the system operator and regulator were solving the grid connection problem, civil servants set out to solve the price support problem. By the end of 2003, the market had grown severely disgruntled at the dysfunction of the AER scheme. Renewable Energy Feed-In Tariffs (REFITs) were gaining popularity in Europe and promised a solution that could overcome the shortcomings of the auction system (Civil servant 15pmi, 2021). During the course of 2004 members in the renewable energy policy community, most notably from DCMNR and SEI developed a REFIT for onshore wind energy. Gaining political acceptance of this new instrument, which was not a competitive market-based instrument, proved a challenge and sheds some light on decision making within government at the time. As a policy maker closely involved in the process explains:

> *"[The Department of] Finance, at the time, liked an auction system. They regarded it as a particularly effective way of ensuring that anything that was built was cost competitive. We had to do a lot of work to convince them to change policy, and in fairness, this is where I suppose the policy system works with the political system. Once the minister [of energy] saw the proposed benefits of the switch of system, we got a political head of steam, and received a cabinet decision to go the REFIT route. Once we got central government*

backing on it, that basically meant the Department of Finance and the regulator had to go that direction because that was now government policy. So, it's the way the system works, sometimes the agencies or bodies will change on their own. Other times they need a bit of a central approach or a political push. At this point in time it was a political push…" (Civil servant 15pmi, 2021)

The REFIT commenced in May 2006 supporting all compliant wind projects connected by 31 December 2010 (Department of Communication Marine and Natural Resources, 2006).[43] The cost of the scheme would be funded by electricity consumers through the PSO levy (refer to Chapter 3.3.2). Although it was open to all wind power generation projects, the tariff was set at €70/MWh; benchmarked to make onshore wind generation economically viable but too low for OFW.

By 2007 it was apparent that the GPA gates and REFIT had solved the most pressing challenges to meeting the 2010 RES-E target. Towards the end of the government's term, civil servants and key sectorial stakeholders set out a long-term national energy strategy in the form of the 2007 White Paper on Energy.[44] This consolidated much of the thinking that had emerged over the previous seven years. By this point onshore wind energy had moved from 'a side issue' and was deemed 'pivotal' to a diverse power mix by 2020. In the short term, the White Paper reiterated the priority of meeting the 2010 target, largely through the REFIT scheme. It deferred support for offshore wind and ocean energy to meeting a 2020 target of 33% of power from a 'balanced portfolio' of renewables. The following excerpt summarises the policy consensus on OFW well:

> *"There are considerable challenges inherent in realising these ambitious targets. The growth of emerging technologies remains constrained by their relative cost. (Offshore wind which is capital intensive and technologically challenging is a case in point). High fossil fuel prices have contributed to making renewables more cost competitive but investment costs do remain a key challenge. The Government considers that the balance of social costs and benefits must be recognised as positive and that is our starting point."* (Department of Communications Marine and Natural Resources, 2007)

[43] The scheme also offered tariffs for biomass and hydro.
[44] This would be only the second such White Paper in Irish history, the first white paper having been produced under Desmond O'Malley's term as Minister of Industry and Commerce in 1979.

4.1.7. The Greens jump through a policy window

The 2007 general election offered offshore wind an unexpected climb up the political agenda. Energy security, sustainability and competition featured more prominently in Fianna Fail's manifesto along with several specific sectorial objectives (Fianna Fail, 2007). The framing of energy around security, sustainability and competition that had emerged under the previous government was now central to the overall framing of energy issues. Objectives to promote security included delivering the East-West interconnector between Ireland and Wales, and the second North-South interconnector between Northern Ireland and the Republic, as well as diversifying fuels and renewable sources in power production. Sustainability included 'dramatically' accelerating the growth of renewable energy sources in the electricity in pursuit of the 33% RES-E target for 2020. Facilitating competition centrally involved completing the unbundling of ESB (establishing Eirgrid as wholly independent TSO) and establishing the Single Electricity Market (SEM). The Irish Green Party's election manifesto explicitly promised an offshore wind REFIT, and to "encourage investment" in a European offshore electricity transmission grid (Green Party, 2007).

The general election results shifted the political balance of power only slightly but sufficiently to create an opportunity for the Green Party's agenda. Again, no party enjoyed an outright majority, but this time long-time coalition partners Fianna Fail and the Progressive Democrats needed a third minority partner to form a majority. Winning only six of 166 seats in the House of Representatives proved sufficient for the Green Party to become the king maker in a new governing coalition with Fianna-Fail and the Progressive Democrats. In the coalition formation negotiations, the Greens secured tempered coalition support for "examining the possibility of appropriate support measures for offshore wind" (Government of Ireland, 2007a). Importantly, Green Party deputy Eamon Ryan secured the Ministerial post for the Department of Communications Energy and Natural Resources (DCENR).

4.1.8. A new policy entrepreneur drives price support up the political agenda

Coming into office Ryan immediately set about implementing plans to maximise renewables on the system by extending REFIT to OFW, tidal and wave, and prioritising greater regional interconnection (Civil servant 15pmi, 2021; Roux, 2021g). For ideas, he drew from several advisors outside the established renewable energy policy community associated with the department at the time. This included industrialists like Eddie O'Connor and other actors from Airtricity and OFW developers associated with NOW Ireland (Civil servant 09pmi, 2021a; Wind energy project developer 12idi, 2021). Through Ryan, the members of NOW Ireland had found a policy and political entrepreneur fully in agreement with the idea that the Irish government ought to support OFW and interconnection proactively and as a priority, with the aim of longer-term regional decarbonisation and establishing Ireland as an exporter of renewable power.

Ryan directed civil servants in the DCENR to commission a study to benchmark OFW, wave and tidal energy REFITs. Published in February 2008, the report set a price of €140/MWh for offshore wind; more than double the REFIT price for onshore wind. Ryan announced the launch of the new REFITs, pending EU State Aid approval (Roux, 2021g). The public announcement provides circumstantial evidence that he also enjoyed the support of the cabinet for this decision (Civil servant 15pmi, 2021).

Ryan also established a parliamentary Joint Committee on Climate Change and Energy Security with the objectives to consider medium and long term climate change targets and the measures needed to meet these, especially maximising the penetration of renewables on the Irish system (Seanad Eireann, 2007). This became a key forum for building cross-party awareness and something of a consensus view across several political parties on the need for an ambitious 2020 target as milestone for deeper longer-term decarbonisation. It also served as a forum for deputies from several parties to host public hearings with a wide array of stakeholders in the renewable energy sector and central actors in the policy community (Roux, 2021g, 2021h, 2021i).

4.2. Case 1: Process tracing result summary

Figure 7 summarises the causal mechanisms and contextual conditions for Case 1 along with an interpretation of these in terms of MSF concepts.

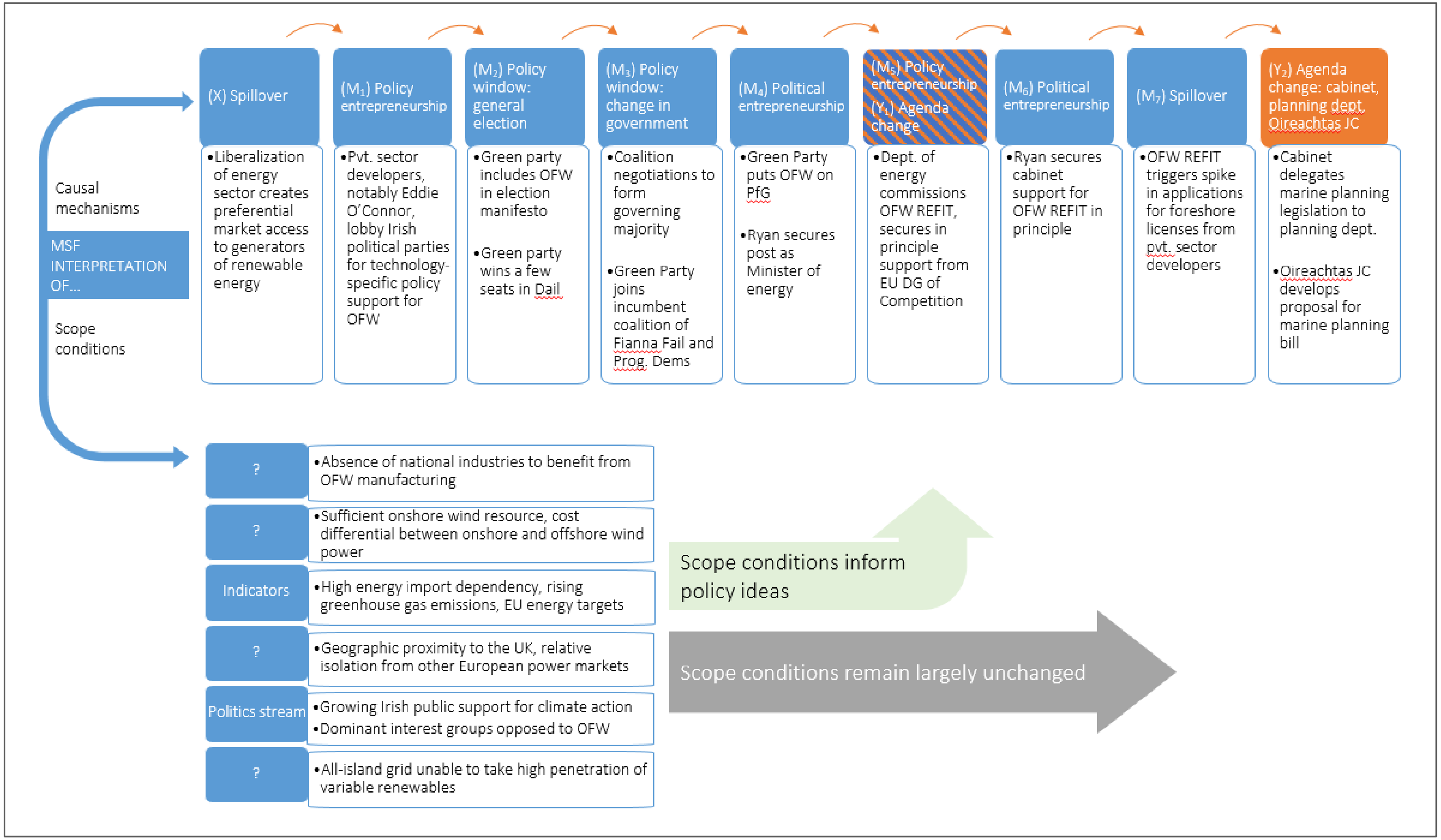

Figure 7: Case 1 summarized as causal mechanisms and scope conditions with Multiple Streams Framework interpretation. ? = MSF does not provide generic interpretation of mechanism of scope condition

Within the temporal scope of this study, the cause of OFW's rise on the Irish political agenda can be traced back to the liberalization of the Irish electricity sector. It was the terms of the Electricity Regulation Act of 1999 which created the incentives for new private generators to develop renewables at scale. The greatest promise lay in offshore wind farms in the Irish Sea, but for that they needed technology-specific policy support from the state. For approximately eight years only a few developers attempted to drive the issue up the political agenda without much success.

Although the Green Paper and the Electricity Regulation Act, both adopted in 1999, set a wider enabling environment for renewables to enter the political agenda, and for associated policy to be developed and enacted, it did not amount to an agenda window opening for OFW. On the contrary, it threatened to foreclose agenda status for the technology. This is because it was apparent to most policy makers in the nascent renewable energy policy community that offshore wind power was not strictly necessary to reach the 2010 renewable electricity target at least cost.

In 2007, the Irish Green Party agreed on an offshore wind REFIT as a policy measure in their general election manifesto (the only political party to do so). The general election results gave no party an outright majority, and the Green Party became a minority partner in a coalition government. In the government negotiations, it secured the ministerial position at the helm of the Department of Communications Energy and Natural Resources. This provided Eamon Ryan with a central position as a political entrepreneur able to put the offshore wind REFIT policy, and OFW and regional interconnection more generally, on the agenda of his department, and to a more limited extent the cabinet and Oireachtas agendas.

By 2007, there was a political consensus between the coalition partners and some opposition parties to frame energy policy around security, sustainability and competition; promote greater electricity interconnection; and accelerate the growth in renewable sources of power production to reach a 2020 target. This served to increase cross-party participation in an Oireachtas Joint Committee on Climate Change and Energy Security (created by Ryan) to consider medium and long-term climate change targets and the policy measures needed to meet these, especially maximising the penetration of renewables on the Irish system.

This committee became the only other political forum, within the legislature, to progress political agreement on OFW and a proposal to reform marine planning legislation to support the commercial deployment of the technology.

The process tracing provides strong evidence that if the Green Party did not secure a part in government and Ryan did not secure the ministerial position for the department of energy, OFW would not have entered the political agenda. Prior to 2007, several parties had, as opposition parties, signalled support for government to support OFW through targeted policies. However, none included explicit policy measures for this in their election manifestos. Advocates for OFW had attempted for approximately eight years (since 1999) to put OFW on to the political agenda, largely without success.

The tracing did not uncover any other mechanisms that explain the rise of OFW on the agenda, but uncovered several scope conditions that militated against it. For instance, Ireland's unexploited onshore wind resource was extensive and cheaper. The renewable energy policy community was focused on RES-E target attainment at least cost and the cost differential between onshore and offshore wind remained large. There was no industrial policy or other benefits associated with diversifying the power generation mix to OFW. Although the public support for climate action was growing, there was no public concern or interest in OFW in particular. For instance, no environmental NGOs, as part of their advocacy for climate action, were advocating for technology-specific policy support for OFW. The balance of influence between interest groups was not in favour of OFW either as it constituted a zero sum game between a few large OFW projects and many smaller onshore wind projects which constituted the interest of most actors in the wind sector. No one in the energy policy community, civil servants and experts in and around government the system operator or the regulator, thought it was a priority; i.e. a solution to pressing energy policy challenges.

The data also provides strong evidence that two competing ideas informed the positions of the above actors vis-à-vis the technology. The idea adopted by almost everyone in the renewable energy policy community and Fianna Fail (the largest partner in the coalition government), was that renewable energy policy should be aimed at attaining the decadal renewable energy target at least cost to Irish tax payers and/or electricity consumers. On the contrary, the Green

Party and advocates of OFW adopted the idea that the decadal targets for 2010 and 2020 were only intermediary milestones to longer term, more ambitious decarbonisation and that the government at the time should prioritise the deployment of OFW along with policies to establish Ireland as a net exporter of electricity. By implication, this group believed it was justified for Irish electricity consumers and/or tax payers to bear some of this cost in the short to medium term. These ideas were connected in complex constellations of beliefs and assumptions, some factual and some normative about how the island's electricity sector would develop and how it ought to be governed. It is beyond the scope of this study to analyse the full constellations of competing beliefs, but the narrative results provide some information on this. Suffice to say that, vis-à-vis OFW's agenda status, the central idea outlined above drove those who brought it on to the agenda in 2007 to undertake their various strategies and distinguished them from those who were either indifferent or opposed to its agenda status.

4.3. Case 2: narrative

Case 2 commences in 2008 when OFW is on the political agenda. It ends in 2011, following the general election, when it is completely off the agenda. It includes two years, roughly 2008 – 2009, where there are failed attempts at adopting policies and legislation to support its commercial deployment.

4.3.1. Unplanned interruptions

During the new coalition government formation, marine licencing and leasing functions under the Foreshore Act were transferred to the Department of Agriculture Fisheries and Food (DAFF) (Government of Ireland, 2007c, 2007b). The Department of Marine and Natural Resources (DMNR) became the Department of Communication Energy and Natural Resources (DCENR). This immediately created an institutional silo that precluded the Minister of the DCENR's discretionary practices in assessing foreshore licence and lease applications (Civil servant 09pmi, 2021a). The DAFF had no capacity or interest in marine energy matters with its agenda heavily skewed to terrestrial agricultural issues (Civil servant 09pmi, 2021a; Policy researcher 20pri, 2021; Wind energy project developer 22pri, 2021).

However, Ryan's announcement of a forthcoming offshore wind REFIT in February 2008 coincided with Airtricity's announced sale to Southern and

Scottish Electric for approximately €1.1 billion. This caused a flurry of interest from prospective offshore wind developers; an offshore wind rush was gaining momentum (Civil servant 29pmi, 2021; Wind energy project developer 12idi, 2021). Within a few months, DAFF officials received 41 applications for foreshore licences to survey potential offshore wind project sites.[45] Senior civil servants anticipated that this offshore wind rush would have potentially significant legal and political ramifications, elevating the issue to the cabinet and seeking legal advice (Civil servant 29pmi, 2021). Some in government, including the Green Party deputy John Gormley, and opposition parties no longer considered the extant policy framework, issued by Fahey's department in 2002 (refer to Chapter 4.1.2, p. 109), as fit for purpose (Roux, 2021h). They called for a cessation of the issuing of licences and leases until legislative reform of the 1933 Foreshore Act.

Cabinet briefly considered two alternative legislative approaches to deal with marine planning consent and leasing of the seabed (Civil servant 29pmi, 2021). One option was standalone legislation governing the permitting of ocean renewables, analogous to existing oil and gas acts, with significant power allocated to the minister of energy. The alternative was a complete overhaul of marine planning legislation that would govern all marine activities in a 'plan-led' approach, based on the Ireland's terrestrial Planning and Development (Strategic Infrastructure) Act 2006. A senior civil servant that contributed to the development of the 2006 Act, advocated for the latter (Civil servant 29pmi, 2021), prompting a cabinet decision in 2009 to transfer most functions under the Foreshore Act, excluding sea-fish and aquaculture, to the Department of Environment, Heritage and Local Government (DEHLG) where terrestrial planning policy expertise resided (Government of Ireland, 2009). The promise of this approach was that comprehensive reform would streamline and simplify the consenting process for government and offshore wind developers, decreasing uncertainty and increasing efficiency. However, it effectively placed a

[45] Between January 2001 and June 2007 only 12 such licence applications had been submitted.

moratorium on licences, necessary to progress surveying, until the enactment of such legislation.

The splitting of the marine planning function between two departments required primary legislation and a transfer of some functions from DAFF to DEHLG. This caused immense and embarrassing bureaucratic delays that lasted the better part of two years. Some of these delays were due to another government policy of decentralising locations for line departments and the unwillingness of civil servants to relocate to offices in Clonakilty (Roux, 2021h). Civil servants maintained that the review of the Foreshore Act could not commence until the legal separation of functions and transfer of staff were completed. Furthermore, they argued that the workload for foreshore related functions had increased immensely without any further resources assigned to deal with it.

The aforementioned delays partially drove the cross-party group (consisting of opposition party deputies) on the Joint Committee for Climate and Energy Security to commence drafting their own legislative proposal, entitled the Offshore Renewable Energy Development Bill (Roux, 2021h, 2021i). By December 2008, the group had submitted their proposal to the government for consideration. However, throughout 2009 the government and Ryan, appeared disinterested in their proposal. Instead, Ryan claimed it would only be 'a few months' for the integration of planning consent for marine renewable energy projects in the Planning and Development (Strategic Infrastructure) Act (Roux, 2021h). An Bord PleanálaAn Bord Pleanála, the authority responsible for issuing planning permission for terrestrial strategic infrastructure, would also be responsible for marine infrastructure; to ensure independence from DCENR. Meanwhile, Ryan had decided to follow the Crown Estate's approach of creating offshore renewable zones. SEI commissioned a Strategic Environmental Impact that would inform such marine zoning as part of an Offshore Renewable Energy Development Plan.

By 2010, the government's bill was still not forthcoming, causing one Senator to muse that the government was taking the supportive consensus across opposition parties lightly; apparently no other minister enjoyed such a consensus on a legislative matter (Roux, 2021i). It appears that, regardless of the political consensus on the matter, the government's unwillingness or inability to assign sufficient resources to the delegated civil service, by way of a sufficient number of skilled staff tasked with drafting complex legislation, was to blame for the delay.

4.3.2. The 2020 target calibrates the objectives of the system operator

During the course of 2008, the renewable energy policy community increasingly shifted its focus towards 2020 target attainment. This was initially based on the programme set out in the 2007 White Paper. In addition, the findings of the All-island Grid Study served to galvanise a wider set of actors around a more ambitious target. A central new actor was Eirgrid, the new system operator.

Eirgrid, the independent TSO, was officially established in July 2006 following a long and complex unbundling process that took the better part of seven years. The first CEO was Dermot Byrne, previously the Head at ESB Networks. One of his first priorities was an organisational shift towards facilitating more renewables on the system (System Operator 03soi, 2020). He was eager to shake off a widely held perception of ESB NG (Eirgrid's institutional predecessor) as being 'anti wind' following the controversial moratorium on new wind grid connections (refer to Chapter 4.1.6). He aimed to establish a culture of customer service in Eirgrid to facilitate the connection of sufficient renewables to the grid to meet the objective of the 2007 White Paper (System Operator 03soi, 2020).

One of the earliest actions to establish a shared evidence base for the aforementioned goal was to commission the first comprehensive assessment of the ability of the electrical power system and, as part of that, the transmission network on the island of Ireland, to absorb large amounts of electricity produced from renewable energy sources. The 'All-Island Grid Study' had been commissioned by civil servants in the DCMNR in 2006, with substantial collaboration between Eirgrid, University College Dublin, and other actors (System Operator 03soi, 2020; Civil servant 09pmi, 2021a; System Operator 17soi, 2022). It found that an electricity system with wind supplying up to 42% of electricity demand could be feasible and only 7% more costly than the lowest cost generation portfolio (Government of Ireland, 2008). Importantly, the All-island grid study established a broad-based consensus between politicians and policymakers, including the system operators and regulator, that this was possible, even if many technical questions remained unresolved (Policy researcher 02pri, 2020; System Operator 03soi, 2020; Civil servant 09pmi, 2021a; System Operator 17soi, 2022). The results of the study were finalised after the new government took office. Ryan used the widely endorsed findings of this study to increase the government's 2020 target to 40% renewable electricity consumption. As Byrne noted shortly after:

> *"Based on the output of the all-island grid study which stated that a target of 42% was possible, the Government set a revised target from 33% up to 40% of electricity from renewable resources. That is the policy to which we are all working. This has been a very clear policy statement by Government and one that has galvanised all the parties in the industry towards making that happen."* (Roux, 2021j)

The more ambitious target placed extra pressure on the system operators to resolve the underlying engineering and market design barriers to achieving an unprecedented degree of variable renewable penetration on the grid (System Operator 17soi, 2022). In response, Eirgrid commissioned a series of studies to design a system services policy to meet the 40% target, an ambitious project that would take several years to complete and several more years to gain regulatory approval (Eirgrid and System Operator for Northern Ireland, 2010; Eirgrid and SONI, 2011b). A key commitment that emerged from this was that Eirgrid could, by 2020 and subject to receiving the requisite funds, operate the all-island grid with a Synchronous-Non-Synchronous Penetration (SNSP) ratio of 75%, without significant curtailment of wind energy.[46] This threshold would be a technical requisite for meeting the new 2020 RES-E target. However, beyond 75% SNSP, Eirgrid estimated that wind energy would face significant curtailment. This would become a key figure throughout the subsequent decade and anchor many debates about the implications of exceeding the 2020 target (Policy researcher 27pri, 2021; System Operator 17soi, 2022).

The All Island Grid Study had provided a sufficient, but by no means comprehensive, evidence base and consensus between the governments, the system operator and the regulator that 40% could be technically feasible and not significantly more expensive (Government of Ireland, 2008). Meanwhile, Ryan also tethered his rationale for policy support for OFW to the more

[46] This essentially means that at any point in time the instantaneous penetration of variable load form wind power could be up to 75% of the load on the power system. Eirgrid estimated that this was necessary if an average target of 40% of power from renewable generation were to be reached.

ambitious target. He maintained that 2GW of OFW would be essential for reaching the 2020 target (Roux, 2021h).

4.3.3. No favours for offshore wind in the grid connection policy regime

A combination of the growing backlog of connection applications and the government's 2007 White Paper triggered the regulator to initiate public consultation on a new Gate 3 wind energy connection policy in 2007 (Commission for Electricity Regulation, 2007). At the outset of the consultation, there was 8,500 MW of renewables in the grid connection queue, already exceeded the estimated 4,400 MW of installed renewables required to meet the 33% RES-E 2020 target. Appendix G provides a detailed account of how the Gate 3 policy came about. Here I provide a summary of the main points that held implications for OFW deployment.

Prior to the consultation on Gate 3, the system operator had started developing a more comprehensive approach to long-term grid development over a 20-year horizon. It proposed this model to the regulator as a way to set some of the criteria for processing the group of applications under Gate 3. The new GDS model incorporated current and likely future generation sites; likely interconnection; the introduction of the All-Island Market; likely closures; government renewable targets; growth in demand; and technological developments. It would be able to identify transmission deep reinforcements required to meet different future scenarios in a technically and economic efficient manner (Commission for Electricity Regulation, 2007). This technological advance enabled optimal long-term grid development to serve as a counterweight to non-discrimination between market participants (most importantly the queue by application date order) in the settling of grid connection policy. Consequently, the Gate 3 connection policy sought to maintain a defensible approach to dealing with the application backlog whilst aligning connection policy with optimal long-term development of the grid.

The main implication of the GDS model was that it could analyse a much larger group of grid connection applications, which in practice extended the grid planning horizon out to 20 years. The regulator therefore set the Gate 3 cap to the estimated MW required for meeting the 40% RES-E target in 2020, demonstrating its support for the government's long-term renewable energy agenda. The GDS relegated the application date order queue to a secondary consideration within the gate (given that the GDS would determine the date of firm connection for generators). However, given the certainty that the approach gave to a larger set of wind developers, a clear majority supported it (Commission for Electricity Regulation, 2008). This was a hard-won compromise between the system operator, regulator and the wind generation market. Essentially, the market would continue determining *where* wind generation plant were to be built, whilst the system operator had more influence in determining *when* plant would be connected to the grid.

The complexity of the shift to the approach used in Gate 3 required much more time. The regulator's consultation and decision took a year. Following the decision, Eirgrid needed more than a year to issue a schedule of connection offers (Eirgrid, 2013). It only published its Gate 3 access schedule (which confirmed the dates that wind developers would have 'firm access' in January 2010.

Gate 3 included three of the five offshore wind projects under development in Ireland, totalling 800 MW in capacity.[47] The offshore wind projects secured offers to connect between 2013 and 2018. This included firm offers to nine offshore wind applications totalling 794.8 MW (Commission for Electricity Regulation, 2010).[48] However, NOW Ireland and Airtricity continued to advocate that offshore wind should not be processed under the gate system "due to its capacity, large scale and the challenging nature of offshore construction" (NOW Ireland, 2008).[49] Airtricity argued that the GDS, which would ultimately be published as Eirgrid's 'Grid 25' strategy, was predominantly focused on onshore wind development (Roux, 2021i).[50] They claimed that grid development and connection were the key barriers to further development of Arklow Bank. I could not find a public statement by the regulator for refusing technology-specific

[47] The offshore wind projects qualified for pre-selection into the gate simply because of their place in the application queue, though the larger Gate cap may have brought forward their processing.
[48] Seven of these applications constituted different parts of the Kish Bank Wind Farm (312 MW scheduled for connection in 2010 and 2013). Oriel (330 MW scheduled for 2017 and 2018) and Doolick offshore wind farm (100.8 MW scheduled for 2018 – 2020) also received firm connection offers.
[49] Airtricity recommended Ireland follow the UK's grid connection policy and that it was open to discussing other models for financing grid connection (alternative to the consumer paying).
[50] Airtricity had commissioned a study that showed the date order criterion in the GPA would cost €400 million more than an optimised criterion around clusters in zones.

terms for OFW connection, but the aforementioned general reasons (and the extended discussion in Appendix G) suffice to explain its decision.

4.3.4. Regional ‘change in thinking’ on interconnection but incrementalism from the TSO

In 2007, thinking around further interconnection with the UK and Europe, and offshore grids in the Irish and North seas, was at its infancy. Progress required significant research and advocacy at a national and regional level. In Ireland, further interconnection and the prospect of creating an electricity export market enjoyed wide cross-party support whilst the government commissioned joint research to understand the feasibility of a regional grid in the Irish Sea. However, ‘incrementalism’ would characterize Eirgrid and the Regulator’s approach to interconnection.

In 2008, the government followed through on the needed legislative reform to enable Eirgird to build and operate new interconnection infrastructure (Roux, 2021g). The Electricity Regulation (Amendment) (EirGrid) Bill 2008 would expand the statutory functions of EirGrid in relation to interconnection, enabling it to construct, own and operate an interconnector (subject to the grant of the appropriate licence and authorisation by the regulator). The Bill also increased EirGrid's borrowing limit to €750 million. The urgent priority of the first measure was to enable Eirgrid to proceed with the East-West Interconnector. The second measure more generally enabled Eirgrid to achieve government targets, especially relating to connecting more renewables to the national grid.

The Bill enjoyed widespread cross-party support as it worked through the legislative process. Both the governing coalition and opposition parties enthusiastically voiced their support for greater interconnection with the UK and France in order to achieve greater energy security and export markets for offshore wind. Simon Coveney, then deputy for Fine Gael in opposition, seeking to out-do the government’s ambition, criticized the government’s interconnection ‘policy’ as “woefully insufficient”:

> *“Fine Gael will not be opposing this Bill and it welcomes its introduction for the very straightforward reason that it believes the east-west interconnector between Ireland and Britain needs to be built as soon as possible. … Interconnection is a good idea but are we ambitious enough with it? … The European Union needs to prepare itself for a time when we will be importing all of our gas from Russia, Kazakhstan, the Middle*

> *East and so on. The Lisbon reform treaty makes it clear that the European Union is preparing itself for that eventuality. … Fine Gael strongly supports the need for energy storage and interconnection so that Ireland can become the green-eyed Arabs of Europe.”*[51] (Roux, 2021g)

Regional concerns over energy insecurity were opening a different agenda window for OFW in Ireland, not framed around national consumption and sustainability, but around a potential export commodity. This idea had been promoted by the likes of Eddie O’Connor since the late 1990s, but by 2008 political receptivity to it appeared to be breaking through to the mainstream of Irish politics.

In addition to legislating for Eirgrid to proceed with the East-West interconnector, the DCENR jointly commissioned an EU-funded study between Ireland, Northern Ireland, and Scotland to examine the feasibility of an offshore interconnected transmission network linking potential renewable energy sites off Western Scotland, Northern Ireland and Ireland (Gannon, 2012). Eirgrid also responded to the government’s ambition by commissioning research on the feasibility of greater interconnection with France and offshore grid development options in the Irish Sea (Eirgrid, 2009b, 2011; Roux, 2021i). With the legislated capacity to construct, own and operate transmission assets and an increased credit cap it clearly had a general interest in the expansion of this field. It would take a couple of years for this research to produce the evidence base for further policy decisions on the matter.

In December 2009, Ministers of North Seas Countries Belgium, Denmark, France, Germany, Ireland, Luxembourg, the Netherlands, Sweden and the United Kingdom signed the first political declaration to launch the North Seas Countries Offshore Grid Initiative NSCOGI) (‘Political declaration on the North Seas Countries Offshore Grid Initiative The declaration’, 2009).[52] The objectives of the initiative was to foster a joint commitment of all stakeholders to tackle all technical, market, regulatory and policy barriers for long term offshore infrastructure developments within the North Seas region, including OFW and cross border transmission grid infrastructure. A more detailed MoU followed in

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[51] Coveney went on to explain that he picked up the phrase ‘green eyed Arabs of Europe’ from a Norwegian expert who had referred to Norway as the ‘blue eyed Arabs of Europe’ and had warned him that Ireland was not thinking ambitiously enough about the potential to establish itself as an energy exporter.

[52] Norway joined shortly after.

2010 with a governance structure that included the regulators and line ministries of all the signatory countries along with a detailed work plan. From Ireland, Ryan and the Chair of the regulator, Michael Tutty, were signatories and participants to this regional initiative. Ryan argued that this “change in thinking” was central to the European Union agenda on energy security and offered an opportunity for Ireland. The east-west interconnector would be the first step for Ireland to greater regional interconnection. Tutty gave a more guarded response. He noted that the general case for interconnection was strong (increased competition, more efficient market prices and greater security), but that the priority for the regulator would be to “slowly adapt” the Single Electricity Market (SEM) to bring it in line with EU regulation. The SEM was only three years old and stakeholders argued that it was not ready for the radical changes that greater interconnection with France and the UK would entail (Commission for Energy Regulation, 2009, 2010).

Meanwhile, Byrne (the CEO of Eirgrid) was careful to position the TSO both as the authoritative generator of interconnection policy alternatives and as the implementer of government policy. When deputies on the Joint Committee questioned the ‘lack of ambition’ of the 500 MW East-West interconnector to support an export industry, Byrne both noted grid constraints to this particular project and demarcated the TSO’s position on determining feasible alternatives:

> *"We also play a key role, in terms of solid analysis that informs policy formation. The work I have discussed here, in terms of further interconnection, is in the public domain for the committee to consider... We are not constrained and do not feel constrained in terms of how we do it. ... We have two roles. One is influencing policy through analysis and the other implementing policy once it is made.”*
> (Roux, 2021i)

The Regulator held a similarly cautious line on interconnection, arguing that the 2020 target could be reached without net export, and that export and interconnection policy should be underpinned by a better understanding of the economics of export, and its effect on Irish consumers (Roux, 2021i).

Around 2009, offshore wind project developers were increasingly setting their hopes on *direct* export to the UK, avoiding the Irish market (and grid) completely and not reliant on further interconnection between the markets. They claimed that grid development and connection were the key barriers to further development and that direct export to the UK from Irish waters could jumpstart initial development in the Irish Sea. OFW's main political entrepreneur, Ryan, also became more careful to distinguish the potential of OFW as an export commodity to be progressed based on improved technology and interconnection with the UK (Roux, 2021i).

4.3.5. The energy policy community advocates against REFIT and overambitious interconnection; politicians take heed

In January 2010, Ireland submitted its National Renewable Energy Action Plan (NREAP) to the EU, committing to a legally binding target of 16% of all energy consumption from renewable sources by 2020 with a subsidiary target of 40% of electricity consumption from renewable sources (Government of Ireland, 2010). In the NREAP's forecasts, offshore wind would provide approximately 10%, or 500 MW, of the needed capacity by 2020. It listed several ongoing measures to achieve this. These included technical studies on the facilitation of the requisite amount of wind energy on the Irish grid and offshore network and interconnection feasibility research, implementing a new 'streamlined and modern' consenting process for offshore renewable infrastructure, and offering an offshore wind REFIT. However, the policy (drafted largely during the course of 2009) had not yet accounted for the change in political and economic conditions in Ireland.

From the beginning of his term in office, Ryan sought to bring in the ideas of advocates like Eddie O'Connor and Brian Britton into the renewable energy policy community. His position in government and at the helm of the DCENR afforded him the position to commission an offshore wind REFIT for Ireland (and to gain necessary government support through agreement on the Cabinet) and offshore grid feasibility studies. However, there were many in the established energy policy community who did not agree with these ideas. Most notably the regulator, system operator and economists at the ESRI (Policy researcher 27pri, 2021). Following the government's announcement of offshore, wave and tidal REFITs, ESRI commissioned an estimate of the policy measure's financial impact on electricity consumers (Devitt and Malaguzzi Valeri, 2011). They argued that an OFW REFIT should not be subsidized by Irish consumers at all, given that there was likely to be sufficient and cheaper onshore capacity to meet national demand in the long-term and that electricity from OFW would likely be channelled to exports,.[53] By 2010 it was clear that the concerns over the cost implications of an offshore wind REFIT were circulating through opposition parties and that some deputies were changing their positions (Roux, 2021j).

In 2008, on a general wave of political support, the government announced an offshore REFIT and reform of marine legislation, whilst the regulator decided on a grid connection policy which would afford three offshore wind farms connection in the next batch of offers. However, between 2008 and 2010, whilst these various policies were being worked out, the political tide had shifted. The coincidence of an announced OFW REFIT, although significantly delayed not yet formally abandoned, and three offshore wind projects with grid connection offers totally 800 MW under Gate 3, raised the concern of opposition parties (Roux, 2021j). Ryan conceded that ESRI had raised ‘understandable’ concerns over the cost of offshore energy and that interconnection would have to be part-funded by the EU and neighbouring markets (Roux, 2021i). He also conceded that a policy consensus still needed to be built around the economic opportunity for offshore energy and that actors like the Industrial Development Agency of Ireland (IDA) needed to participate in energy policy forums. However, he did not publicly abandon the by now much-delayed OFW REFIT proposal.

4.3.6. The financial crisis closes down prospects for Irish OFW

The shifting agendas and policy developments on renewable energy covered in the previous section coincided with the unfolding of the Irish fiscal and banking crises that eventually culminated in the Irish financial crisis in 2011 (Donovan and Antoin E. Murphy, 2013). The political and economic fallout from the financial crisis affected political and policy support for the deployment of OFW in four ways.

Firstly, the handling of the banking and fiscal crises precipitated the fall of the Fianna Fáil-led coalition government. The Green Party signalled its withdrawal from the coalition in September 2010 and called for an election in 2011. All coalition partners suffered large defeats and the Greens lost all their seats in the parliament. Fine Gael and the Labour party formed a new governing

[53] ESRI recommended that policy support for wave and tidal energy ought to be sustained through grants rather than a REFIT.

coalition with a programme for government driven by recovery from the financial crash (Government of Ireland, 2011). One of Fine Gael's election promises was to lower energy prices, with an explicit commitment to reform the "PSO/REFIT subsidy system". This commitment aligned with its prior opposition to REFITs for offshore wind, wave, and tidal, informed by analysis from the ESRI. Fine Gael's ascent to power opened an opportunity for proponents of a wider 'least cost', technology-neutral decarbonisation policy to push their preferred solutions (Industry association advocate 23idi, 2021; Policy researcher 27pri, 2021). ESRI seized the window of opportunity in 2011 to review Irish energy policy and its alignment with EU policy. It recommended that continued policy support for renewables should abandon offshore, wave and tidal REFITs and focus exclusively on onshore wind, to minimize costs increases for consumers. It advised that any Irish investment in renewables to exceed the 2020 target could result in stranded assets, that further promotion of renewables should be commensurate with greater interconnection, but interconnection costs should not be shifted on to the Irish consumers either (Fitz Gerald, 2011). ESRI's recommendations proved influential in the new government's Strategy for Renewable Energy 2012 – 2020 (Government of Ireland, 2012).

Secondly, the recession caused a significant decrease in the national demand for electricity and downward revisions of demand forecasts for the decade ahead. In 2007 the system operators forecasted that annual electricity demand would be between 34.8 TWh and 37.2 TWh by 2014 (Eirgrid, 2007).[54] By 2011, this was revised to 28.2 – 28.6 TWh by 2014, and forecasted for 31.3 – 31.4 TWh by 2020 (Eirgrid and SONI, 2011a).[55] The following year, this was revised to 26.4 – 27.0 TWh by 2014, and forecasted for 29.3 – 30.8 TWh by 2021 (Eirgrid and SONI, 2012).[56] The inclusion of offshore wind (along with other ocean renewables) in the long list of NREAP actions for 2020 rested precariously on future national demand forecasts, in lieu of an export market. Wiping out roughly 25% of electricity demand by 2014 meant that Ireland would need much less electricity overall, and the all-island grid would absorb much less variable supply at 75% SNSP by the end of the decade. In 2008 it was estimated that Ireland would need 5,800 MW of wind capacity to meet the 40%

[54] For the all-island system: 44.9 – 48.2 TWh by 2014.
[55] For the all island system: 37.4 – 38.7 TWh by 2014, 40.9 – 43.4 TWh by 2021.
[56] For the all island system: 35.3 – 36.3 TWh by 2014, 39.1 – 41.4 TWh by 2021.

target in 2020, in 2009 this was revised to just over 4,600, and by 2011 revised downward again to 3,500 – 4,000 MW (Eirgrid, 2009a; Eirgrid and SONI, 2011a).

Thirdly, throughout and following the financial crisis, the installed capacity of onshore wind energy increased steadily and without noteworthy interruptions (Eirgrid and SONI, 2012). The onshore wind REFIT predominantly drove this growth. The first REFIT had proved successful in delivering the 2010 RES-E target where the AER auctions had failed. Under the onshore wind REFIT extension, the previous government had guaranteed support to qualifying projects completed by 31 December 2015. At the time, policy makers did not have a cheaper and technically feasible alternative to meet the 2020 RES-E target. The fact that the REFIT was not funded from the fiscus shielded it from the dramatic change in fiscal policy (Civil servant 15pmi, 2021). However, concerns over the cost of the PSO levy to consumers, along with the cost of capacity payments did elevate the issue on to the election manifesto and programme for government. Economic and power system modellers at SEI, Eirgrid and the ESRI sought to model the overall effect of increasing wind on the system on the consumer price of electricity with some dispute over its impact (Policy researcher 07pri, 2020; Policy researcher 27pri, 2021). ESRI modelling showed that the PSO cost to consumers was offset by the reduction in wholesale electricity prices due to the increased availability of zero marginal cost wind (Di Cosmo and Valeri, 2012). However, another report that is not publicly accessible demonstrated that there was an additional cost to consumers when using the more accurate production cost of electricity in analysis (Policy researcher 07pri, 2020).[57] Policy makers opted to emphasise the cost-neutral result to argue in favour of retaining the momentum that had built behind onshore wind thanks to the REFIT-PSO regime. Whilst the Fine Gael government axed the offshore wind REFIT, the onshore REFIT enjoyed a stay of execution. The extension of the REFIT was calibrated to ensure the realisation of the 2020 RES-E target and by 2012 it was clear to the policy community that it would probably be sufficient for this objective. The success of onshore wind deployment alongside the substantial downward revision of

[57] Due to shortcomings in the market design at the time there was ‘missing money’ in that the market price did not fully account for the long run cost of electricity production from certain plant. Wind enjoyed an advantage at the expense of long-term investment in dispatchable plant.

economic growth forecasts made it clear by 2012 that Ireland's pipeline of onshore wind projects would suffice to meet the 2020 renewables target (Rabitte, 2013).

Finally, several rounds of fiscal cuts and the change in government triggered a period of high staff turnover in the DCENR, DAFF and DEHLG, including junior and senior civil servants, and ministerial posts (Civil servant 09pmi, 2021a; Civil servant 15pmi, 2021; Civil servant 29pmi, 2021). This resulted in shifts in power between the executive, various ministers and senior civil servants in particular departments. It significantly changed the agendas for the respective departments and their capacity to develop and implement policies in relevant areas. From 2011 onwards, the DCENR and Eirgrid completed various reports commissioned during the previous government's term to assess the feasibility of offshore grid development and interconnection. For instance, the Interreg-funded ISLES study demonstrated the feasibility of greater interconnection and the Eirgrid study presented several options for offshore grid development. However, given the dramatic shift in economic conditions, political agendas, and institutional turnover, the findings of these studies failed to find policy entrepreneurs to progress (Policy researcher 04pri, 2020; Civil servant 09pmi, 2021a; Civil servant 15pmi, 2021).

4.4. Case 2: process tracing result summary

Next, I trace the mechanisms which led to the failure to adopt policies to support OFW's commercial deployment. Following the rise of OFW on the political agenda in 2007, debate and policy development for a price support instrument, grid connection and marine planning legislation spread across several institutions following distinct pathways, but remaining causally entangled or co-dependent. I discuss each policy element in turn.

The reasons for ultimately not adopting the OFW REFIT was partially due to unforeseen changes in the wider economic and political context after the REFIT had entered the political agenda. However, some of the mediating reasons that delayed adoption of the OFW REFIT between mid-2008 and the end of the government's term, were due to the unintended effects of grid connection policy.

From the outset of Ryan's term, it was clear that the department of energy would develop the OFW REFIT instrument. The same civil servants responsible for the previous REFIT, managed the commissioning for the OFW REFIT proposal (alongside a wave and tidal REFIT), which largely consisted in setting a technology-specific tariff for OFW. Benchmarking the terms of the OFW REFIT only took a few months, following which the government made a public announcement of the forthcoming REFIT and the rate of the tariff. Two inferences can be drawn from the data. By February 2008, the EU DG of Competition had already given an informal confirmation that the instrument was generally compliant with state aid regulations and likely to receive clearance, and the cabinet (notably the treasury) had agreed with the draft proposal. From March onwards, Ryan blamed delay in implementation of the REFIT on the work required by his department and OFW developers to get formal state aid clearance for the proposed tariff rate. However, by October Ryan claimed that the offshore REFIT would be finalised in the 'very near future'.

Shortly after, an important inflection point occurred in November 2008 when Ryan noted (for the first time on public record at least) that the department would issue a "more appropriate timeline" for adopting the REFIT based on when OFW projects could obtain firm grid connections under the Gate 3 grid connection policy. In 2007, the TSO had proposed an ambitious new approach to integrating renewable generation into a long-term plan for the development of transmission infrastructure. This entailed processing an unprecedented number and capacity of connection applications. The regulator consulted on this in 2008 and with widespread support from the onshore wind industry adopted this policy. However, it was only in January 2010 that the TSO issued its schedule of dates for firm grid connections. For just over a year therefore, it was not known when exactly the offshore wind projects within the batch would have firm connection access scheduled for. Throughout the connection processing period, the department held off on progressing the OFW REFIT, maintaining that it would be premature to adopt a REFIT without knowing when projects would be able to connect. Ultimately, in 2010, the TSO scheduled firm connections for three OFW projects in 2013, 2017 and 2018 according to its GDS approach. Ryan's department subsequently implemented an extension of the (onshore) wind REFIT and a biomass REFIT, but delayed adoption of the OFW, wave and tidal REFITs. This provides some proof that certainty over grid access was a necessary, and potentially sufficient, condition for delaying the adoption of the OFW REFIT for the remainder of the government's term.

Would the government have passed the REFIT in its term if it had not been for the financial crash, or was the scheduling of grid connection offers sufficient to delay the implementation of the REFIT beyond the government's term? In order to probe this, it is necessary to look at the discussion around technology-specific grid connection policy for OFW alongside Ryan (and the government's) wider stance on connection policy. One of the most contentious political points was the inefficiencies, and additional costs to electricity consumers, of a market-led approach to grid connection. In response to Gate 1 and Gate 2, opposition party deputies frequently demanded a more strategic approach from the regulator and government. The minister of energy could exercise their power under the act to give direction to the regulator on connection policy; this was mainly as a response to breaking away from the application date order processing of applications and finding centralised ways to distinguish between speculative and proper applications, and align applications with optimal grid development. Ryan, like previous ministers, refused to intervene on this. This may be either because he agreed with the regulator's approach or because the legal constraints on intervention made it a costly and politically risky matter for him. In addition, by 2008, both the regulator and the TSO had given credible signals that they were facilitating government targets for accelerating the rollout of renewables in general. In the case of the regulator, calibrating the Gate 3 batch size to the new 40% RES-E target and only providing preferential terms to non-renewable plant and technologies where these served the goal of decarbonisation. By 2010 the Chair of the regulator openly stated that OFW was unnecessary for reaching the 2020 RES-E target.

Finally, given that Ryan was the primary driver of the REFIT, it is important to note if changes in his own beliefs, importantly learning, contributed to his position. When he commissioned the REFIT, the regulator had not yet made a draft proposal for Gate 3. By the time Ryan announced the REFIT, public consultation on the draft terms for Gate 3 was open. During this period the unintended consequences of Gate 1 and 2 was very much a topic of discussion. The regulator had not originally intended for the gate system to continue after one or two gates, but given the spike in applications and the path dependency set by the application date processing rule, by 2008 the regulator felt locked in to a very set interpretation of its statutory duties. From the available data, it appears that Ryan first came to accept the rationale for the regulatory approach, following which the implications for the REFIT became clear. Even if the financial crash had not happened, it is likely that the path dependency created by the grid connection policy, coupled with its more general success at facilitating onshore wind to meet the government's target, would have delayed the implementation of the OFW REFIT until 2011 or 2012 anyway. The effect of the financial crisis on the REFIT only kicked in by 2011 with a new government at the helm. The new government explicitly abandoned the OFW REFIT due to the cost implications for electricity consumers in the context of the financial crash.

The timing of working out the grid connection policy is also key here. The regulator announced the final terms of the Gate 3 policy in 2008, but the TSO only managed to process all the applications in the batch by January 2010. Importantly, this entailed the schedule of firm connection offer dates for each connection application within the batch. By 2010 the government was in crisis mode more generally. ESRI analysis had also demonstrated the additional costs of the OFW REFIT on electricity consumers.

The delay in state aid approval was temporary and did not materially affect the REFIT terms. If state aid clearance had been obtained quicker, the instrument would still have faced the challenge of the grid connection policy.

Over this period the regulator also refused to adopt a technology-specific grid connection policy for OFW. The central regulatory issue here is that it would allow offshore project applications to 'jump the queue' of onshore wind applications. It is necessary to read the regulator's refusal alongside its willingness to create new categories to set parallel queues for other technologies. The Electricity Regulation Act forbids the regulator from discriminating unfairly between applicants for licences and authorisations, alongside the duties to promote competition in the generation and supply of electricity and to promote the use of 'renewable, sustainable or alternative forms of energy'. Within this latter category it does not distinguish promotion between onshore wind, offshore wind or solar. The regulator did, over the period in question, respond to political signals without any ministers having to exercise their formal power of direction. The regulator did this primarily by ensuring that grid connection policy was calibrated to meeting decadal renewable energy targets; first the 2010 and then the 2020 target. However, it also acted on other political signals. For instance, alongside the Gate 3 connection policy for all wind projects, it created a parallel category that enabled the sequential (not batch) processing of connection applications for solar PV projects with capacity less than 5 MW. What would justify this whilst denying offshore wind applicants similar preferential treatment? Firstly, the government provided a signal in the 2007 White Paper on Energy to support small scale distributed generation of electricity. Secondly, the regulator assumed (incorrectly), that there would not be many spatially clustered grid connection applications for small-scale solar; i.e. solar would not create local grid congestion issues. The rationale of the regulator was essentially that it could comply with the political objective of supporting small-scale distributed renewable generation, as long as it was small, spatially distributed and did not impinge on grid access for commercial scale (onshore) wind applicants. OFW was very different from this. It consisted in a very small number of very large projects that would certainly take scarce capacity from onshore projects.

What argument could be made consistent with the Electricity Regulation Act to justify such discrimination? One argument, advanced by Ryan and OFW developers, was that some OFW generation was necessary to meet the 2020 RES-E target. However, this claim was far from certain. The regulator did not endorse it and the system operator remained noncommittal. Importantly, there was not yet the capacity for long-term energy system scenario modelling to establish an evidentiary base around which more stakeholders could form a rough consensus on future expectations. In the period 2007 – 2010, the key forecasting tool was the seven-year capacity demand forecast, a central forecasting device issued by the system operator. OFW was definitely not necessary across this shorter planning horizon. The unintended consequence of the GPA, based on application submission date order, had created a legitimate expectation with onshore wind developers that the regulator did not have the confidence to break. The system operator had, for Gate 1 and 2, no technical solution that could optimise batch processing based on other criteria (such as optimal grid development) that would be beyond challenge, and the regulator expected that onshore wind developers would issue legal challenges against such alternative criteria. This then constituted a path dependency for grid connection policy that hindered the preferential treatment of OFW. With Gate 3, the GDR approach proposed by Eirgrid struck a hard-won compromise with the onshore wind sector. In this context, it appears highly unlikely that any justification for preferential treatment of OFW could have been made, and certainly none of the strongest advocates were able to.

Next, I consider the failure in developing new marine planning legislation following OFW's rise on the agenda. For approximately seven years, two consecutive governments were content that the extant Foreshore Act of 1933 and a supplementary policy guidance note for intending developers sufficed as a policy framework for prospective OFW developers to obtain the necessary licences and leases to construct and operate OFW projects. This lasted for as long as surveying licences were very few. It was only when the announcement of an OFW REFIT caused an offshore wind rush that the government decided a new legislative framework was required. This coincided with the recent success of civil servants to develop the terrestrial Planning and Development (Strategic Infrastructure) Act 2006. Terrestrial planners, imbued with the confidence from the passing of the prior act, successfully advocated government that a similar integrated legal approach ought to be used for all maritime planning. Government transferred the responsibility to this group. However, splitting the marine consenting function between the department for agriculture and fisheries and the department for planning caused unforeseen delays due to the need to pass new legislation to split the function and the practicalities of relocating civil servants between different cities. Once the aforementioned was completed, which took almost two years, work on developing the legislative proposal commenced. However, by this point, the REFIT was on hold (pending the outcome of grid connection policy implementation), and the under-resourced department allocated its resources to other issues. Shortly after, the financial crash triggered a change in government and the transfer of key civil servants to other policy briefs. A key point in policy making again relates to timing. For a relatively small state like Ireland, developing a complex new legislative proposal (a bill) can take years before it reaches the legislature for formal debate, refinement and adoption by elected officials (so-called ‘decision making’ in MSF literature). What the process tracing makes clear is that the prospect of deploying OFW was the only driver in this period to provide an incentive to undertake such work. But the political interest in offshore renewables waned before the completion of a proposal. Lacking an alternative driver, legislative development fell into abeyance. Comparatively, the development of *sectorial* legislation for offshore renewables, analogous to offshore oil and gas legislation, appears quicker and easier, and hence more likely to be completed within policy windows that may only be open for a couple of years or less.

Next, I consider the sequence of events that explain how OFW moved *off* the political agenda in 2009 – 2010, as summarized in Figure 8.

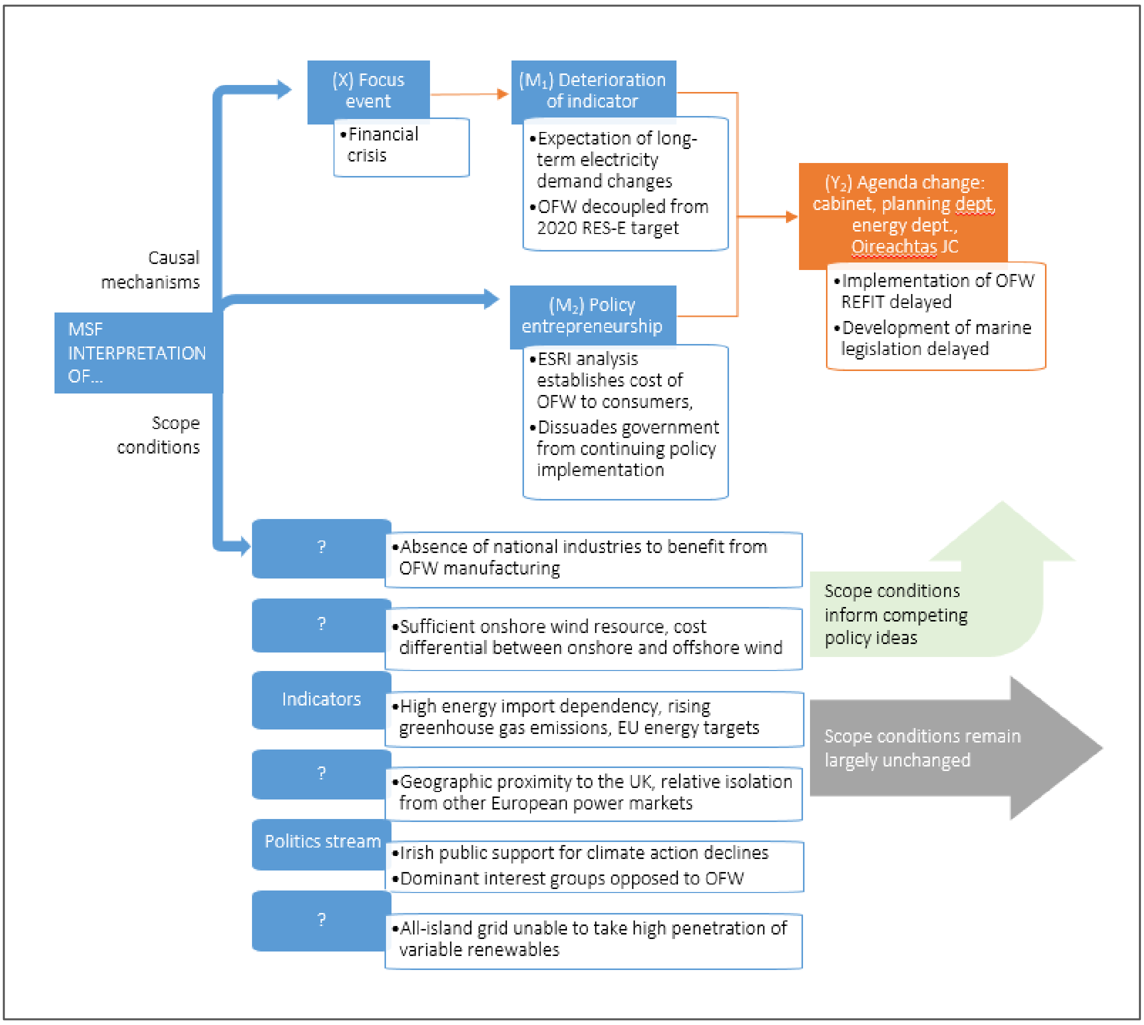

Figure 8: Case 2 summarized as causal mechanisms and scope conditions with Multiple Streams Framework interpretation. ? = MSF does not provide generic interpretation of mechanism or scope condition.

The financial crisis in Ireland increasingly dominated political agendas from the end of 2008 onwards as policy makers’ understanding of the extent of the crisis grew over a two-year period. However, it was not simply that there was no time to progress work on OFW. OFW's tenuous agenda status had been tied to its peripheral contribution to the 2020 RES-E target, and the advocacy by some politicians, most notably Ryan, that it was justifiable for electricity consumers to pay for the additional costs of an OFW REFIT in the medium term to support long-term decarbonisation and export. The economic downturn dramatically decreased projections of future economic growth. Electricity demand forecasts took economic growth projections as a key input. It would have been clear to many policy makers in the renewable energy policy community that with the projected economic downturn, Ireland would need much less electricity from renewable by 2020 to meet its 40% target. A marginal contribution from OFW would no longer be necessary. Secondly, the ESRI analysis had successfully demonstrated that the instrument would have a significant impact on Irish electricity consumers. Many politicians who had previously supported the OFW REFIT, took note and changed their stance. Particularly as the financial crisis centred debate on the government's fiscal policy, any policy measure that would add extra costs to tax payers or consumers and was not essential to short-term interests would be jettisoned. The willingness of politicians to champion certain expensive policies had shifted dramatically from the Celtic Tiger era in anticipation of the fallout of the financial crisis. Once government abandoned the implementation of the offshore wind REFIT, there was little reason to progress the complex and costly overhaul of marine planning legislation.

4.5. Case 3: narrative

In this section, I present the results for the period 2012 to the 2020 general election. It covers a period of energy policy transition from a mix of policies aimed at realising the 2020 target to developing new solutions calibrated to a much more ambitious 2030 target.

4.5.1. A failed export scheme and grid expansion has unintended consequences

In 2009, the European Directive 2009/28/EC on the promotion of the use of energy from renewable sources established mandatory national targets consistent with a 20% renewable energy target by 2020 for the Community. It also provided 'flexibility mechanisms' whereby member states could make statistical transfers or undertake joint projects to achieve their respective national targets (European Parliament Council of the European Union, 2009).[58]

Joint projects created an opportunity for Irish OFW for direct export to the UK, just as the fallout from the financial crisis had closed the opportunity to serve Irish consumption and Ireland's 2020 target. By March 2012, collaboration on renewable energy development featured prominently in the joint statement between the UK Prime Minister, David Cameron, and the Taoiseach, Enda Kenny, on British-Irish relations for the coming decade (Cameron and Kenny, 2012). Shortly after, the UK Department for Energy and Climate Change (DECC) closed a public call for evidence on utilising flexibility mechanisms under the Directive (UK Department of Energy and Climate Change, 2012). DECC and the UK Government's Committee on Climate Change's own modelling at the time showed that the UK market could scale at a sufficient rate to meet its 15% renewable energy target by 2020. However, it remained interested in the flexibility mechanisms as a potentially more cost effective route to renewable energy deployment and a risk mitigation measure, should UK deployment not materialise as projected. Given its own substantial offshore wind resource, it was interested in both opportunities for export and import under the flexibility mechanisms. It noted a particular interest in potential opportunities for joint projects outside of the UK, asking industry to provide information on project locations, technology type, potential generating capacity and capital and operating cost estimates. Several project developers and industry associations responded to this call, with eleven projects in Ireland, including three Irish offshore wind farm developments (Oriel, Dublin Array, and Fuinneamh Sceirde Teoranta) and NOW Ireland. They advocated for an intergovernmental agreement on joint projects. However, the Irish projects that stood to gain first from the flexibility mechanism were cheaper, onshore projects that could energize first. Mainstream Energy, Element Power, and Bord na

[58] A statistical transfer consisted of an agreement between two Member States, whereby one country would sell a credit for an amount of energy from a renewable source, generated (and consumed) in that country, to the other country, counting towards its renewable energy target attainment. It does not involve the physical transfer of energy between states, nor does it involve the private sector, being an agreement between states. Joint projects, on the other hand, involved collaboration between two or more member states on electricity generation projects that would involve trade in electricity from renewable sources between the states. This would involve the private sector project developers as well as an agreement between states on how energy from such projects would count towards their 2020 target attainment.

Mona initiated a cluster of massive projects in the Midlands, which would become known as the Midlands Export Scheme.[59]

On the Irish side, DCENR commissioned analysis with SEAI, Eirgrid and the regulator to establish the viability, cost and benefit of Ireland using flexibility mechanisms, particularly joint projects for export to the UK. This demonstrated that such an export scheme would be mutually beneficial and led to a Memorandum of Understanding in January 2013 to "achieve closer integration of the UK and Irish electricity markets" and to analyse "how Irish renewable energy resources, onshore and offshore, might be developed to the mutual benefit of Ireland and the United Kingdom" (UK Department of Energy and Climate Change, 2013). During the course of 2013 it was "all systems go" on negotiating an agreement, according to a source privy to the negotiations (Civil servant 29pmi, 2021) and by the end of the year, Minister Pat Rabbitte reported to the Dail that negotiations on a strike price for electricity from the Midlands Export Scheme were imminent (Roux, 2021l).

However, the negotiation of "regulatory complexities" became protracted as time ran out for any agreed projects to make the envisioned contribution to the UK's 2020 target. At the Anglo-Irish summit in March 2014, the Taoiseach and the Prime Minister agreed that the "exploration of a new architecture" was required if an intergovernmental agreement on the export of renewable electricity was to work to the benefit of both jurisdictions. Rabbitte remained persuaded "beyond doubt" that there was considerable economic value for both countries, but for Ireland in particular (Roux, 2021l). Ultimately, the UK and Irish negotiation teams could not reach agreement on a joint regulatory regime with the Irish government casting thinly veiled blame on the UK. A key informant privy to the negotiations was more forthright:

> *"[I]t was proved to be very feasible, you know, that there would be a good return for all. It fell down because the British didn't want to develop a joint regulatory regime. Their attitude was 'give us the renewable energy and let the developers point their infrastructure towards the U.K. without going anywhere near Ireland'. That just wasn't politically acceptable. … From our point of view, offshore*

[59] Bord na Mona aimed to develop 2000 MW from cut away peat bog on their properties. Mainstream Power (the continuity venture that Eddie O'Connor set up after the sale of Airtricity) aimed to develop 1200 MW of onshore wind capacity, followed by a further 3800 MW from offshore wind in the Irish Sea. Element proposed a further 3000 MW of wind farms throughout the Midlands via the 'Greenwire' project.

> *renewable energy wasn't just about giving our vast resources away. Truth be told as well, I think the industry itself would have been lobbying behind the scenes with the British. They would have seen a huge attraction in the electricity just going to the UK directly and not having to pay their own jurisdictional royalty ... the whole joint regulatory thing was to make sure that we had understanding of how it's dealt with in different scenarios, you know, security of supply scenarios, all of those things. So you had to have a joint regulatory system or it would have been just essentially a different jurisdiction, harvesting something from our jurisdiction."* (Civil servant 29pmi, 2021)

Other interviews confirm that the negotiations broke down over a disagreement on royalties and regulations, but that the cost of interconnection may also have tilted the cost benefit calculations out of Ireland's favour (Policy researcher 27pri, 2021). By the end of the year, a spokesperson for DCENR confirmed that discussions on electricity trade was off until after 2020 (Roux, 2021m). The extent to which the regulator sticking points related to royalties or benefits for Ireland, cost of transmission infrastructure, or market integration in the UK doesn't appear to be on the public record. It may also be that the UK DECC realised, as time progressed, that it could safely meet, or come close to meeting, its target with domestic generation and that statistical transfers would be a simpler and potentially more cost effective means on making up for a marginal shortfall.

The scramble to develop the Midlands Export Scheme as a joint project had an unintended consequence. It precipitated a (sub-national) regional change in Irish public mood to onshore wind energy and related interconnection infrastructure from supportive to critical (Eirgrid, 2014b; National Economic and Social Council, 2014). This spilled over into a national political controversy (Roux, 2021k). Opposition party suggested that Ireland's wind resources would be a "giveaway like oil and gas" and shortly after Sinn Féin launched its Wind Turbine Regulation Bill to impose a minimum set back distance for wind turbines of ten times their height from dwellings and zoning of sites for wind turbine developments (Roux, 2021l). Although the government majority in the Oireachtas effectively meant such an opposition bill had no chance of passing, it none the less signalled that politicians had taken note of the shift in public sentiments. It is through this controversy that a peripheral narrative became reinforced in the Oireachtas, and amongst members of the public opposing the

Midlands Export Scheme, that wind power generation capacity should move offshore (Roux, 2021l).

However, ultimately, the political pivot did not originate because of opposition parties in the Oireachtas. It was public opposition to Eirgrid's ambitious grid development activities under the Grid25 plan that would ultimately open the window for OFW again. By 2014, the TSO conceded that a general anger to its projects existed and policy makers took note of delays in, or cancellation of, grid reinforcement projects (Eirgrid, 2014b; National Economic and Social Council, 2014). Over time this started informing the beliefs of policy makers that grid upgrades and expansions to connect the anticipated onshore wind generation capacity would become increasingly difficult. The TSO pivoted to advocating for supporting OFW on the east coast as it believed the connection of such sites to proximate demand centres would face less opposition. The first formal, public admission of this came in the TSO's long-term scenario planning exercises in 2017 (Eirgrid, 2017). However, key informant interviews confirmed there had been discussions around this for some time prior to this (Civil servant 15pmi, 2022). I continue this discussion in Chapter 4.5.8.

4.5.2. Researchers and civil servants drive a new 'evidence based' approach to Irish energy policy

In September 2012 the EU Commissioner for Energy, Günther Oettinger, visited Ireland for the inauguration of the East-West interconnector and addressed the Oireachtas Joint Committee on Transport and Communications (Roux, 2021k). Oettinger's main question to the committee regarded new climate change and/or energy targets for 2030. Should the main goal be CO_2 emissions reduction, renewables, or both? In October 2014 the European Council endorsed a binding EU target of 40% reduction in greenhouse gasses by 2030 compared to 1990 (General Secretariat of the Council, 2014).[60] It also agreed rules for how each member state would determine its own national emissions reduction target. The shift in the nature of the decadal target, from multiple nationally binding sectorial renewable energy targets for 2020 (see Chapter 4.1.7) to an emissions reduction target (bifurcated by ETS and non-ETS sectors

[60] with sub-targets of 43% emissions reduction from the ETS and 30% from non-ETS sectors compared to 2005.

for 2030) would significantly influence how Ireland progressed its own target setting over the subsequent years (more on this in Chapter 4.5.9).

The Irish government’s response to the 2030 target negotiations in 2014 set a new precedent for applying an ‘evidence based’ approach to longer-term emissions and energy target setting. Policy makers in the DCENR would apply this approach to several key policies and legislation over subsequent years, informed by an advancing model of the Irish energy system, and a small but growing network of energy systems modellers. This approach would also have a significant influence on policy makers’ thinking on how and when individual energy technologies might contribute to a long-term decarbonisation pathway. Along with the fallout from Ireland’s financial crash, this new way of thinking would demote OFW on the political agenda for several years.

In this section, I describe how the development and application of the Irish TIMES Model (ITM) brought about a new paradigm of thinking within climate change and energy policy-making networks. I link this to an explanation of how this paradigm affected the thinking of policy makers on policy support for particular energy technologies, including OFW, in the formulation of the key national climate change and energy policies of the period, namely the 2015 Energy White Paper and the 2017 National Mitigation Plan.

Between 2009 and 2011 there was an acceleration of intent by European Member States and the Commission to set increasingly ambitious climate change mitigation targets over an extending time horizon out to 2050.[61]

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[61] In 2009 European Member States agreed on legally binding national targets for 2020, along with the need for reducing emissions further, consistent with limiting global annual mean surface temperature increase to 2C. Directive 2009/28/EC committed Ireland to a share of 16% of energy from renewable sources in gross final consumption of energy and established ‘flexibility measures’ to reduce the cost of achieving national targets for Member States, opening the window for direct export of electricity from Ireland to the UK (refer to Chapter 4.3.1). Directive 2009/29/EC extended and improved the greenhouse gas emissions allowance trading scheme, reducing emission allowances to 21% below 2005 emission levels by 2020 for electricity generators and other installations covered by the scheme, also referred to as ETS emissions (*Directive 2009/29/EC of the European Parliament and of the Council*, 2009). Decision 406/2009/EC committed Ireland to limiting national greenhouse gas emissions to 20% below its 2005 emissions level (*Decision No 406/2009/EC of the European Parliament and of the Council of Ministers of 23 April 2009*, 2009). The Decision also established the view that the European Community should continue to reduce its emissions collectively by 60 to 80% by 2050 compared to 1990. The Commission’s aspirations for 2050 targets quickly became more ambitious. By 2011 it proposed a collective reduction of 80% to 95% below 1990 levels by 2050. It issued a series of ‘roadmaps’, including a ‘Roadmap for moving to a competitive low-carbon

Importantly, an increasingly sophisticated suite of computer models produced these scenario-based explorations. Central to this, was an energy system analysis model, called PRIMES (Price-Induced Market Equilibrium System), developed by research engineers at the National Technical University of Athens, under the leadership of Prof. Pantelis Capros.[62] By 2011, the Commission had employed Capros and his team of modellers for almost a decade to issue regularly updated ‘reference scenarios’ for the EU and each Member State. These reference scenarios demonstrated the emissions reductions that Member States could achieve with current trends and policies. Over time, PRIMES and the increasing suite of linked models supported policy analysis for more issues, including security of energy supply, strategy, costs, pricing policy, taxation, standards on technologies, renewable sources, energy efficiency, and electricity market liberalisation. Expectations of the European Commission on what the emissions reductions the region as a whole could achieve, and the potential contribution from each Member State out to 2030, crystalised through the EU Reference Scenarios. The Commission collaborated with a network of experts from Member State to validate assumptions and scenario design, but clearly the power and sophistication of PRIMES afforded the Commission, and their enlisted experts, significant influence in the negotiations of 2020 targets.

It became increasingly important for Irish policy makers to have their own robust and defensible projections, as a counter point to the Commission’s projections, if they were to have a substantial say in framing 2030 targets and legally binding commitments (Gallachó*ir et al*>, 2012). This idea did not come from politicians, but rather from discussions between civil servants and energy system researchers:

> *“It wasn't political in the sense that [the Minister thought] Ireland wasn't going to agree with what the EU said because of PRIMES. It was that [civil servants and researchers] felt that we had particular interests in whole*

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economy in 2050’ and an ‘Energy Roadmap 2050’, to explore different pathways to decarbonisation for a policy agenda beyond 2020.

[62] PRIMES is a partial equilibrium modelling system that simulates an energy market equilibrium in the European Union and each of its Member States. The model represents explicit and detailed energy demand, supply and emission abatement technologies. Over time, PRIMES’s sophistication increased, linking to various other models, with the suite able to analyse the impacts of all GHG emissions and removals across multiple sectors - https://www.energyplan.eu/othertools/national/primes/

system thinking [for Ireland] that wouldn't necessarily be reflected in Europe generally, and we needed to have independent modelling capacity for the scenarios that we could see evolving. And Brian [O'Gallachoir's] team were very good on scenario development of a complete energy systems nature that didn't seem to be happening in PRIMES. … So it was the high level civil servant technical view that this was a capacity worth developing and fostering rather than a ministerial political decision." (Civil servant 09pmi, 2022)

In 2009 the Irish Environmental Protection Agency (EPA) commissioned a team of researchers at UCC and ESRI, under the steer of Brian O'Gallachoir, to build and run an energy systems optimisation model for Ireland (Gallachóir *et al*, 2012). O'Gallachoir and his collaborators utilised the TIMES (The Integrated MARKAL-EFOM System) model generator, developed by an international network of modellers through the International Energy Agency's Energy Technology Systems Analysis Programme.[63] TIMES models simulate the energy system that meets the energy service demands over a specified time horizon at least cost, indicating the optimal mix of technologies and fuels for specified periods, the associated emissions, mining and import activities and the equilibrium level of the demand. By 2012, the researchers had completed the first phase of developing a TIMES model optimised for the Irish energy system, the Irish TIMES model (ITM). ITM promised to provide, for the first time, a full energy-systems approach to assessing alternative future policy pathways to emission reduction targets, including impacts on the Irish economy, energy mix and dependence, and the environment (Gallachóir *et al.*, 2012). By 2013, O'Gallachoir advocated a cross-party cohort of parliamentarians on the value of the ITM for Irish policy makers to explore possible energy futures based on contrasting policy scenarios. He argued that Ireland now had the modelling tools to support 'evidence-based' answers to difficult questions, such as 'What ought Ireland's contribution to the regional 2030 target to be and how ought this to be divided between different sectors to achieve this at least cost to Irish citizens?' The ITM promised a step change improvement towards the ideal of evidence-based policy making at a full energy-systems level. Its expanding capabilities could bring an increasing number of technologies, assumptions and individual energy policy instruments into a coherent overarching least cost optimisation over multiple time slices up to 2050. It didn't take long for elected

[63] https://iea-etsap.org/

officials and policy makers in the DCENR to recognize ITM's value for negotiating the framing of long-term targets with the Commission (Gallachóir *et al.*, 2020). For instance, during the course of 2014, the Irish delegation used ITM results to argue that the marginal abatement cost for a 33% reduction in GHG emissions by 2030 would be significantly higher than the PRIMES scenario solution (€151/t compared €40/t). Furthermore, a least cost solution to the 2030 target allocates a smaller contribution to renewable electricity than the PRIMES simulation (51% RES-E compared to 60% RES-E).

The ITM results pointed to a paradigm shift if policy makers were to make good on the promise of evidence based, least cost energy policy choices. It did not adjudicate between one policy instrument and an alternative, but rather demonstrated with great clarity the rationale for focussing on a wholly different policy area. It suggested radically different policy pathways to what the government had already embarked on in the NREAP for meeting the 2020 target (Gallachóir *et al.*, 2012). For instance, the dominant renewable energy policy focus at the time was firmly set on supporting more wind-generated electricity to meet the 2020 target. The ITN instead recommended that a least cost solution to reaching the 2020 16% renewable energy target would require a significantly higher contribution from renewable heating, and a lower contribution from renewable electricity.[64] Central to this paradigm shift was a shift in policy focus away from a preoccupation with the deployment of wind-generated electricity to supporting renewable heat and transport fuels, and the electrification of heating. Demonstrating cheaper alternative pathways to meeting the 2020 target may have been merely academic at this point, but it underscored the importance of shifting policy thinking for the next generation of decadal target setting.

[64] The NREAP modal targets for 2020 were for renewable energy to account for 10% of road and rail transport energy (RES-T), 12% share of thermal energy for heating and cooling (RES-H), and a 42.5% share of gross electricity consumption (RES-E) by 2020. The ITM's least-cost solution for reaching the 16% renewables target under EU Directive 2009/28/EC (TIM's REN-16 scenario) suggested 18% for RES-H and 34% for RES-E. The ITM generated solutions that diverged even more dramatically from NREAP when considering non-ETS sectors as stipulated in EU Decision 406/2009. Renewable transport and renewable heat became even more important when assuming that Ireland would not curb emissions from the agricultural sector for meeting the 2020 target or that the agriculture sector could only reduce emissions by 50% by 2050.

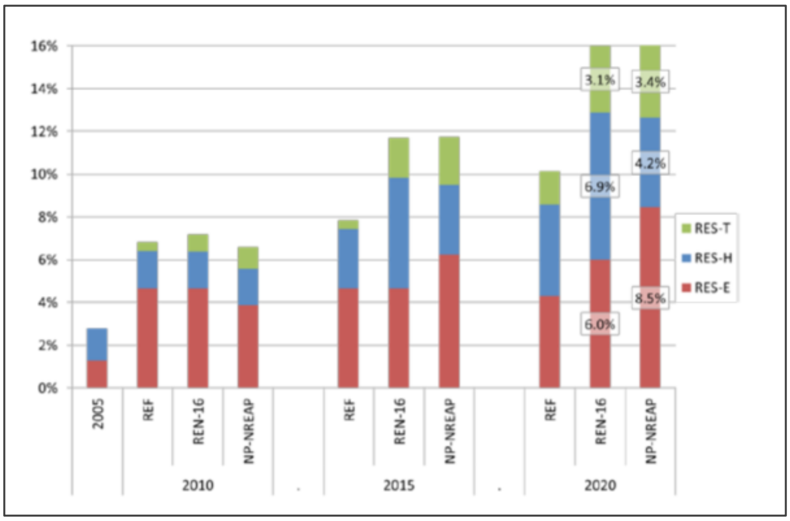


Figure 9: Extract from the early Irish TIMES results recommending a departure from the predominant focus of renewable energy policy at the time, supporting deployment of more wind (the 'NP-NREAP' scenario), to a least-cost scenario for 2020 to focusing on renewable fuels for heating and transport (the 'REN-16' scenario). Source: Fig 3.1 in (Gallachóir *et al*>, 2012)

The first ITM simulations also enabled the first 'evidence based' explorations of long-term pathways to a 2050 least cost energy mix under different emission constraints (Chiodi *et al.*, 2013). A least cost pathway to reducing emissions by 80% by 2050 required extensive electrification of transport and growth in electrification of residential heating *from 2030*. A least cost pathway to 95% emissions reduction by 2050 required more extensive electrification of residential heating. Whilst these shifts would increase the demand for low carbon electricity generation, least cost mixes for this would not include offshore wind power. The ITM projected that renewable generated electricity in 2050 should account for 71.9% of gross final electricity consumption (GEC) for an 80% reduction scenario and 100% of GEC for a 95% reduction scenario. A least cost solution for the latter mix, would comprise 67% wind, 28% biomass, a small contribution from hydro power, and the remainder from electricity imports. Under a 2050 emissions reduction scenario of 80%, ITM projected that 6.9 GW of onshore wind power would provide all of the non-dispatchable electricity in a least cost generation mix. Only in a 95% emissions reduction scenario for 2050 did ITM solve an electricity demand level and generation mix that exploits offshore wind by mid-century; a mere 440 ktoe, requiring 2 GW of offshore wind power capacity (Deane *et al.*, 2013).

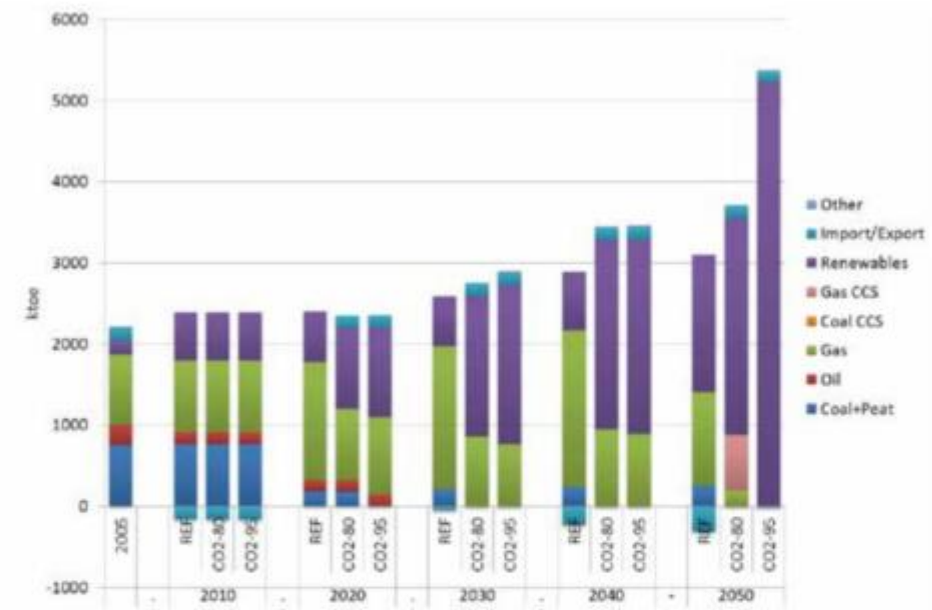


Figure 5.4. Electricity generation by fuel in REF, CO2-80 and CO2-95 (ktoe).

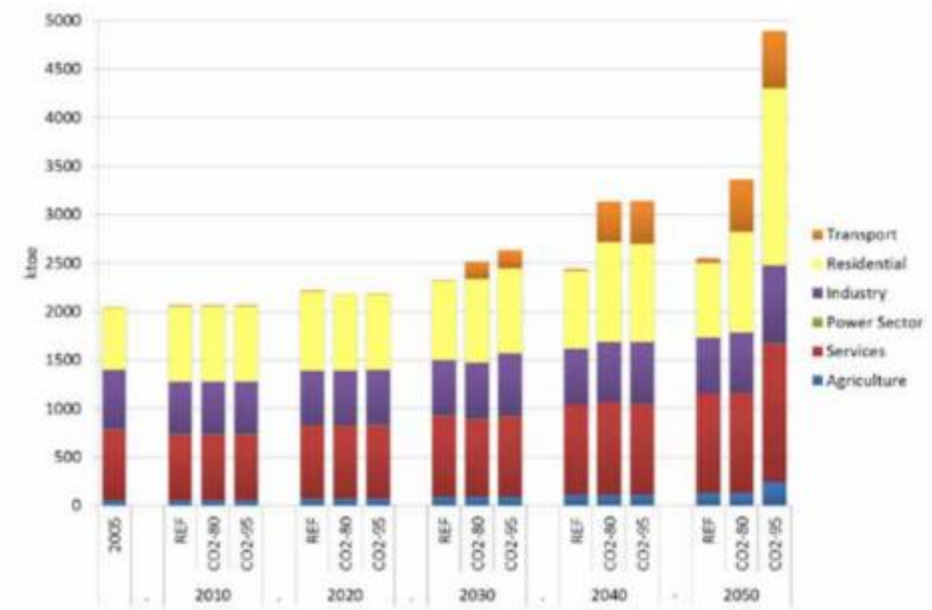


Figure 5.5. Electricity consumption by sector in REF, CO2-80 and CO2-95 (ktoe).

Figure 10: Extract from the early results of the Irish TIMES model. Only a deep decarbonisation pathway would drive dramatic increase in demand for renewable electricity by 2050. This would largely come from onshore wind and biomass. Source: (Deane *et al.*, 2013)

From its early application to simulate Ireland's first long-term mitigation pathways, ITM results (and the modellers that developed and operated and communicated it) went on to inform two further policies, the 2015 Energy White Paper and the first National Mitigation Plan in 2017. The 2015 Energy White Paper set out the government's high level energy policy for the time horizon out to 2030. An update to the 2007 White Paper, it continued the overall framing of national energy policy in terms of three core objectives: sustainability, security of supply, and competitiveness. The ITM foregrounded sustainability through exact policy scenarios that optimised least cost energy mixes subject to a CO_2 emission reduction constraint. Interestingly, there were no ITM scenarios that solved a least cost mix subject to energy security targets. Centrally, the 2015 White Paper framed a vision that would reduce emissions from the energy sector by between 80% and 95%, compared to 1990 levels, by 2050 at least cost. The ITM and iterative engagement with Irish energy modellers and extensive review from the International Energy Agency significantly influenced the agenda articulated in the 2015 White Paper towards policy action in support of energy efficiency improvements, bioenergy contributions to the heat and transport sectors, and away from the previous dominant focus on electricity generation from wind power (Civil servant 09pmi, 2022). Consequently, the White Paper included noticeably more detailed actions on these matters, and very little detailed consideration of policy actions to support particular renewable electricity generation technologies beyond meeting the 2020 target. Concerns with cost effectiveness and evidence based policy was apparent in framing the government's approach to the 2015 Energy White Paper:

> *"Energy policy will seek to achieve optimum benefits at least cost. Government will ensure that policy measures are evidence based and subject to rigorous analysis and appraisal prior to being implemented."* (Department of Communication Environment and Natural Resources, 2015, p. 8)

The White Paper spelled out the implication for OFW in a brief reference:

> *"Ireland's offshore [wind] resource could, in future, be considered as a potential export opportunity. In the longer term, as the cost of deployment reduces, it will also present an opportunity for domestic use."*

Beyond cost effectiveness, the government's only commitment to a price support scheme was to develop a successor to REFIT 2 and 3, which would be 'market-based' in line with new European Commission rules on government support for energy projects. Grid connection policy would still be calibrated to meeting the 2020 target, but also seek to accommodate smaller community-led projects. The White Paper did not prioritise greater interconnection or propose any solution to overcome the challenges relating to Ireland's small market size and peripheral location in the region. It did lay down the principle that such infrastructure projects would only be supported to the extent that they proved cost efficient to Irish consumers and that the government would work to access EU funding to this end.

If energy policy makers, i.e. civil servants and the responsible Minister, were to follow through on the guidance of the 2015 White Paper, the focus of energy policy making would shift dramatically to the considerable challenges of supporting massive gains in energy efficiency in various sectors, the introduction of renewable fuels in heating and transport and the electrification of these sectors. By 2016, the ITM scenarios had repeatedly demonstrated that OFW was almost irrelevant in all least cost long-term mitigation pathways (even the most ambitious), positively relegating it to the agenda of future policy makers, a couple of decades into a barely imagined future:

> *"Our electricity system will be one where onshore wind remains a key part of Ireland's generation portfolio out to 2030. Assuming more cost competitive technologies do not emerge in this decade, this is likely to remain the position beyond 2030 and possibly out to 2050. In this decade [2050], increasingly competitive costs will allow offshore wind to play a significant role in Ireland's electricity generation system."* (Department of Communications Climate Action & Environment, 2017)

Between 2011 and 2016, the apparent progression that was building around the use of the ITM to inform a more evidence-based and technocratic approach to energy policy making belied the lack of agenda status of these issues within the government. In lieu of political entrepreneurs to drive ambitious legislation, the job of solving energy policy problems lay wholly in the departmental civil service and the growing network of researchers and analysts specialising in this domain. Senior civil servants who remained in post during the tumultuous post-financial crash years enjoyed more agency and influence to commission policy solutions in anticipation of the longer-term political problem that climate change and emissions reductions presented to Ireland (Policy maker 18pmi, 2021; Civil servant 09pmi, 2022). A few civil servants had different ways of articulating this:

> *"However, don't forget that the period was marked by short term governments and many changes of minister [in the DCENR] in the period. So it would not be correct to say that there was policy continuity at political level. It was a deliberate policy of the senior civil service that we would produce as much evidence as we could in the hope that we didn't have to start from scratch every time there was a*

> *change at government level in the thinking."* (Civil servant 09pmi, 2022)

> *"[I]n a way, when the Greens [were] in, they're pretty gung ho … and I guess provided good market signalling and also [impetus] for the public service to try to work out how to catch up. ... What it did was generate centres of gravity in [a government agency] to try to work out either how to put some analysis behind those ideas or come up with studies that could inform policy development to implement that stuff. And then during periods where the Greens aren't in, our attitude was more about building a case and bringing it to government, for increased spend on efficiency or renewable policies and measures. And so the way we operated [during this period] was less about trying to work out how to attain the government's targets and more about driving them to stretch themselves … [because] at the same time EU and international momentum [was] really cooking along big time and [was] going to force us by directive in Ireland to do more than we wanted to do… So it was more agency to the department, what you call policy entrepreneurship."* (Policy researcher 04pri, 2020)

In closing, the key take away from this period for OFW is that the all energy systems least cost approach to setting long-term mitigation pathways became the dominant paradigm in Irish renewable energy and climate policy making stream. Only in the most ambitious mitigation scenarios proposed for 2050 did OFW form part of a least cost policy scenario. This consensus emerged largely between civil servants and system modellers, whilst the post-financial crash government of 2011 – 2016 had little interest in energy and climate policy aimed at reaching the emerging 2030 target and longer-term objectives.

4.5.3. REFIT expires and civil servants explore new price support instruments

REFIT 2 was set to expire on 31 December 2015. As the expiration date loomed closer, civil servants in DCENR started consulting on a new price support instrument to replace it (*Renewable Energy Feed in Tariff 2012 - REFIT 2*, 2015). Since the extension of the previous REFIT in 2010, the European legislative context had changed significantly. Most notably there had been a shift in regional legislation towards increased competition and use of markets to drive efficiency. For renewables that meant that applications of member states for new feed-in tariffs were likely to face stiff opposition and that the preference was for competitive auctions. A decade after the department ended its first unsuccessful experiment with power auctions, it would have another go at them. However, as the REFIT expired at the end of 2015 no headway had yet been made on developing new policy alternatives for a price support instrument (Roux, 2021n).

The expiration of the REFIT, and the general expectation that more renewable capacity would be required in Ireland and that it would need some form of price support, were sufficient for civil servants to commission analysis on options. The shifting European norm towards greater use of markets to attain climate change and energy objectives was sufficient to constraint this analysis to only considering different auction options (Cambridge Economic Policy Associates, 2017a). However, the process of setting the 2030 emissions target would delay the softening up of a final price support instrument for a significant amount of time. I therefore defer further discussion of this to Chapter 4.5.11, after considering the softening up of the 2030 target between 2017 – 2019.

4.5.4. Gate 3 connection policy has unintended consequences

The large intake of Gate 3, calibrated to meet the 2020 RES-E target, had unintended consequences, but offered the regulator a reprieve from having to develop a new connection policy for several years (refer to Sections 4.3.3). The unintended consequences provided influential feedback that informed the thinking of the regulator, system operators and the market on a more 'enduring' connection policy. In this section I explain the unintended consequences of the GPA approach as applied to the Gate 3 policy in the period 2011 – 2016 and its implications for OFW deployment.

Between 2008 and 2014, electricity demand fell by 6.7%. By 2014 demand had stabilised but was not expected to grow significantly before 2025. There was a significant capacity surplus in dispatchable and total plant. High uptake of Gate 3 offers had continued, driven by the REFIT, with 3263 MW of renewable offers accepted by September 2015. The majority of contracted parties had made their first stage payment (approximately 10% of total connection cost), a clear signal of intent to proceed to construction. The fallout of the financial crises and revised economic and energy demand forecasts indicated that a sufficient margin of supply over demand was already secured through to the early 2020s. By 2014 the expectation was that Gate 3 offers would comfortably meet the RES-E 2020 target and ensure a surplus of dispatchable capacity (Eirgrid, 2014a).

The extension of the REFIT drove the acceptance of grid connection offers under Gate 3. The high rate of early uptake of grid connection offers for Gate 3 clearly signalled that developers would accept most offers. Meanwhile, the terms of the Gate 3 connection policy was also fuelling a growing secondary market for grid connection capacity. The Gate 3 policy included capacity relocation rules, which offered projects flexibility if they had difficulties in progressing at a given location. Developers could transfer their grid connection offer(s) to a different project and location from the one listed in their application. They could also sell the offer to another developer for a project in a different location, opening up a secondary market for trading connection capacity outside of the regulated connection process. The capacity relocation rules, introduced to offer Gate 3 projects flexibility, triggered a secondary capacity market that fuelled speculative connection requests and planning applications (Electricity Regulator 21eri, 2021). Given the sheer scale of the Gate 3 batch (calibrated to provide sufficient connection capacity to meet the 2020 target) the market knew that it was unlikely that there would be more capacity on offer for almost a decade. The Gate 3 regulation therefore both permitted a secondary market and unintentionally created a scarce commodity that drove up the price of connection offers on the secondary market (Electricity Regulator 21eri, 2021). This further fuelled speculative connection applications and planning requests as the market anticipated the need to get in the queue for the next gate batch, whenever that would be. Capacity relocation weakened developers' commitment to particular projects and reduced the quality of service that genuine applicants received from the system operators who were processing large volumes of speculative applications. For developers of OFW projects with connection offers, this provided an incentive to sell or transfer their offers to onshore projects. The alternative was to pay a very high upfront acceptance fee and hope that a route to market would materialise in order to use the connection offer by the time their firm access was scheduled. Here a developer on one of the offshore project provide an illustration of the choice:

> *"We got a big connection [offer] for 330 MW. We needed [a cash deposit of] € 3,300,000 which we didn't have. The money that we had invested originally had pretty much run out. … So it was decided [name redacted] onshore developers had a proposal to build a wind farm in basically North Kildare. We were on the same [transmission] line ... We sold 120 MW to them. ... but they didn't get planning*

> *permission. And then there was an arrangement that we could get it back, but they didn't want to sell it back. They had another application in North Meath, which would have been suitable as well… And didn't get planning permission for that either. In the meantime, we had the money. We sold 120 MW [of the connection offer]. We still had 210 MW. We used the money we got from [name redacted] to pay the € 2.1 million [deposit for accepting the remainder of the offer]."* (Wind energy project developer 32iai, 2022)

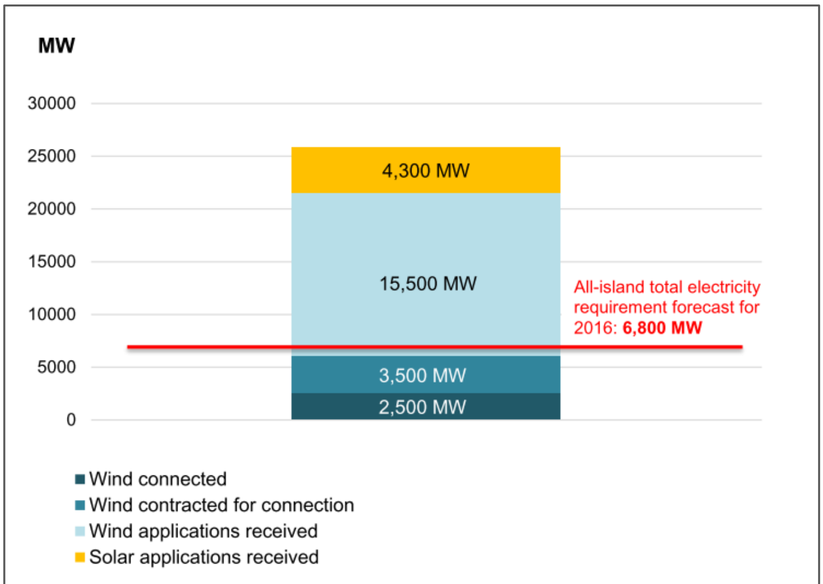
Of the three offshore wind projects with connection offers for a combined capacity of almost 800 MW only one accepted a part of its offer. Kish Bank refused its offers, Doolick sold its capacity to an onshore project, and Oriel sold part of its connection capacity to an onshore project and accepted the remainder, still contracted but unused at the time of writing (System Operator 26soi, 2021).

The shift to a very large GPA for wind generation under Gate 3 had been a compromise between non-discriminatory treatment of generators and optimal grid development over the long-term. However, it also created market uncertainty (as there would be no clear signal on when new gates would be opened), excessive work for the system operators, and further speculation and build-up of connection applications.

In December 2015, the regulator published its proposal for transition to an Enduring Connection Policy (ECP). As before, the main challenge lay in optimally allocating grid capacity as a scarce resource. The guiding principles proposed by the regulator for the ECP was not noticeably different from the principles that had guided it since its inception and objectives under the 1999 Act. Whilst the proposed guiding principles remained the same, the regulator argued that the context had shifted significantly since its previous decision. It argued that the GPA that the TSO employed for Gates 1-3 was no longer appropriate (Commission for Electricity Regulation, 2015b). The regulator did not consider EU negotiations on 2030 targets to be at a sufficient point to offer any guidance on grid connection policy either. However, the by now persistent challenge of connection application build-up had not ceased. Since the close of connection offers under Gate 3, renewable developers had sought grid connections for 25,400 MW (refer to Figure 11).

In addition, the non-GPA route to connection, which was intended to support a non-existent solar PV industry in 2009, triggered over 600 grid connection applications for over 6,000 MW by 2017 (Commission for Electricity Regulation, 2017a) of solar PV. Processing these applications subject to set timelines on a rolling basis was diverting significant SO resources to (potentially speculative) solar PV, whilst wind had no route to connection following Gate 3, raising the ire of wind developers (IWEA, 2017).

The regulator proposed scrapping all connection applications until a new ECP was in place. The Gate system with priority given by date order of application and no other policies restricting application was clearly driving the application build-up. However, more than a year passed before it followed through on this proposal. By this point, the SOs had received approximately 36,000 MW of connection applications; more than five times the all-island system requirements at the time.[65] In order to avoid a further speculative rush, the regulator directed the System Operators to suspend accepting and processing further connection applications and new capacity relocation requests (Commission for Regulation of Utilities, 2017a).



Source: CER; based on data provided by the system operators in September 2016 and the All-Island Generation Capacity Statement 2016-2025 (Appendix 1, table A-1 at p 60). For presentation purposes, all figures have been rounded. See section 5.3.1,

Figure 11: Excerpt from the regulator's consultation on Enduring Connection Policy. By 2015 there had been a significant build-up of grid connection applications from renewables. Source: (Commission for Electricity Regulation, 2015b)

[65] The non-GPA route to connection, which was intended to support a non-existent solar PV industry in 2009, triggered over 600 grid connection applications for over 6,000 MW by 2017 (Commission for Electricity Regulation, 2017a) of solar PV. Processing these applications subject to set timelines on a rolling basis was diverting significant SO resources to (potentially speculative) solar PV, whilst wind had no route to connection following Gate 3, raising the ire of wind developers (IWEA, 2017). Industry stakeholders had raised these and other issues through the Generator Connections Liaison Group for some time.

In transitioning towards an ECP, the urgent priority for CER focused on making efficient use of existing connections and infrastructure, releasing capacity held by projects unlikely to utilise it, and prioritising system services for the increased penetration of renewables. CER decided to incentivise the release of capacity by projects unlikely to proceed and allocating available capacity to generators that could provide system services to increase SNSP. The CER proposed four new ‘policy drivers’ for consideration for the ECP itself. Firstly, prioritising the processing of applications for interconnectors in line with EU policy (see Section 4.5.14). This would also contribute to security of supply, increase market efficiency and trading, and reduce curtailment. This provided strong reasons to consider interconnectors separately or with different criteria to generation within an ECP. Secondly, prioritise connection of generators that can provide needed system services (as elaborated under Eirgrid’s DS3 programme – refer to Chapter 4.3.2) needed to increase SNSP and penetration of variable renewables. Thirdly, prioritising projects that use the existing network over those requiring deep reinforcements. Fourthly, considering planning permission as a criterion to receive a connection offer. The latter two drivers in particular, signalled a significant departure from the line held since 2004 that efficient and optimal usage of the existing and planned network capacity could not trump fair and non-discriminatory treatment of generators. With ECP-1 the CRU set out a proposal to deal with the existing volume of applications in a way that would “promotes a more optimal use of the existing network taking into account the current system needs, national policy and the consumer interest. In particular, ECP-1 aims to ensure that the projects which receive connection offers are the ones that are most likely to be built.” (Commission for Electricity Regulation, 2017a, p. 1).

The above policy drivers, along with the unintended consequences of Gate 3, provided CER with a powerful rationale to move away from large, infrequent gates (with less onerous entry criteria) to smaller, more frequent group processing that is technology-neutral and includes more onerous entry criteria. However, the regulator would not reach a decision on the new ECP regime until the end of 2017, partially coordinated with the new price support instrument. I therefore continue this discussion in Chapter 4.5.13.

4.5.5. Marine planning still in the doldrums

It was February 2013 when the Department of Environment, Community and Local Government (DECLG) finally published a consultation paper to inform new foreshore legislation.[66] Minister of State, Jan O'Sullivan, launched the consultation with the oft-made lament that management of the marine had been demand-driven rather than plan-led, and promised to bring forward new legislation in 2013 to fix this (BIM Ireland, 2013). Following public consultation, the DECLG published the General Scheme of the Maritime Area and Foreshore (Amendment) Bill in October 2013 (Department of the Environment Community and Local Government, 2013; MerrionStreet, 2013).

The main provisions of the bill concerned the alignment of the foreshore consent regime with the terrestrial planning system; the creation of a new 'nearshore' area; the definition of the Irish maritime area (for the first time) to encompass foreshore, the exclusive economic zone and the continental shelf; the future designation of particular zones within the maritime area; the introduction of maritime options enabling project proponents to reserve a portion of the maritime area for a limited period while applying for the necessary development consents; the regulation of offshore commercial gas storage facilities as strategic infrastructure; and amendments to the Dumping at Sea Acts. The bill included proposals to simplify and clarify the development consent process. This included a separation of the property management function and the development consent function. The former exercised through foreshore leasing and licensing by the Minister for DECLG and Minister for DCENR, the latter exercised by planning authorities and An Bord Pleanála. This was aimed at resolving potential conflicts between the interest of the State in seeking to maximise its revenue from the licensing of State property and the public interest in ensuring developments in the maritime area are acceptable in planning and environmental terms. It proposed a division of the development consent function between An Bord PleanálaAn Bord Pleanála and the planning authorities with the latter as the sole authority to carry out environmental impact assessments or appropriate assessments for projects requiring these.

[66] The consultation document was entitled 'A New Planning and Consent Architecture for Development in the Marine Area'

The General Scheme, to a lesser degree, sought to facilitate a plan-led approach to managing the marine environment. Defining the Irish maritime area would be the first necessary step to a national framework for the future production of a marine spatial plan or a series of marine spatial plans. The General Scheme also included a proposal to give the Minister of the DCENR power to designate renewable energy zones in the marine area. Representatives from the Coastal and Marine Research Centre raised the concern that the bill would in effect only regulate marine activities through the consenting process, rather than improving management of, and reducing potential conflict between, a wide variety of marine and coastal activities. For instance, the bill did not include consideration of fisheries and aquaculture, both significant maritime sectors, risking further sectorial division, uncertainty and conflict.

An Bord Pleanála broadly welcomed the key provisions of the Bill, particular as it sought to position itself as the single consenting authority for both onshore and offshore elements of strategic infrastructure projects. Under the bill, An Bord Pleanála would be the single consenting authority for any application designated as strategic infrastructure in the terrestrial and maritime areas and anything that needed an EIA or an AA, which would include all offshore windfarms. Several TDs and respondents to the public consultation raised concerns over the consolidation of consenting power with the board as the authority of first and last consent with only the recourse being judicial review and the lack of special designation and protection for the foreshore (Coastal Concern Alliance, 2013). Since the adoption of the Strategic Infrastructure Development Act, there was a perception of wider public discontent over a lack of public participation or an appeal process and the treatment of local authorities as statutory consultees rather than capacitated to contribute to decision making. The wider concern raised was that the much-needed review of the Foreshore Acts would merely be an exercise to streamline consenting for large-scale developments. In addition, some called for a general exclusion zone for the foreshore area from large infrastructure projects whilst others advocate for prioritising the designation of marine protected areas prior to commencing with the consenting of infrastructure project applications under the act.

Importantly, whilst the DECLG was developing the bill in 2013, the EU published a proposal for a framework Directive on Integrated Coastal Management (ICM) and Marine Spatial Planning (MSP). If such a directive was to be adopted it would make ICM and/or MSP mandatory for Member States. The DECLG officials working on the Maritime Area and Foreshore (Amendment) Bill argued that the development of a MSP framework in Ireland would take several years and that their intention was to "future-proof" their legislation to recognise future MSP in consenting when such plans are put in place. However, DECLG argued that several elements of an MSP framework were already in place, including the draft Offshore Renewable Energy Development Plan (OREDP).

A further Oireachtas Committee report consolidated feedback on the General Scheme in February 2014 and the Taoiseach noted that the bill would be introduced to the Houses of the Oireachtas before the summer. The Maritime Area and Foreshore (Amendment) Bill was on the A list in the legislative programme, but by April O'Sullivan noted that it would only be ready by the end of the year. Whilst opposition TDs sporadically raised the issue in parliamentary questions, nothing of substance was forthcoming on the reasons for delay on the public record, other than that the bill was complicated and drafted in-house in the DECLG. More than two years later the Assistant Secretary of DECLG, David Walsh, still maintained that the bill was "well advanced and is among the Department's priorities to get published during this current session."

It is surprising how long the department and the government were able to maintain the pretence that the bill was progressing without opposition parties capitalizing on the bluff. However, it does point to the general lack of political interest in the matter for an entire term of government. It also affirms the case that OFW had in fact been the main driver of legislative reform. As one key informant privy to the work, describe the reasons for the lack of progress:

> *"It went through a pre-legislative scrutiny process in 2013. But it was never going to happen, because offshore renewable energy, without a support price, was never going to happen. And then other things became priorities when it was understood that offshore renewable energy was not going to happen in the near term. … The whole intention was for the Marine area bill to proceed so that even in that period of time that we knew [offshore renewables] wasn't going to happen, you would at least have the consenting regime ready to*

receive renewable energy when it became attractive to do. The bill sort of stalled, I think the bill stalled because if I'm honest about it, I think it stalled because there was nobody in the department that was incentivised to take it forward. You know, I think the reality would have been that people were doing other things on the planning front. And that's the reality. I had left, I was doing other things." (Civil servant 29pmi, 2021)

4.5.6. Offshore wind energy not on the agenda for the 2016 Fine Gael government

The general election of 2016 again failed to produce an overall majority for any individual party. The previous governing coalition of Fine Gael and Labour had also lost a large proportion of seats, and none of the traditional coalition government allies could form a majority. Extensive negotiations ultimately led to the first minority government since 1989. Fine Gael formed a minority coalition with a grouping of independent TDs, and Fianna Fail (as the second largest party in the Dail) agreed to a 'confidence and supply' arrangement so that a minority government could be formed (Fine Gael, 2016).

Neither energy nor climate change policy were on the agenda for the confidence and supply arrangement which established some agreement on the most contentious agenda items between Fianna Fail and Fine Gael for the coming term of government. The new Programme for Government (PfG) did prioritise several climate-change related items that would set an important context for energy policy (Government of Ireland, 2016). It promised a 'National Dialogue on Climate Change' that would involve public consultation aimed at publishing a plan for a long-term transition to a low carbon future, consistent with the Paris Agreement. This would take the form of the first statutory National Mitigation Plan (NMP) for the period 2050. On energy policy, the government committed to review of the REFIT mechanism, as the central policy instrument to support the NMP. It also recognized the "divisions and distress caused in local communities who feel that new energy infrastructure, like wind farms and pylons are imposed on them" and promised to update the wind farm planning guidelines as a matter of urgency. However, consistent with Fine Gael's 2012 Energy Policy and 2015 Energy White Paper, the government did not consider OFW as a solution to any of the aforementioned issues deserving priority within the current term of government.

4.5.7. The economy bounces back, emissions climb and government concedes a policy-objective mismatch on climate change

From 2014 the Irish economy had started to rebound from the financial crash and by 2017 it had experienced several years of high growth. In its first report to government in December 2016, the Climate Change Advisory Council expressed concern that the official projections of greenhouse gas emissions indicated that Ireland may not meet its 2020 target nor be on a pathway to meet its 2050 goal (FitzGerald, 2016).[67] Shortly after, the Environmental Protection Agency's annual national inventory of emissions indicated the first annual increase in emissions since 2005 for the year 2015 (Duffy *et al.*, 2017).

Over a period of 12 – 18 months, sustained feedback from several points drove growing recognition by government and opposition parties that a) there was a significant mismatch between Ireland's emissions trajectory, its 2020 target and long-term goal, and b) that the matter was of increasing importance to the Irish public who had a more general distrust in the government to act on the matter (Roux, 2021p, 2021o). By 2018, the EPA projected that Ireland would only decrease its emissions by 1% by 2020, a dismal failure on the 20% emissions reduction target (Environmental Protection Agency, 2018). It also indicated that Ireland was not on a path to its longer-term goals either, whilst growing regional efforts clearly signalled that further decadal targets were likely to be significantly more ambitious. It was beyond dispute that Ireland's economic growth had not decoupled from its emissions and that government policies, even considering some potential additional measures, were wholly insufficient to meet its target. In his 'annual transition statement' on climate change action, Naughton noted his disappointment at the emissions data and urgency in decoupling economic growth from emissions increases. Yet, opposition parties did not miss the opportunity to lambast him for inadequate preparation for the legislated annual statement to the Oireachtas. Naughton's department had failed to prepare the required written report on the transition prior to the Oireachtas debate and he had failed to share his written statement before the debate. For opposition parties this clearly served as a signal that he lacked a genuine concern for the

[67] The Climate Change and Development Act 2015 had established the Climate Change Advisory Council as an independent statutory body to advise government on the transition to a low carbon economy. This provided an independent feedback mechanism (with legal standing) to the state on policy development and implementation to meet decadal emissions reduction targets. Professor John FitzGerald was appointed as the first Chair of the Council.

issue and commitment to prioritise the necessary work across several departments implicated in the National Mitigation Plan. Distrust in the government's commitment to the requisite climate change action extended beyond the predictable criticisms of opposition parties. Government took note of a wider public distrust in the government on this matter. The Irish Citizens' Assembly on climate change underscored the public consensus on the need for more ambitious climate action (*Third Report and Recommendations of the Citizens' Assembly. How the State Can Make Ireland a Leader in Tackling Climate Change*, 2018). The recognition of the importance of the deterioration of Ireland's emissions trajectory, and the growing importance of climate change to a growing proportion of the public, coupled with deep general distrust in politics became a key concern to elected officials and (unelected) civil servants alike:

> *"Certainly there were lots of energy ministers passing through for short periods of time … [and] a realization within the government system [more generally] that trust needed to be rebuilt with the public in general. Hence the citizens assembly..."* (Civil servant 09pmi, 2021b)

The Taoiseach, Leo Varadkar, acknowledged that Ireland had been a 'laggard' on climate change action: "It does not give me any pleasure to say that and I do not say it without wanting to act." (Roux, 2021q).

4.5.8. Challenges with grid development drives TSO advocacy for OFW

This section continues on from Chapter 4.5.1, noting the continuing challenges Eirgrid faced with implementing its Grid25 policy throughout the mid-2010s. Civil servants in the department of energy and the regulator generally received a steady flow of information on the matter, if not always on the public record:

> *"[We] had extensive dealings with [Eirgrid and ESB Networks] over the years and most of our focus over that length of time would have been the challenge of connecting onshore wind. We knew full well from talking to them … that a lot of projects that we would have been eyeing up onshore in the north west were going to be challenging to get connected because a lot of the backbone transmission systems that needed to be in place had been quietly shelved or extensively delayed due to public objection. So we didn't get that major investment in transmission development that we had hoped for."*
> (Civil servant 15pmi, 2022)

By 2017, Eirgrid's scenario planning reflected a more pessimistic view of the deployment of onshore wind energy and related grid development. It decreased the growth rate in onshore wind expansion do to ‘increasing societal challenges’ and increased OFW capacity for all future electricity scenarios by 2030 (Eirgrid, 2017). By 2018 there were increasing signs that Eirgrid’s Grid 25 programme was running increasingly behind schedule. Many transmission line reinforcement projects were extensively delayed due to judicial review, and/or public opposition at various stages of the planning and construction process. Whilst the wind industry remained extremely bullish about the expansion of onshore wind capacity (Turner, Zhang and Rix, 2018), Eirgrid was proactively preparing the case to government for a shift in strategy towards OFW. By November 2018, the CEO, Mark Foley gave an unequivocal statement to the Oireachtas Joint Committee on Climate Action on the matter:

> *“While onshore wind will play a vital role in the next decade, it cannot provide the totality of requirements for Ireland’s decarbonisation needs. There is a role and a need for a broader range of technologies including solar and offshore wind... The time has come for Ireland to embrace offshore wind at scale as a vital element in our fight to reverse the trajectory of carbon emissions from industry and society. ... We are trying to stimulate the policy debate so the Government can make a decision and provide policy direction. We thought that offering a view to stimulate that would be helpful rather than sitting back and waiting. ... We feel a responsibility. Offshore wind will take many years to develop so the sooner we have the conversation, make some policy decisions and resolve regulatory and licensing issues, the sooner developers will start putting money into projects."* (Roux, 2021q)

By that point Eirgrid was conducting studies to identify the optimum delivery model for the development and connection of OFW to the Irish transmission system, focusing on the approximately 5.6 GW of offshore wind projects that had applied for connection, predominantly off the east coast. EirGrid proposed a centralised model, used in Denmark and the Netherlands, as the most cost effective model. EirGrid would provide a masterplan and secure planning consent for an optimum offshore grid network into which offshore wind developers would ultimately connect, with the first phase of such a masterplan focused on the east coast of Ireland. Its advocacy on this and proactive work precedes its support for a 70% RES-E target. It was advocating for a large shift to offshore wind prior to and regardless of the government’s increasing ambition on the 2030 target. Delays in onshore grid expansion was *sufficient* for it to advocate for a shift to supporting offshore at scale off the east coast of Ireland as a central priority from 2017 onwards.

4.5.9. If not a 'least cost' pathway, then at least a 'realistic' plan for a 2030 target

Just as the TSO started its advocacy for a shift to OFW, another cluster of energy policy makers where bringing the all-systems least cost approach to policy making to bear on Ireland's first statutory NMP. As demonstrated in the Chapter 4.5.2, this approach had already relegated OFW to a distant policy concern for the most ambitious decarbonisation pathways. By 2017 policy makers utilised the ITM for Ireland's first NMP (Curtin *et al.*, 2017; Department of Communications Climate Action & Environment, 2017). The centrality of Irish TIMES projections are apparent in the NMP:

> *"Key to addressing the long-term view required by the National Policy Position is the development of possible transition pathway scenarios to 2050 to inform sectoral strategic choices and policy development within sectors. Transition pathway scenarios will assist in understanding the strategic choices that Ireland will face in the years ahead, in identifying specific policies and measures that may be needed, and in establishing the required stable policy framework at sectoral level needed to achieve the 2050 objective in a cost-effective manner. These will also be essential in informing the achievement of Ireland's intermediate targets, established at EU level, for the 2020 and 2030 periods."* (Department of Communications Climate Action & Environment, 2017)

The all energy system least cost approach, together with the proposed bifurcation of 2030 emissions reductions targets between the European Trading Scheme (ETS) sectors and non-ETS sectors was steering policy pathways even further away from prioritising wind electricity generation. The ITM modellers developed a NMP scenario that combined mandatory obligations for 2030 (proposed by the EU, but not agreed) with national ambitions for 2050. For 2030, this amounted to a carbon price rise to €40/t that would drive ETS emissions reductions, and a target of 30% reduction below 2005 levels for non-ETS sectors.[68] Ireland would have to bring forward policy measures with a cumulative GHG mitigation capacity of 89 $MtCO_2eq$ between 2021 and 2030[69] and follow this with a pathway to reducing overall CO_2 emissions to 80% below 1990 levels by 2050. The NMP scenario incorporated policy makers'

[68] A key challenge in projections related to the uncertainty of national ETS reduction in the context of an EU-wide ETS. Implementation of renewable electricity support measures in many EU Member States would dampen the ETS price and effect of ETS decarbonisation in Ireland.
[69] The estimated difference between TIMES BAU emissions scenario of 472MtCO2eq and the budget of 383MtCO2eq for the 30% target.

expectation that the agricultural sector would not reduce emissions. It assumed that agriculture emissions would continue the trend under the Business As Usual (BAU) scenario, shifting a significant burden on to non-ETS energy emissions. As one policy maker noted:

> *"I mean, there was a real growing realisation … suddenly it was clear that the agricultural sector was beginning to go in the wrong direction at a rate of knots following the end of the milk quota system. And so some of the expected savings that we were looking at or potentially hoping for three or four years earlier from the agricultural sector, not only were the savings not going to be delivered on, but the actual emissions were getting bigger."* (Civil servant 15pmi, 2022)

The assumptions on agriculture emissions and the future price for ETS sector emissions shifted the weight of the decarbonisation effort on to the transport, residential and services sectors. The ITM NMP scenario projected emission reductions in the ETS sector of 29% relative to 2005, the greater proportion of this decline occurring before 2020 and emissions from electricity generation flat lining between 2020-2030. It allocated significant reduction in petrol and diesel use by 2030 to an increased use of biofuels, vehicle efficiency gains, and electrification of the private transport fleet (including widespread deployment of both plug-in hybrids and fully electric vehicles). This would require the equivalent of over 1 million electric vehicles on the road, slightly under 50% of the private car fleet in Ireland at the time (2017). The ITM allocated emissions reductions in the heating of buildings largely to energy efficiency gains and increase in the use of biomass. It is notable that the NMP scenario allocates 75% of decarbonisation efforts to increased energy efficiency (in services and residential sectors, and the purchase of more efficient vehicles). Consequently, the NMP scenario only projects a 9% electricity production increases by 2030 over a BAU scenario; 34,184GWh compared to 31,255 GWh. The projected renewable share of electricity generation in the NMP scenario is 32% in 2030, lower than Ireland's 2020 RES-E target of 40%.

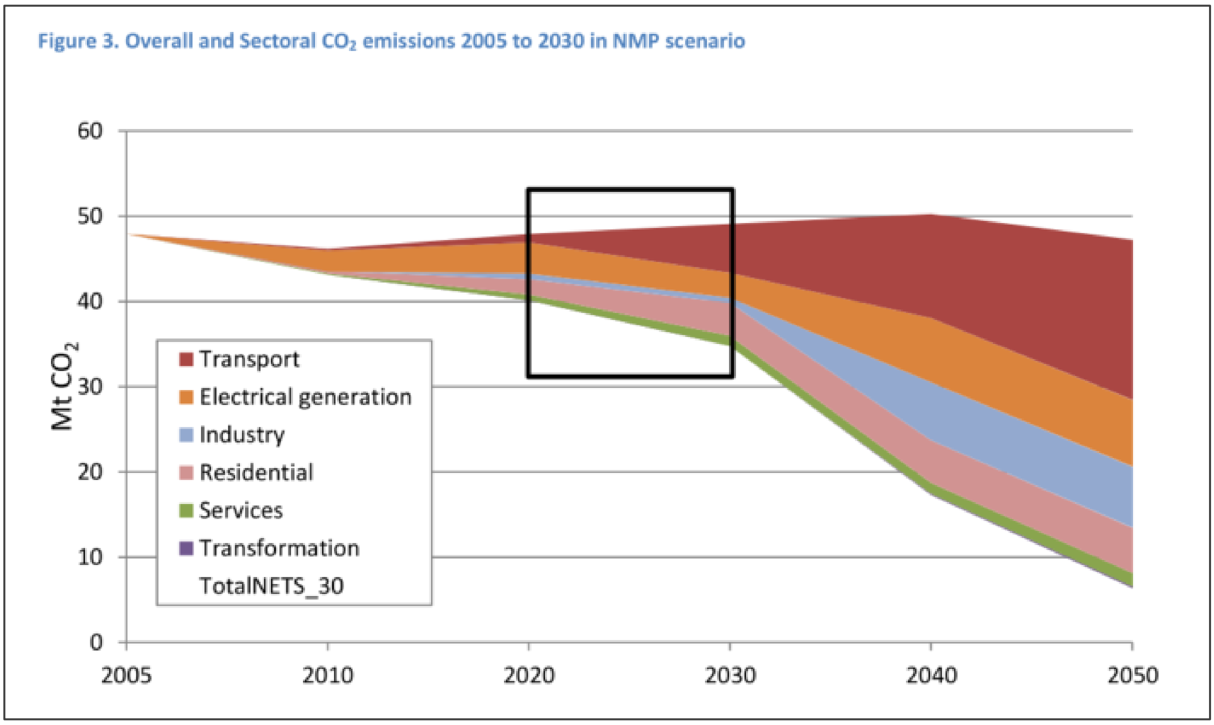


Figure 12: Extract from the Irish TIMES National Mitigation Plan 2017 scenario. The weight of decarbonisation for the 2030 target would fall on transport and heating. Source: (Curtin *et al.*, 2017).

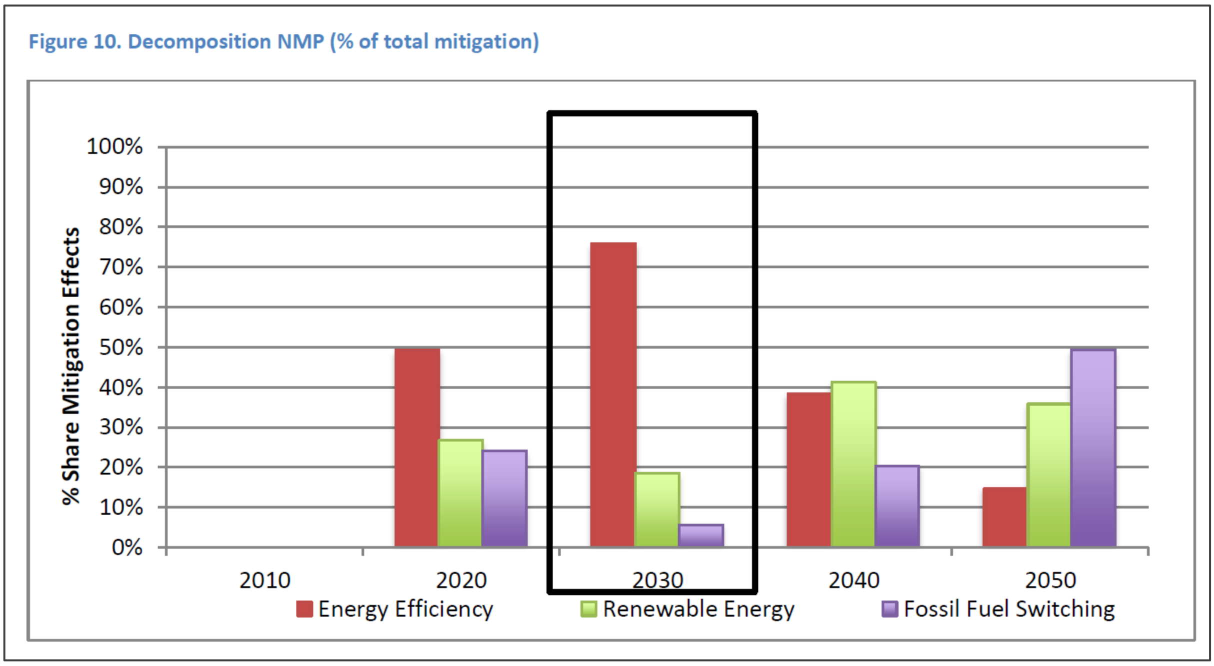


Figure 13: Extract from the Irish TIMES National Mitigation Plan Scenario 2017. Energy efficiency gains in transport and building heating would have to account for the brunt of decarbonisation for 2030. Source: (Curtin *et al.*, 2017).

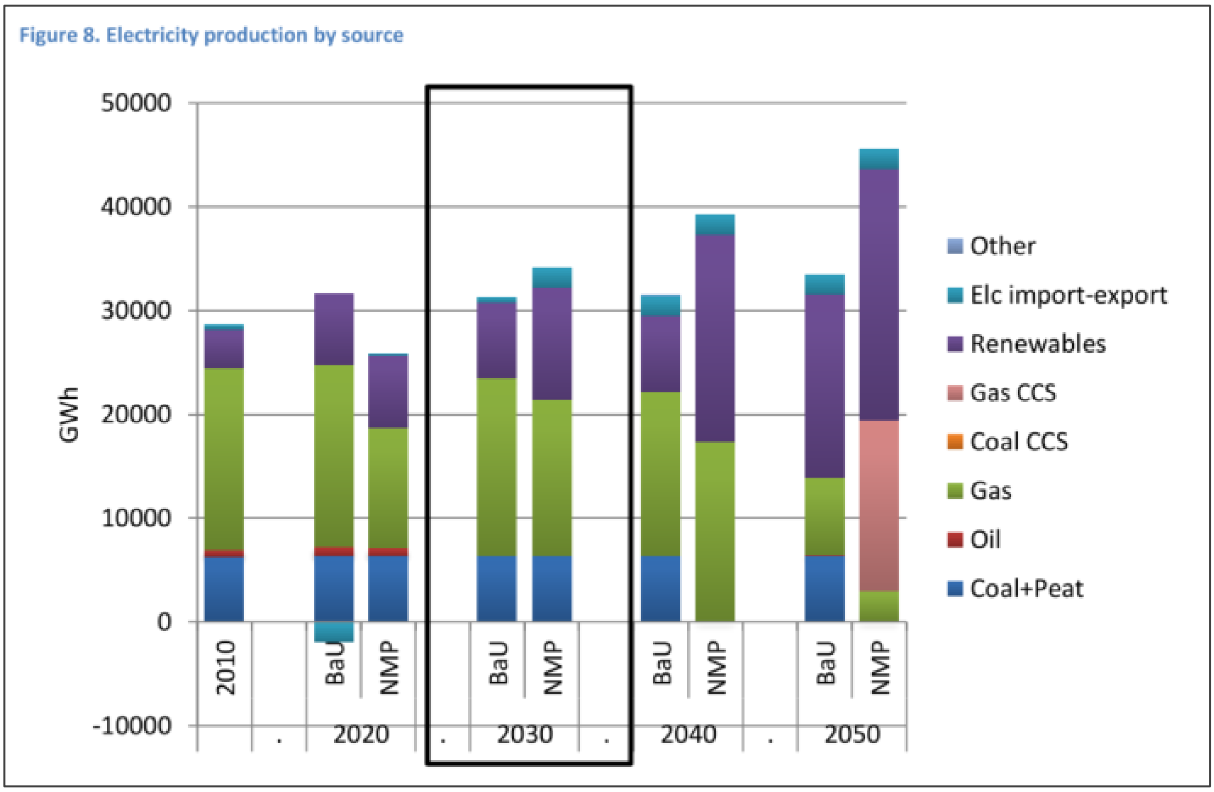


Figure 14: Extract from Irish TIMES model National Mitigation Plan Scenario. Electricity demand would barely increase due to projected efficiency gains. By implication, offshore wind would not be required for meeting the 2030 target. Source: (Curtin *et al.*, 2017).

It is difficult to overstate the disjuncture between the implementation of policy measures to reach the 2020 targets (and the policy ideas that drove this) and the Irish TIMES model least cost solutions for 2030. Putting the disjuncture in temporal terms, for wind-generated electricity there was a mismatch of well over a decade between the expected rates of wind penetration on the Irish grid. Policy makers estimated that the 2020 RES-E target would require 3,500 to 4,000 MW of (onshore) renewables. By 2017, the ITM NMP scenario least cost solution required 3,410 MW by 2030. At that point, Ireland already had installed capacity of 2,851 MW. Ireland had committed to an overall RES target of 16% by 2020 and a RES-E target of 40% by 2020, but NMP recommended that a least cost solution would entail a 16% RES and 31% RES-E contribution by 2030. The policies being implemented by 2017 to support renewable electricity generation would suffice to meet the 2030 target (Department of Communication Climate Action and Environment, 2018a). Looking towards 2050, OFW would make a significant contribution by mid-century only if Ireland moved to a deep decarbonisation pathway (95% reduction), the system ran on 100% renewables, or a sufficient amount of biomass couldn't be imported (Yue *et al.*, 2020).

A disjuncture was also emerging between some civil servants and their enlisted energy systems modellers who were responsible for the 2015 White Paper and NMP, and another group of civil servants clustered with the TSO and focused on 2030 target attainment. Officially, policies such as the 2015 Energy White Paper and the 2017 NMP laid equal emphasis on the 'central roles' of agriculture, the built environment, transport and electricity generation to meet the emissions target at least cost and a 'whole-of-government' approach to target attainment. However, by 2017 civil servants in the DCCAE started discussing 'realistic' policy options for attaining the 2030 target that departed significantly from the recommendations of the NMP (Civil servant 15pmi, 2022). One node for discussing options coalesced around the deadline for submitting the draft National Energy and Climate Plan (NECP) to the European Union. The government had to submit this by 31 December 2018. This would be the key initial input to agreeing the exact figures for the legally binding national emissions reduction target for 2030.

Policy makers in the DCCAE dramatically reduced the policy alternatives for meeting the emissions reduction target based on their pragmatic judgement of the policy levers the department had significant control over, jettisoning whole sectors based on lack of progress over the past decade. For instance, by 2017 it was apparent that the government would fail to meet the heat and transport renewable energy targets for 2020 and that they had little hope of the agriculture sector cutting its non-energy emissions. As one civil servant put it:

> *"… there was the realism of what can actually be delivered as opposed to just the least cost benefit. And there was a realisation that we're more likely to be able to deliver on renewable electricity than we are on some of the other policy areas, even if in theory some of the other policy areas might be slightly cheaper … we were more or less doing the same on the transport fuel side, our biofuel obligation had kind of kept us more or less at a European level. The one area on the energy side that we were struggling to get under the bonnet on was heat. And in looking at the heat system we would have done a lot of work with SEAI in particular on this. The very dispersed nature of heating the Irish market made it very difficult to get at because we didn't have a big industrial processing cohort that we could get into from an industrial perspective. We didn't have any history or approaches been taken at district heating. So the heating cooling target was the one that we were finding very difficult, to make progress on from a decarbonisation and from an efficiency perspective. I mean, there was a real growing realisation at the time that the agricultural sector was beginning to go in the wrong direction at a rate of knots following the end of the milk quota system. … So as a result, we did push the electricity*

> *generation side of it because we felt we could actually make progress there."* (Civil servant 15pmi, 2022)

This shift in thinking can be traced by comparing the NMP with the draft and final NECP, published in December 2018 and 2019 respectively. The draft NECP used four scenarios to project the envelope of emissions reduction potential by 2030. Two scenarios only used existing policy measures, that had either been adopted or was certain to be adopted very soon, the "With Existing Measures" (WEM) scenarios, to drive projections. Two scenarios added additional policy measures to the WEM list, the "With Additional Measures" (WAM) scenarios. The mitigation of each of the aforementioned was modelled under a low and high oil price. The WEM scenarios projected RES targets that would be attained with policies in place prior to the end of 2017. The With Additional Measures (WAM) scenarios included the anticipated impact of all policies announced in the National Development Plan and additional measures. The additional measures considered appear to be the outcome of an intensive period of engagement within the renewable energy policy community, facilitated by the DCCAE, but informed by industry (most notably the wind energy industry), the system operators and owners, the regulator and academic researchers and think tanks like the ESRI.

The shift in thinking that had occurred roughly was already apparent in the draft WEM scenarios. OFW would be introduced into the electricity mix by 2028 and 600 MW of capacity would be installed by 2030 (consistent with Eirgrid's scenario planning). Since the publication of the economic assessment for the RESS in 2017, policy makers had taken note of the rapidly declining costs of offshore wind power in other jurisdictions, along with significant delays Eirgrid faced in grid development. ESRI again stepped in to estimate the cost of government support for OFW on Irish electricity consumers. However, unlike its previous assessment a decade earlier, this time it found that diversifying energy generation to include the OFW projects already in various stages of development would cost the Irish electricity consumer 'moderately more' (7-9%) whilst addressing grid-related challenges (Slednev *et al.*, 2018). This contradicted the recommendation from Cambridge Economic Consultants on the RESS price support instrument. Civil servants opted for ESRI's recommendations to inform the NECP.

As for grid development, the draft NECP revealed the civil servants' pessimistic assumptions about the progress on Eirgrid's Grid 2025 programme. The most high profile failure had been delays in building the North-South Interconnector from Northern Ireland to the Republic, though there had been many other delays which received less national media attention (Civil servant 15pmi, 2022; System Operator 17soi, 2022). The high expectations for grid development in the onshore wind generation centres of the west and south west were waning. Offshore wind power would therefore not technically be part of a least cost electricity generation mix, but at least the DCCAE judged the premium small enough given the technology diversification and energy security benefits. After all, the most feasible offshore wind projects ran along the east coast, close to the demand centre of Dublin.

It is worth noting that the inflection in thinking around the offshore/onshore wind contribution happened when the investment differential was still relatively large. The cost of OFW had indeed decreased rapidly between roughly 2015 and 2018. Offshore wind auctions in the Netherlands, Denmark and the UK awarded record low prices of around € 0.06/kWh. These price points precipitated a rapid shift in expectations in the Irish energy policy and research communities 2018 (IRENA, 2018). For instance, the ESRI-supported analysis which was key to informing policy makers' expectations had the following assumptions. They used average 2015 investment values of 1560 €/kW for wind onshore and 4650 €/kW for wind offshore – still a very large price differential. What closed the expected price differential was the assumption that onshore wind would have a cost reduction rate of 5% between 2025 and 2050, whereas OFW would have a cost reduction rate of 15% over the same period. Updates to the Irish TIMES technology cost assumptions also took a declining price difference into account, but still did not bring offshore wind into a least cost solution. By the end of 2018, in no policy scenarios did TIMES runs allocate a significant contribution from OFW to least cost emissions reduction pathways until 2050.

The draft NECP revealed that the mitigation potential from existing policy measures would fall well short of the proposed 2030 target. In the electricity sector it would maintain the 40% RES-E target for 2020 with the addition of around 600 MW of offshore wind by 2030 (starting deployment in 2023). If the government included additional policy measures in the electricity sector, it could reach a RES-E target of 55%, which would include an offshore wind capacity 1.8 GW. Existing policy measures would only achieve a 40% RES-E target in 2030 and assumed an SNSP cap at 65%. Through widespread consultations the DCCAE started considering alternatives for the additional policy measures that would close the gap to the 55% RES-E target by 2030. For electricity generation, such measures included closing Moneypoint by the end of 2025, increasing solar PV capacity and introducing offshore wind generation in 2023. This scenario also included hitting the 75% SNSP and having the Celtic interconnector in place by 2026. With the additional measures, the projection was for a RES-E of 53.8 – 57.1% (hitting the 55% RES-E target), and for offshore wind to contribute 337.1 – 443.4 ktoe from 1.8 GW of installed capacity by 2030.

The draft NECP also revealed the departure from the all systems least cost approach that had dominated the 2015 White Paper and NMP. Irish TIMES continued to prove influential in sustaining the government's overarching commitment to increasingly ambitious climate change targets (Policy researcher 30pri, 2022). It essentially demonstrated that there were ways in theory, pathways, to attaining deep emission cuts by 2050. It also sustained this influence over three successive governments and more Ministers of the energy and climate change portfolio. However, when policy makers in DCCAE came up against the challenge of specifying actions to attain an intermediary 2030 target they opted to depart drastically from TIMES solutions to policy options they deemed feasible, or 'realistic' as a key informant put it, under multiple institutional and socio-political constraints. For DCCAE this meant a dramatic pivot back to instruments targeting electricity generation.

The wind energy industry was quick to seize the opportunity presented by the ratcheting up of climate targets to push for much more ambitious renewable energy targets. In 2018 it commissioned research which showed that a RES-E target of 70% by 2030 was feasible (Turner, Zhang and Rix, 2018). It remained bullish on the prospects of onshore wind energy even whilst the TSO grew increasingly pessimistic about its ability to connect such capacity. IWEA's research proved influential with civil servants who had an increasing challenge finding areas to meet the emissions reduction target. Eirgrid would not immediately endorse the feasibility of a 70% RES-E target by 2030, but confirmed that the requisite SNSP threshold of 85% - 90% could be met. By early 2019, civil servants opted to ratchet up the RES-E target from 55% to 70%.

4.5.10. The Climate Action Plan and McKinsey's black box

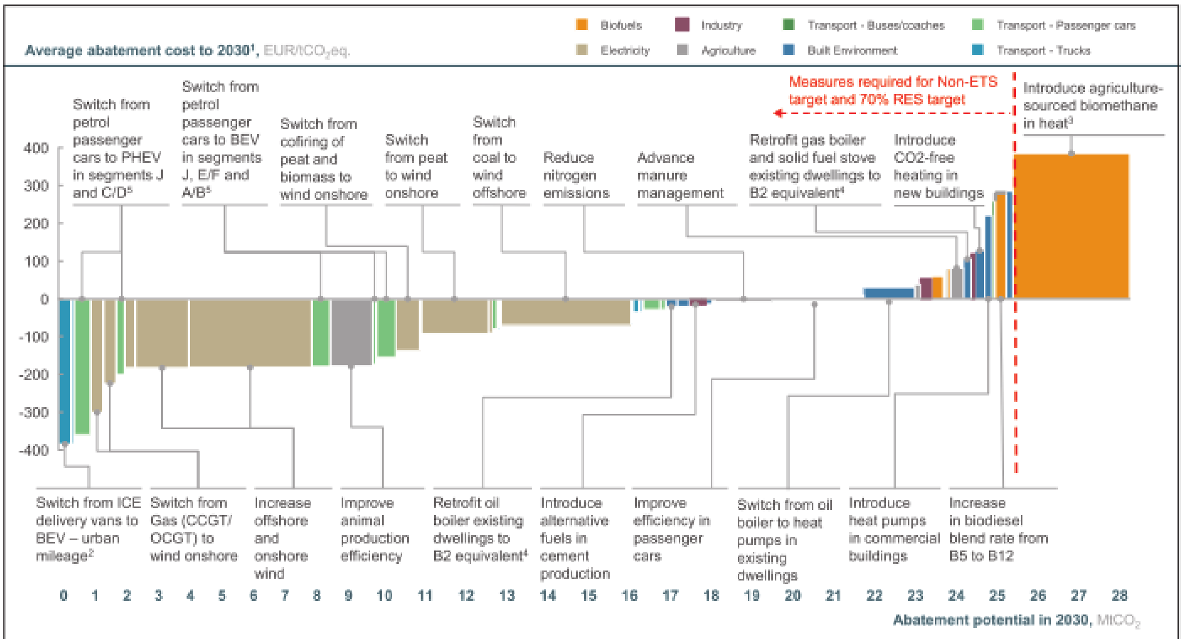
Evidence of the vast policy-objective mismatch on greenhouse gas emissions, the Citizens Assembly on Climate Change, and recognition of the challenge by the government happened to coincide with the resignation of Naughton. His resignation was due to an unrelated controversy over the National Broadband Plan. In his place, Varadkar appointed the seasoned TD, Richard Bruton. Bruton had been a research economist by profession and worked for the ESRI before entering politics in the 1990s. He had served as Minister at the helm of several departments and had been lauded for the Action Plan for Jobs that he implemented between 2011 and 2016 when he was Minister for Jobs, Enterprise and Innovation. The Action Plan for Jobs had set the target of creating 100,000 jobs following the financial crash and was widely regarded as a success. In its review of the Action Plan, the OECD noted that the "most striking innovation in the Irish public policy context is a coordination mechanism that ensures high-level political buy-in and oversight, whole-of-government engagement and the establishment of quarterly targets underpinned by a robust monitoring system." (OECD, 2014)

From his appointment at the helm of DCCAE in October 2018, Bruton set out with vigour to apply the approach he employed with the Action Plan for Jobs to the challenge of getting national policy back on track to meet Ireland's climate change targets and turn Ireland from a 'laggard to a leader'. It would take the form of the Climate Action Plan, as Bruton promised:

> *"The mandate I have is to produce a whole-of-government plan that will take on the national mitigation plan. That plan, admittedly, was not a detailed roadmap but a set of signposts for the direction of travel. We must now create a detailed roadmap. Furthermore, we must have the policy tools that will deliver progress on that road and verifiably show that we are reducing in the respective sectors. We must have a target for the direction of travel for the sector, monitor it, verifiably examine the impact of policies we are adopting in that direction of travel and take corrective action if we are not achieving it. That requires structural change and it will be difficult."* (Roux, 2021q)

Bruton made a key decision early on to appoint the consulting firm McKinsey to perform the analysis underpinning the prioritisation of actions in the CAP as well as liaising with a wide set of stakeholders to compile their responses and inputs. This may have been because the turnover of staff within the DCCAE had left some technical capacity gaps and the largely academic network that made up the TRAM group were not sufficiently client-oriented or demand-led to package and present bespoke analysis under severe time-constraints (Policy researcher 27pri, 2021; Policy researcher 30pri, 2022).

McKinsey's results for a "cost effective" pathway to meeting the 2030 target had the same overarching policy constraint as previous TIMES scenarios, but differed significantly from the preceding TIMES simulations. The aim remained to meet the 2030 carbon budget of 378.3 $MtCO_2eq$ for the non-ETS sectors under the EU's Effort Sharing Regulation, and Ireland's subsidiary goal of 70% RES-E. However, central to McKinsey's recommendations was the construction of a Marginal Abatement Cost Curve (MACC) that ordered the average marginal cost of a range of technology changes, often fuel switches, out to 2030 along with the abatement potential for the predefined switches (see Figure 15). For instance, a switch from coal to offshore wind power in the Irish power system (e.g. the closure of Moneypoint in 2025 and proportional introduction of OFW starting from 2023) would have a specific abatement potential in $MtCO_2eq$ and average abatement cost of EUR/tCO_2eq by 2030. The data inputs for the MACC included over 300 "underpinning technology business cases" based on McKinsey's globally-sourced data on emissions mitigation technologies, which was "localised for Ireland" based on engagement with Government departments and agencies during the preparation of the CAP. Each business case included "a perspective" on technology evolution between 2020 and 2030 (e.g. technology cost and efficiency improvements) (Government of Ireland, 2019a).



Note: The horizontal axis shows the abatement potential of the technology switches. The vertical axis displays the average abatement cost as EUR/tC02 for each switch. The C02 price of the EU ETS is included in the cost of measures for industry and power and heat

1 Measures considered exclude LULUCF and biofuels use in energy/heat production. MACC does not include cost of enabling infrastructure (e.g., EV charging network, transmission & distribution upgrade). Agriculture measures are based on Teagasc Greenhouse Gas Working Group report "An Analysis of Abatement Potential of Greenhouse Gas Emissions in Irish Agriculture 2021-2030"; Total abatement includes abatement for growth in the analysed sectors;
2 The switch to electric light commercial vehicles bring early TCO parity due to low weight vehicles doing long journeys;
3 Biogas/biomethane abatement lever could displace emissions in both industry, buildings and power,
4 B2 BER insulation equivalent: includes wall, roof & window insulation, excludes boiler upgrade
5 Vehicle classes include: A/B - mini, small cars; C/D - medium, large cars; E/F - executive, luxury cars; J - sport utility cars (including off-road vehicles)

Figure 15: The Marginal Abatement Cost Curve that McKinsey constructed for the Climate Action Plan to reach the 2030 target with "least burden and most opportunity". Source: (Government of Ireland, 2019a).

OFW was one the big beneficiaries from this analysis. The MACC recommended a significant increase in the deployment of wind energy to substitute coal, peat and gas in the electricity generation mix and to meet significant projected increases in electricity demand due to the widespread adoption of EVs and heat pumps. 8.2 GW of onshore wind and 3.5 GW of offshore wind capacity would be required by 2030 to switch from coal, peat, biomass and gas in electricity generation and to meet the projected demand for close on a million EVs and 600,000 heat pumps (see Figure 16). Within roughly a year of engagement and modelling activities starting with the draft NECP and ending with the CAP, OFW's contribution to Ireland's climate change target had increased fourfold in capacity terms, from 600 MW to 3.5 GW.

	Technology	NDP 2030	Uptake to meet 2030 targets (Based on MACC analysis) 2025	2030
Electricity	**Total RES in Generation mix[4], %**	**55**	**52**	**70**
	• Onshore wind, GW	~7	~6.5	~8.2
	• Offshore wind, GW	1.8	~1.0	~3.5
	• Solar PV, GW	1.5	~0.2	~0.4
Transport	**Electric Vehicles, #**	**498,000**	**181,500**	**936,000**
	• Passenger EVs, #	355,000	57,000	550,000
	• Passenger PHEVs, #	118,000	94,000	290,000
	• Electric delivery vans, #	19,000	30,000	61,000
	• Electric trucks, #	n.a	0	34,000
	• Electric buses, #	1,250	500-600	1,000-1,200
	Bioethanol blend, Volume	**E10**	**E10**	**E10**
	Biodiesel blend, Volume	**B12**	**B12**	**B12**
Built Environment	**Retrofitted homes[1], cumulative 2021-30, #**	**450,000**	**300,000**	**500,000**
	Electric heating sources, total residential, #	**370,000**	**350,000**	**600,000**
	• New buildings, #	200,000	50,000	200,000
	• Existing buildings, #	170,000	300,000	400,000
	Electric heating sources, total commercial, #	**15,000[3]**	**15,000**	**25,000**
Enterprise	**Emissions, $MtCO_2eq.$**	**9**	**8**	**8**
	• Alternative fuels in cement fuel mix, %	N/A	65%	80%
	• CO2-neutral heat generation in food industry[2], %	N/A	~70%	~80%
Agriculture	**Emissions, $MtCO_2eq.$**	**21**	**19**	**18**
	• Fertilizers CAN replacement, %	N/A	40%	50%
	• Trailing-shoe slurry spreading, %	N/A	30%	50%
Other (e.g. waste)	**Emissions, $MtCO_2eq.$**	**3.2**	**3.2**	**3.2**

Solar PV, some electrification of buses, and biofuel blending are identified in 2030 the NDP scenario but are not showing as cost-effective in MACC. Despite MACC analysis these technologies may remain in plan given other factors (e.g., exchequer cost, ease of implementation, need for public sector leadership)

1 Retrofit to B2 BER fabric equivalent
2 Includes biomass and electricity
3 Not specified in NDP, estimated based on residential ratio
4 RESS competitive auction determines the final mix

Figure 16: McKinsey's 'dashboard' for Ireland's decarbonization pathway to 2030. Source: (Government of Ireland, 2019a).

McKinsey's analysis introduced new assumptions and methods to the task of target attainment, but these were not completely transparent. McKinsey had delivered what the government had demanded and to a tight deadline; a plan to close the 58.4 $MtCO_2eq$ gap to reach the Non-ETS target and have 70% of electricity needs from renewable sources. However, some experts in the policy community remained suspicious of McKinsey's lack of transparency on their technical assumptions and methodology. As two experts noted independently:

> *"We did get a chance to critique them. I [went] to a few meetings with them asking them for more detail and they're very good at not giving more detail. They talk about their proprietary model. I think there are a few problems with that. It's a bit opaque. It's a model that's underpinning a lot of national policy decisions, but it's kind of commercially sensitive and off limits. But they were very good at doing some analysis and presenting it to departments and then kind of appearing to listen … they never shared enough of their model for us to get a sense, is it rigorous or not, you know. Are they just really smooth talkers?* (Policy researcher 30pri, 2022)

> *"when we asked to see how [McKinsey] came up with the numbers, they said 'It's our intellectual property, you can't see it.' It's totally inappropriate. … if [state agencies] rely on McKinsey research to put in place carbon budgets and the people of Ireland cannot vet how*

> *they came up with those numbers, that's not acceptable. … You have a black box which decides."* (Policy researcher 27pri, 2021)

Regardless of whether McKinsey's model assumptions were technically defensible, my research findings underscore the divergence of expert judgements between different groups within the energy policy network and the rupture caused by the new entrant, as the political agenda and political constraints pushed the available evidence, modelling capacity and expert judgement. As one energy modeller reflected on the period:

> *"Would we have allowed our model to be co-opted into letting the electricity sector do even more than previously? You know, we were trying not to let that happen. I mean, that might have happened, but the system perspective focused on heat and transport meant we would tried to emphasise those sectors in our elevator pitch or our policy briefs. So I would say the sense that the electricity sector could deliver more were likely to come from the electricity sector, IWEA or Eirgrid."* (Policy researcher 27pri, 2021)

In addition to the 'realism' of civil servants (Section 4.5.8) that drove the shift back to electricity generation as the key pillar in decarbonisation, there was an additional driver for the increase in OFW's contribution to the NECP and CAP, as one policy maker noted:

> *"[T]here was the realisation that a very strong message needed to be fed in, not just to the political system, but also into the regulatory and grid planning system. ... The NECP took the view that we needed to focus some development offshore as opposed to onshore, and that we also needed to get a message into the transmission and regulatory systems that offshore is coming and you better start thinking about where it's going to be accepted and how we're going to deal with it in the market. It would be very difficult for a large offshore project just to plug in to the zero bid SEM. So, you know, that had to be given the regulatory framework as well. At that point in time it needed to get kick-started, basically."* (Civil servant 15pmi, 2022)

Almost a million electric vehicles, 600,000 residential heat pumps, 8.2 GW of onshore and 3.5 GW of offshore wind could solve McKinsey's model and appease the government, but was it actually feasible? What was clear was that pressure was building from within government to meet increasingly ambitious targets; to 'find' mitigatable MtCO_2 wherever possible. Expert judgement certainly differed on some assumptions, particularly on what may be technically feasible and socially acceptable by 2030. It is debatable whether the likes of

McKinsey were more unscrupulous in meeting the demands of a paying client, whilst academic and/or independent experts were more reluctant to stretch their credulity and suspend their critical judgement. Either way, both the CAP and final NECP had settled on the necessity of significant amounts of OFW to reach the 2030 target and an exact number of 3.5 GW of installed capacity to aim at. This largely rested on the projected growth in electricity demand due to the widespread electrification of heating and transport sectors. But even here, the line between realism and fantasy is traversed through a myriad modelling input assumptions, ranging from long-term technology adoption assumptions to daily power loads on parts of the distribution system. As one senior power system engineer put it:

> *“I also think [Eirgrid’s] modellers are getting certain things wrong. So one of the big issues for me is in our modelling, we are not modelling what is likely to happen, we're modelling what we want to happen. And it's a bias of ours. So one of the issues, our modellers have assumed electrification of cars. And they've also implicitly assumed that there would be a flexible product that a lot of the charging of cars and heat pumps will occur off peak. So when they do that study, they don't see any technical problem in Dublin. ESB networks did a very similar network model and saw massive overloads in 2025, 2026. ... I had a discussion with [Eirgrid’s] planners and said it's not going to work the way we modelled it. And then I heard that one of our planners who got in to CEO, Mark Foley, was asked the question ‘Do we need a flexible grid by 2030?’ And he says ‘No, we don't.’ And I couldn't fucking believe it, because he's looking at a model. He's assuming if we get everything built, and he's not even modelling trip maintenance, and if demand is moved, but there's no incentive. So [name redacted] can’t show a value to the regulator of having an incentive for flexible demand because there doesn’t appear to be any problem.”* (System Operator 17soi, 2022)

Dynamically what appeared to be occurring was a kind of unintended leap-frogging by which different actors in the policy community were using incremental innovative proposals from other actors to ‘leapfrog’ ahead in proposing new reasons to adopt increasingly ambitious targets. By 2017, engineers within Eirgrid were mooting the technical feasibility of moving beyond 75% SNSP with the department (System Operator 17soi, 2022). Eirgrid’s signalling that SNSP could go “well beyond” 75% emboldened policy makers to explore deeper emissions cuts in the electricity generation sector. This emboldened the wind industry to propose a target of 70% RES-E by 2030 through an influential analysis IWEA commissioned (Turner, Zhang and Rix, 2018). This convinced policy makers in the department but Eirgrid would not confirm the technical feasibility of reaching 70% RES-E by 2030, given its noted assumptions about grid development challenges. In drafting the CAP, policy makers, convinced by IWEA's proposal (or at least desperate for any solutions to meet a demanding decarbonisation target) returned to Eirgrid with a target of 70% RES-E by 2030, a target that caught some in the TSO by surprise. By October 2019, Eirgrid acknowledges key actions from the Climate Action Plan as its responsibility, including facilitating 70% renewables on the grid. Given Eirgrid's expectations over social acceptance barriers to the necessary onshore grid development to support 70% they pushed even harder for a larger pivot to OFW. By the end of 2019, Eirgrid's Chairperson, Brendan Tuohy, was unequivocal: "To put the conditions on it, we must go offshore and we must be successful in the offshore... we will not do it [the 2030 RES-E target] if we do not meet the offshore targets." (Roux, 2021r)

4.5.11. The new target recalibrates the price support instrument

This section continues on from Chapter 4.5.3. I show how the 2030 70% RES-E target 'calibrated' the price support instrument, the Renewable Electricity Support Scheme (RESS), over the period 2017 – 2020, and drove the relative importance of OFW within the RESS.

It took civil servants in DCCAE a year and a half to commission and publish the economic assessment of options for a new price support instrument for renewables (Cambridge Economic Policy Associates, 2017a). The analysis exemplified the varied policy objectives that informed the government's assessment of alternatives in the context of increasingly ambitious 2030 emissions targets. The report's authors:

> *"More specific assessment criteria were identified … (1) value for money criteria (impact on the Public Service Obligation (PSO), savings on imported fuel, impact on grid/system costs, facilitating private sector investment, cost effectiveness); (2) security of supply; (3) Energy White Paper objectives (exploring market opportunities for micro-generation, renewable diversity); (4) community and citizen participation; (5) compatibility with I-SEM; (6) EU targets (contributing towards 2020 and 2030 RES targets); and (7) greenhouse gas (GHG) reductions and savings/environment impact."* (Cambridge Economic Policy Associates, 2017a)

Policy makers were designing a new price support instrument to incentivise sufficient new renewable generation to deliver Ireland's 2030 RES-e target and enable community and citizen participation in renewable energy projects, whilst ensuring cost-effectiveness and compatibility with the I-SEM. The range of scenarios modelled in the analysis provides a good indication of scope of the respective objectives and the range of policy alternatives under consideration. Policy makers within DCCAE had requested the consultants to consider four different supply mix scenarios in order to understand the cost implications of reaching their policy objectives of technology resource diversification and energy security. This included a baseline and scenarios with offshore wind, bioenergy, and additional solar PV respectively.[70] It also included a range of RES-E targets from maintaining a 40% baseline (the 2020 target) up to 55% RES-E by 2030. The analysis considered a range of price support instruments including a feed-in tariff and floating feed-in premium, though the former was incompatible with new EU legislation and the I-SEM.

The recommendation of the analysis was unequivocal:

> *"The LCOE analysis completed in this study suggests that apart from the repowering of existing large hydro generators, onshore wind is generally the lowest-cost RES-e technology. Furthermore, due to the large deployment potential for onshore wind, the RES-e supply curve is relatively flat in Ireland, at least up to the levels that are required to meet the envisaged RES-e targets. Consequently, if the cost effectiveness of the RESS were the only objective, the least-cost RES-e mix would consist of mostly onshore wind, with some well-located large solar PV also entering the mix. Many other RES-e technologies have much higher LCOEs, and are not likely to be viable without separate, targeted support."* (Cambridge Economic Policy Associates, 2017a, p. 7)

The consultants estimated that large onshore wind would have a viability gap of € 27/MWh by 2020 and only €2 / MWh by 2030, becoming practically viable without price support by the end of the decade. Offshore wind, on the other hand, had a viability gap of € 77 / MWh in 2020 and € 37 / MWh in 2030.[71] With this difference in viability gaps, a least cost price support scheme calibrated to maintaining the 40% RES-E contribution would cost roughly half of a scheme that allocated 20% of new capacity funded under the scheme to OFW (325

[70] In each of the options considered, it was assumed that 67 percent of the total RES-e mix needed to meet the RES-e target would come from the least-cost RES-e mix, 13 percent from the community-led mix, and the remaining 20 percent would be represented by each of the three technology listed above.

[71] The viability gap represents the difference between a RES-e generator's LCOE and its levelised market revenues. A RES-e project with a zero or negative viability gap should be able to recover its costs from the market, without needing any other form of support.

MW); € 527 million compared to just over € 1 billion. Importantly, the analysis also highlighted that increasing the RES-e target above the 40% 'baseline' would have a large, non-linear, impact on the scheme's cost. Whereas the baseline solution for the 40% target would cost €560 million, the baseline solution for the 55% target would cost over € 6 billion. This underscored the increasing importance of cost effectiveness of a price support scheme at higher levels of renewable deployment.[72] This finding was complementary to the Irish TIMES outputs in confirming the high cost of relying heavily on electricity generation to reach emission reduction targets.

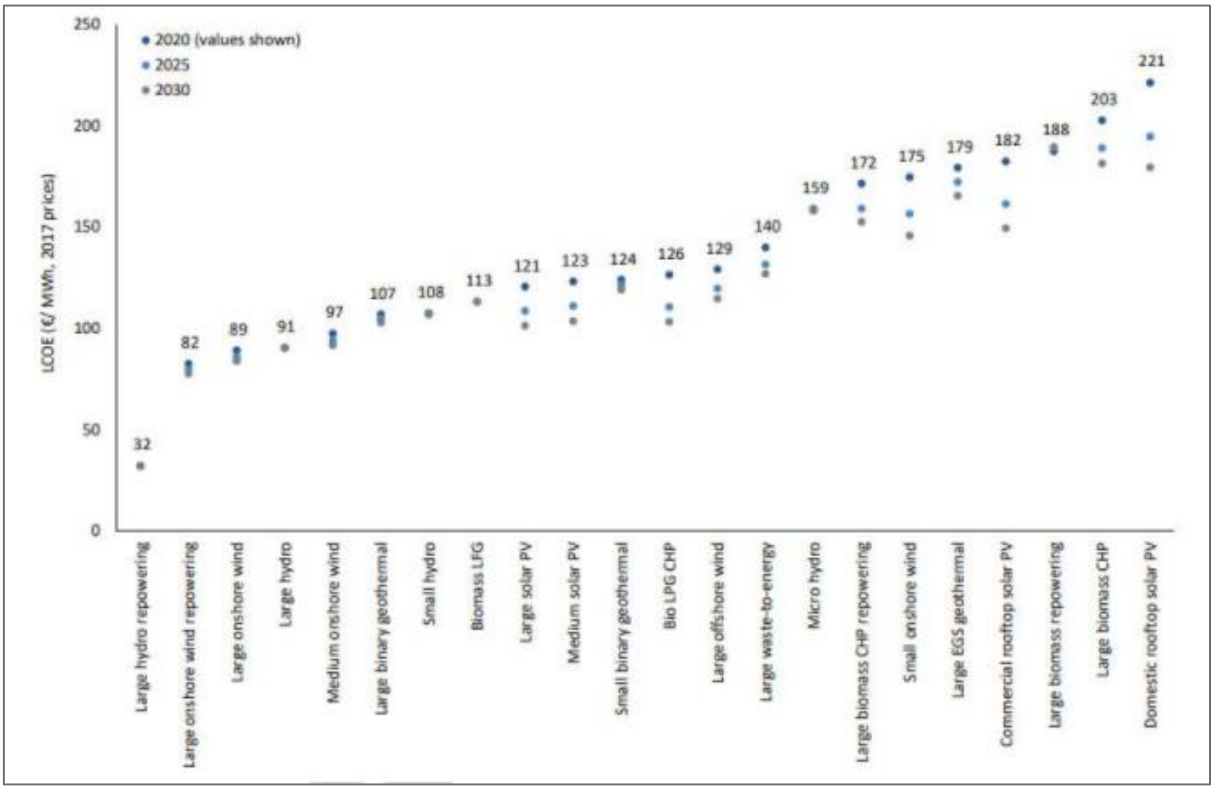


Figure 17: Extract from Cambridge Economic Assessment of the projected LCOE of generation technologies for 2020 - 2030. Source: (Cambridge Economic Policy Associates, 2017a).

It would take another two years for the DCCAE to publish its final High Level Design of the price support instrument, the Renewable Electricity Support Scheme (RESS) auctions (more on this in Chapter 4.5.11).

[72] At least some of the cost sensitivity was due to the rising level of wind curtailment at high penetration levels. The RES scheme economic analysis found that 20% of wind would be curtailed in realising a 55% RES-E target if the SNSP limit remained at 75%.

Government published the High Level Design of the RESS scheme in July 2018 and referred it to the EU State Aid approval process. It included a commitment to a series of scheduled, competitive auctions with sufficient flexibility to allow Government “to respond to falling technology costs, market conditions and renewable electricity policy objectives throughout the lifetime of the scheme and to ‘change as we go’ the focus of individual auctions, as appropriate.” (Government of Ireland, 2019b) The High Level Design specifications included a commitment to deciding technology specific support based on viability gap analyses and the possibility that different learning rates may lead to converging costs between technologies over the decade, thus increasing the diversity of technologies naturally within a maturing scheme. However, it noted the complex trade-off between cost minimization and the benefits of diversification, emphasising ESRI’s finding that diversification to offshore wind could reduce grid costs and “concerns in relation to acceptance and land-use planning” for a moderate cost increase to consumers. Noting that technology diversity would accelerate as RES-E ambition increases partially due to “social acceptance challenges and limits on the available land for onshore wind.”

However, at this point, the government still shied away from proposing a technology-specific auction for offshore wind, or an offshore wind ‘pot’ within the auction rounds. Rather, the design principle would be that the policy would set a technology neutral demand cap in GWh and let the market competitively resolve the mix of technologies. It reasoned that the onshore Wind Energy Development Guidelines (under development at the time) would effectively place a cap on the volume of onshore wind that could be delivered under RESS through a mix of new regulations, including set back distances, noise limits, and planning success rates. Regulation would drive diversification whilst the price support instrument would drive competition.

The RESS would initially be calibrated to deliver the 55% RES-E target by 2030, setting caps in terms of GWh based on projected growth in electricity demand, the pipeline of projects in the CRU’s connection policy process, and the potential need to compensate for heat and transport sectors within Ireland’s NECP trajectory. An offer of connection would be a pre-requisite to participate in the auction. RESS would seek to deliver the amount of electricity necessary to reach Ireland’s 2030 contribution to EU renewable electricity targets.

Underpinning all of this were economic growth assumptions and related demand assumptions regarding data centres, electric vehicle and heat pump adoption that would have to be monitored closely. The calibration of capacity caps for the successive auctions would incorporate the modelling of UCC, SEAI and the TRAM for the 'trajectory years' to reach 2030.

The High Level Design of the RESS included several 'levers' to deliver diversity within a competitive framework. However, it ruled out a technology-specific auction for OFW, citing concerns over gaining state aid approval, and an overarching priority to minimize costs through technology neutral auctions.

Example of RESS 2 Auction with two separate outcomes. ***Technology Specific*** *(estimates based on proxy bid prices) auction with a delivery date of end 2023 and no single technology cap.*

	Auction capacity (3,000 GW/hrs)	*MW equivalent*	*Est Cost (€m)*	*Auction capacity (4,000 GW/hrs)*	*MW Equivalent*	*Est Cost (€m)*
Onshore wind	*1500 (50%)*	*535*	***120***	*2000 (50%)*	*714*	***160***
Solar PV	*500 (17%)*	*500*	***60***	*800 (20%)*	*800*	***96***
Bioenergy				*400 (10%)*	*60*	***80***
Offshore wind	*1000 (33%)*	*253*	***125***	*800 (20%)*	*202*	***100***
Total Cost			***€305***			***€434***

These figures are indicative only and do not represent the cost of the PSO to the scheme or to electricity users final bills.

Figure 18: Extract from Cambridge Economic Assessment comparing cost implications of twotechnology-specific auction alternatives. Source: (Cambridge Economic Policy Associates, 2017a).

Repeated Oireachtas questions from Ryan reveal that by the end of 2018 the government was not yet willing to prioritise technology-specific price support instrument for offshore wind (Roux, 2021q).

However, sustained discussions between the DCCAE, Eirgrid, CRU, and industry throughout the latter part of 2018 and into 2019 continued to sway the government from its strict cost competitive approach to the non-cost arguments for technology-specific auctions for OFW. Both Eirgrid and the wind industry took opportunities to advocate government (behind closed doors), and cross-party fora in the Oireachtas to send strong 'policy signals' to kick-start private sector investment in the industry. Here Mark Foley, the CEO of Eirgrid, makes the case with a cross-party group of TDs in the Oireachtas Joint Committee on Climate Action:

> *"The time has come for Ireland to embrace offshore wind at scale as a vital element in our fight to reverse the trajectory of carbon emissions from industry and society. ... We are trying to stimulate the policy debate so the Government can make a decision and provide policy direction. We thought that offering a view to stimulate that would be helpful rather than sitting back and waiting. ... Offshore wind will take many years to develop so the sooner we have the conversation, make some policy decisions and resolve regulatory and licensing issues, the sooner developers will start putting money into projects."*

Following the commitment to 70% RES-E by 2030 and the concomitant 3.5 GW of offshore wind, Bruton conceded: "In time, albeit probably not in the first auction, we will have to consider the requirement to have a dedicated pot for OFW to get the industry moving."

By the time the DCCAE published the final NECP in December 2019, judgements had aligned between civil servants, the government, Eirgrid, industry and the regulator to 'kick start' the OFW industry through several policy measures:

> *"[T]here was the realisation that a very strong message needed to be fed in, not just to the political system, but also into the regulatory and grid planning system. ... [We] had extensive dealings with [Eirgrid and ESB Networks] over the years and … took the view that we needed to focus some development offshore as opposed to onshore, and that we also needed to get a message into the transmission and regulatory systems that offshore is coming and you better start thinking about where it's going to be accepted and how we're going to deal with it in the market. … At that point in time it needed to get kick-started, basically."* (Civil servant 15pmi, 2022)

Shortly after the general elections in 2020, the new Minister for DCCAE, Eamon Ryan, confirmed his short-term priorities, including holding the first RESS auction in 2020 and scheduling the first technology-specific RESS auction for offshore wind capacity only by 2021.

4.5.12. The new target drives marine planning legislation reform

This section continues on from Chapter 4.5.5 (p. 168). By 2017, the Department for Housing Planning and Local Development (DHPLG) was still, officially, awaiting advice from the Attorney General on the Maritime Area and Foreshore (Amendment) Bill. However, privately some civil servants in the DHPLG had all but given up on a comprehensive marine planning bill, proposing to abandon the bill and revert to sectorial marine legislation to advance different sectorial interests (Civil servant 29pmi, 2021; Policy maker 18pmi, 2021). Marine planning was going nowhere and had barely progressed, potentially for years. In 2018, some policy makers acquainted with the work noted that the policy making in the area was still “in disarray” (Roux, 2021q).

However, during the course of 2018 a renewed push to progress legislation in the area commenced. The government consulted on a policy statement for marine planning and the previous bill was rebranded as the Marine Planning and Development Management Bill (MPDM bill) (Department of Housing Planning and Local Government, 2018a). Anticipation of a more coordinated government effort to support OFW as an essential part of the emerging 2030 climate change target, was a central driver in progressing work after nearly a decade of delay (Civil servant 29pmi, 2021; Roux, 2021q; Wind energy project developer 22pri, 2021). By 2019, the issue had been escalated to the Cabinet and the Office of the Toaiseach was coordinating legislative progress on this across departments (Policy maker 18pmi, 2021; Roux, 2021r). Notably, the agenda status of OFW (as part and parcel of 2030 climate change target attainment) was driving intensive cross-departmental collaboration between the DHPLG and the DCCAE on the components of the bill relating to offshore renewable energy consenting. The draft bill eventually entered the formal legislative process in the Oireachtas in 2021 and was enacted in 2022, falling outside the temporal scope of this study.

Prior to the government’s renewed interest in progressing marine legislation, time had also been running down on the deadline for submission of Ireland’s

Marine Spatial Plan (MSP) to the European Commission. By the end of 2017 an MSF function was established within the DHPLG and limited resources assigned to it. It issued a roadmap outlining a three-year process for publishing Ireland's MSP, which would be called the National Marine Planning Framework (NMPF) (Department of Housing Planning and Local Government, 2017). However, the NMPF would not solve the legislative problems for consenting OFW, nor would it be driven by OFW advocates. In due course, public bodies consenting marine development activities would be obliged to take into account the objectives in the NMPF as part of their decision-making processes. However, all of the legal complexities that had scuppered the marine planning bill, would still need to be dealt with through new legislation. The NMPF would be an additional policy on top of current and future consenting legislation; complying with the EU directive and fulfilling the aspiration of a strategic, integrated and plan-led approach by the state to use of the marine environment (Department of Housing Planning and Local Government, 2018b; Government of Ireland, 2021).

Throughout 2018 and 2019 DHLGH undertook an extensive and laborious process of public and stakeholder consultation to inform the draft NMPF. Two years later, it published the draft NMPF, along with Strategic Environmental Assessment of the framework, Appropriate Assessment and a Natura Impact Statement, for further public consultation.

Various stakeholders had collectively ensured that the objectives for offshore wind (and other ocean renewables) were transposed into the NMPF. The NMPF essentially compiled existing policy objectives for ORE from existing energy policies and draft legislation along with relevant 'planning policy' points. Policy points from the 2015 White Paper, Climate Action Plan, OREDP and its review, the government's Marine Policy Statement, and the draft MPDM bill all received due recognition. Alongside energy, it followed a similar template for the other marine sectors, including objectives and selected planning policy points for fisheries, defence, aquaculture, sport and recreation, mining, ports, telecommunications, and waste water treatment. Whilst noting the possibility of adverse and positive interactions between marine sectors, the NMPF did not seek to provide policy to resolve potential conflicts. One of the contentious issues was whether the NMPF should provide spatial designations or marine zones for particular activities. Following ‘critical consideration’ by the Advisory Group, a consensus emerged that the forthcoming MPDM Act would provide the legal bases for a system of designation of Strategic Marine Activity Zones (SMAZ). The draft proposal was that any line Ministry could propose a designation for such a zone for a particular activity, but that the Government would collectively decide on the adoption of such proposals, which would then automatically be included in the NMPF (Department of Housing Planning and Local Government, 2019a).

What is clear from the extensively documented consultation process is that an immense effort went into representing the objectives and key policy planning points from each of the marine sectors and consulting both stakeholders and individual citizens without interest in particular sectors (Department of Housing Planning and Local Government, 2018b, 2019b, 2019a, 2021). The process was not driven by any particular sector. The OFW sector ensured that DHLGH included the existing and emergent objectives from energy and climate policy, including the 3.5 GW offshore wind target by 2030. However, the NMPF process and draft document also did not seek to provide a legislative basis for resolving conflict between any sectors. Softening up an acceptable NMPF was more a matter of procedural diligence and compliance with the requirements of the European Directive. In the end it provided incremental progress to the ideal of a plan-led approach to marine development, but kicked the proverbial can down the road to the MPDM bill to resolve many key issues. The function that it performed for the OFW sector at the time was to generate a document with legal standing that functioned as a guarantor that sufficient effort had been made to consult the Irish public and affected stakeholders on the objectives of the ORE sector alongside other marine sectors.

Whilst the draft NMPF was open for public consultation the term of the Fine Gael-led government drew to a close and general elections were called for 2020. However, the NMPF had always been a policy almost entirely advanced by civil servants (Policy maker 18pmi, 2021). The NMPF would eventually be adopted in 2021, falling outside the temporal scope of this study.

4.5.13. Grid connection transitions to an ‘enduring policy’

This section continues on from Chapter 4.5.4 (p. 163). As noted, the unintended consequences of Gate 3 connection policy and several new ‘policy drivers’, provided the regulator with a powerful rationale to move away from large, infrequent gates (with less onerous entry criteria) to smaller, more frequent group processing that include more onerous entry criteria. Appendix H provides a detailed account of the development of the first Enduring Connection Policy (ECP-1). In this section I provide a summary of its implications for OFW.

In ECP-1, the regulator first used its established position on policy drivers to prioritize the connection of 'shovel ready' projects whilst 'laying the foundations' for more regulator batch processing, potentially annually from 2020 onwards (Commission for Regulation of Utilities, 2017b, 2018a). Having issued sufficient wind power connection offers in Gate 3 to meet the RES-E 2020 target, the focus was now on managing the cost-implications of this. This involved investment in existing generation capacity and new more flexible technologies, including storage. The invention of the concept of 'shovel ready projects' that could meet pressing policy objectives served to justify abandoning the long-held policy of processing grid connection applications for wind generators by date order [81]. ECP-1 prioritised connections for system services (under the DS3 programme) to reduce the curtailment of renewables, wholesale energy prices and a reduction in constraint payments. Shovel ready renewable generation connections would be identified as having planning permission and connection contracts would have longstop dates of 2 years (i.e. they had to be able to energise in two years).[73]

Whilst ECP-1 did not provide technology-specific preferential treatment for OFW, it did signal an important shift in the regulator's approach to connection policy that would ultimately serve OFW. As Dr Paul McGowan, chairperson of the Commission for Regulation of Utilities (CRU) responded to elected officials during an Oireachtas committee hearing:

> "Our approach to connections has changed and we have introduced a regular batch system, the purpose of which is to bring forward many of the projects that fit with the renewable energy support scheme the Government is initiating. ... [W]e will follow whatever is in the RESS system and try to facilitate that. It is a matter then for the Minister and the Department as to how that is designed. ... If offshore generation is part of that system, we will look at its efficient integration."

[73] OFW applicants were required to have a foreshore lease [180]. This ruled out all but two projects, Codling and Arklow Bank (which had obtained their leases in the early 2000s).

It did not take long for the CAP to commit the regulator to connecting 3.5 GW of offshore wind by 2030 (Government of Ireland, 2019a), and by March 2020 the regulator directed the system operator to process grid connection applications for the OFW projects deemed 'relevant projects' separate from the ECP batches (Gannon, 2020). For the first time, and after two decades, OFW projects did not have to queue along with thousands of onshore wind applications. The anticipation of forthcoming preferential treatment in the auction regime (i.e. a technology-specific auction) was a sufficient reason for the regulator to construct an ad hoc technology-specific connection policy.

4.5.14. The mismatch between interconnection policy and OFW ambition

In this section, I provide a description of the development of two interconnector projects, the Greenlink and Celtic Interconnector, over the period 2011 – 2020 and how this drove the regulator to develop more coherent, if still piecemeal, interconnection policy. Secondly, I show how the statutory duties of the regulator and the TSO under the 1999 Act and EU regulation circumscribed their policies and the role of government in policymaking. Taken together, this demonstrates how the promise of a massive OFW resource failed to drive more ambitious interconnection with neighbouring markets, and how the planned interconnection was formed by rationales completely separate from an aim to establish Ireland as a net exporter of electricity from OFW. Ultimately, this demonstrates how greater interconnection failed to drive OFW deployment in Ireland and vice versa between 2011 – 2020.

Between 2011 and 2016, progress on regional interconnection in the North Sea via the NSCOG Initiative failed to create political impetus in Ireland. However, the first signs of substantive national interconnection policy emerged in 2015, driven henceforth by two project proposals: the Greenlink interconnector between Ireland and Wales, and the Celtic interconnector between Ireland and France. Aligning the peculiarities of these two projects, Ireland's peripheral location, and the statutory obligations of the regulator and the TSO, would circumscribe acceptable terms for Irish interconnection policy. Ireland's geographic remoteness from continental Europe significantly increased interconnection costs, which in turn constrained viable business models for constructing and operating such connections and drove a policy based on demonstrable economic benefit. A heuristic was that interconnection between

Ireland and France would be ten times more expensive than a comparative connection between two continental neighbours.[74]

Eirgrid followed its 2009 economic feasibility report (refer to Chapter 4.3.4) with bilateral discussions with the French TSO, réseau de transport d'électricité français (RTE), on joint studies to better define the costs and benefits of potential interconnection. They added a proposed interconnector of 700 – 1,000 MW to the list of projects of 'Pan-European Significance' in ENTSO-E's 2012 Ten Year Network Development Plan (TYNDP) (ENTSO-E, 2012). In 2013 the project was designated as a Project of Common Interest (PCI) under the new EU Regulation 2013/347 within the Northern Seas Offshore Grid Priority Corridor (European Parliament; European Council, 2013).[75] The TYNDP and consequent PCI status afforded the project several benefits. In 2014, it formed part of ENTSO-E's Cost Benefit Analysis (CBA) of all PCI's. This provided an independent assessment of the project's net benefit across a range of new European network development scenarios for 2030, created by ENTSO-E and consistent with the EU's Energy Roadmap 2050 (ENTSO-E, 2014). The PCI status also qualified the project to apply for grant funding from the Connecting Europe Facility (CEF). In 2015 Eirgrid and RTE commissioned an integrated feasibility study, with 50% of the costs funded by the CEF (Eirgrid, 2016). The study undertook marine surveys, preliminary design studies and commercial, legal and governance aspects for a 700MW, 320 kV – 500 kV connection between La Martyre in France and Great Island or Knockraha in Ireland (Innovation and Networks Executive Agency, 2016).

At the same time as Eirgrid was progressing development of the Celtic Interconnector, a private sector promoter was progressing a proposal for another interconnector to the UK. Greenlink was the first interconnector project between Ireland and the UK proposed by a private promoter with private debt

[74] Eirgrid and RTE argued that a 400 kV AC line of around 50 km could connect two continental countries as a touchstone for thinking about the additional cost of connecting France and Ireland and to underscore the case for significant EU grant support.

[75] "Projects of common interest benefit from accelerated planning and permit granting; a single national authority for obtaining permits; improved regulatory conditions; lOFWr administrative costs due to streamlined environmental assessment processes; increased public participation via consultations; increased visibility to investors. They also have the right to apply for funding from the Connecting Europe Facility (CEF)." - https://energy.ec.europa.eu/topics/infrastructure/projects-common-interest/key-cross-border-infrastructure-projects_en#the-pci-list

and equity finance. The promoter, Element Power, aimed to develop a viable hybrid model, partially financed through private debt and equity, and partially financed through regulated tariffs from electricity consumers.[76] Greenlink obtained an interconnector licence for the GB system in February 2015 and provisional (in principle) approval for a 'cap and floor' charging regime by September (Crouch, 2015). By the end of 2015, Greenlink was also a designated PCI on the EU's updated list (PCI 1.9.1) (European Union, 2015).

As the two project proposals progressed, a series of policy problems unfolded that threatened to delay project development, particularly for Greenlink. The first centred on Irish consumers partially underwriting a merchant-led interconnector project through a cap and floor charging regime. The second issue centred on the interaction between Greenlink and Celtic and the extent to which either project would erode the public interest case of the other. The third issue centred on creating a separate connection policy for interconnectors. By the time the Greenlink and Celtic projects started raising these policy and regulatory challenges, the Irish regulator was subject to EU law and regulation that require it to treat infrastructure projects with PCI status in particular ways.

EU Directives and regulations would largely set the course of Irish interconnection policy. The EU's 2013 Regulation on PCIs required national regulatory authorities to streamline permit granting procedures, reduce permitting duration, and increase public participation for projects with PCI status, giving them "the most rapid treatment legally possible" and "the highest national significance possible" within the permit granting process (European Parliament; European Council, 2013). The European Council Decisions on the 2030 climate and energy framework set the targets for how much interconnection member states would have to achieve by 2020 and 2030; 10% and 15% respectively (General Secretariat of the Council, 2014).

By 2015, policy drivers at a regional level had started spilling over into Irish connection policy. Whilst the projected margin between generation and demand within the all-island market remained the key influencer of connection policy,

[76] Throughout the period, there was no proposal for an interconnector from Ireland to a neighbouring market on a 'merchant model' – i.e. fully reliant on congestion revenues (with the owner bearing all the risks of cost recovery). Such a model was almost certainly not economically viable.

interconnection policy across Europe started playing an important role. In Gate 3, the regulator decided to process conventional generation capacity and interconnection applications as part of the Gate 3 batch of connection applications (more info in Section 4.3.3). However, by 2015 the regulator proposed treating interconnector connection applications differently from generation and demand applications due to the provisions of the Third Energy Package, EU network codes and projects with PCI status, all requiring preferential treatment of electricity interconnectors (Commission for Electricity Regulation, 2015b).

By August 2016 the regulator had decided to separate the consideration of interconnector applications from grid connection applications, and hosted a public consultation on how it may proceed with interconnector policy (Commission for Electricity Regulation, 2016). However, by the end of 2017 no detailed policy was forthcoming. Instead it directed Eirgrid to consider grid connection applications for any interconnector project with PCI status (Commission for Electricity Regulation, 2017b; Melvin, 2017). In practice, this was a direction to process the grid connection application for the Greenlink project. The path-dependency that the Gate policy created for connecting wind generation (Section 4.3.3) did not encumber the creation of a new category or queue for connecting interconnectors. The regulator, generally averse to decisions that may spur legal challenges, did not ask for a formal policy statement from government to support this decision. Compliance with European law and regulations were sufficient reason to change policy unilaterally.

Whilst connection policy for interconnectors proved simple, the CRU did not manage to progress incentive policy for interconnection by the end of 2017. It had not proactively worked out how to deal with incentives for merchant interconnector projects, opting intentionally for a wait and see approach, reactive to the peculiarities of any proposal Element Power would put to it for Greenlink (Commission for Electricity Regulation, 2015a; Commission for Regulation of Utilities, 2018c). For the East-West Interconnector it had used a ‘capital asset pricing model’ which assessed Eirgrid’s proposed interconnection asset and calculated a ‘fair return’ in the form of a risk weighted average cost of capital (WACC) for Eirgrid (Commission for Electricity Regulation, 2015a). Originally, it proposed considering the same approach for merchant-owned interconnection assets, whilst reviewing alternative incentive models in other jurisdictions, such as the ‘cap and floor model’. However, until the Greenlink proposal, it remained undecided on whether Irish electricity consumers should bear any of the risk associated with specific merchant-owned interconnector projects.

By the end of 2017, Ireland had no substantial interconnection policy against which to assess the Greenlink application. However, the principle of maximizing societal welfare and the methods for calculating the net welfare impact of individual interconnectors had become institutionalised through the construction the Ten Year Network Development Plan (TYNDP) and development scenarios out to 2030 (consistent with the 2050 energy roadmap). Further methodological guidelines for conducting economic Cost Benefit Analysis (CBA) for interconnectors grafted on to the aforementioned plans and scenarios offering both a harmonised energy system-wide cost-benefit analysis at the union level and solutions for member states assessing the peculiarities of project proposals within their jurisdiction. CRU would adopt these principles and guidelines in assessing Greenlink. However it did not have sufficient confidence in the policy context to make a unilateral decision on the charging regime for Greenlink. In 2018 it would ask the government for an explicit policy statement on interconnection in this regard. I continue this narrative in Section 4.5.14.

The submission of the Greenlink application in the context of European Directives and Regulation precipitated a response from the regulator. However, at that point it felt it lacked sufficient direction from government on a charging regime. Government would have to issue a policy statement in this regard which precipitated further public consultation in January 2018 and a policy statement in June 2018. I commence the narrative for this and subsequent policy development and its link to OFW deployment in Section 4.5.14.

The NSCOGI continued its analytic work following the landmark MoU in 2010 (refer to Section 4.3.4) Following the MoU, NSCOGI members progressed technical analysis through working groups focused on offshore infrastructure, market and regulatory issues, and planning and permitting. Ireland co-chaired the working group on Market and Regulatory Issues with the UK. The 2012 NSCOGI cost-benefit evaluation indicated an overall net-gain for a coordinated regional grid, with the island of Ireland benefiting from electricity production cost savings of approximately €440 million annually. Ireland would be a net-importer of electricity via two new hypothetical connections to France and the UK respectively, even with ambitious assumptions on installed offshore capacity by 2020 and 2030. Ireland would essentially export wind that would otherwise have been curtailed, and import cheaper electricity from Europe (from hard coal, lignite and nuclear) during peak demand periods, displacing expensive gas peakers (*The North Seas Countries Offshore Grid Initiative: Final Report Working Group 1 - Grid Configuration*, 2012). However, over the period, the prospect of greater regional interconnection did not feature prominently on the Irish political agenda, nor did it provide a tangible export market opportunity to drive OFW up the political agenda. In 2016, Minister Naughten signed Ireland up to the NSCOGI Political Declaration alongside the other member states, but this failed to draw much interest from the Irish government, civil service, regulator or system operator:

> *"It didn't really have much bearing on the cabinet agenda... The North Seas initiative had been around for quite a long time, However, it wasn't well supported uniformly by participating countries in terms of coherent analysis. So it didn't really become much of a useful player in the overall scheme until very recently."* (Policy maker, Interviewee 09pmi)

Between 2016 and 2018 Eirgrid and RTE, again with CEF co-funding, completed technical design-related studies, agreement on legal governance, financing strategy and contract preparation for engineering, procurement and construction work (European Commission, 2016). In September 2018 Eirgrid submitted its funding request to CRU (Eirgrid, 2018a) and in December formally notified An Bord PleanálaAn Bord Pleanála that it would commence the permit granting process (Eirgrid, 2018b).

In 2017, Element Power applied to CRU to determine that it was in the public interest for Greenlink to be part of the Irish transmission system, and to approve the proposed charging methodology (Ludlam, 2017). Although Element Power had initiated work on the Greenlink proposal after the Celtic interconnector, it had drawn ahead in its funding submission to the CRU by 2017. This would be the first time the regulator had to perform a revenue review for a proposed asset owned by a merchant, and not by ESB Networks or Eirgrid (the 'network owner' or 'network operator').

By November 2017, the European Commission's Expert Group on Electricity Interconnection defined "maximizing social welfare" as the "underlying principle" for national regulatory authorities to decide on individual interconnection projects along with substantive technical (European Commission Expert Group on Electricity Interconnection Targets, 2017). It defined this underlying principle in terms of several criteria and formulas to guide national governments, regulators and TSOs in progressing towards the decadal targets and prioritise the urgency of interconnecting particular neighbouring markets. Most importantly for Irish interconnection policy, it reinforced the central necessity of producing robust economic Cost Benefit Analysis at the project level according to the new methodological guidance issued by ENTSO-E:

> *"As the ultimate condition and irrespective of any minimum interconnection target, in the Expert Group's opinion, each planned interconnector should demonstrate that its benefits to society outweigh its costs. … Therefore, planned interconnectors should always be accompanied by a thorough cost-benefit analysis (CBA) test as a prerequisite for any investment decision in line with the methodology developed by ENTSO-E as part of the Ten-Year Network Development Plan and selection of Projects of Common Interest."* (European Commission Expert Group on Electricity Interconnection Targets, 2017, p. 33)

In December 2017, Element Power submitted its application to CRU to decide whether it was in the public interest to include Greenlink in the Irish transmission system and to approve a cap and floor charging regime for the interconnector. Element power asked CRU to adopt a symmetrical regime to the UK cap and floor decision. Most of the cap and floor regime was ultimately aimed at supporting bankability on a project-specific basis. Baringa Partners LLP assessed the social welfare of the Greenlink interconnector. The CBA was based on the assumption of a homogenous cap and floor regime applying to the entire project capex and revenue and split 50/50 between consumers in GB and Ireland. The promoter argued that their modelling demonstrated a fundamentally different business model for interconnection where most value is derived from increasing the ability of two markets to integrate intermittent wind through frequent changes in flow patterns across the interconnector. Any CBA would therefore be highly sensitive to the amount of variable renewables (particularly wind) integrated into the respective systems under future scenarios. In two of the three scenarios that Baringa modelled, Greenlink produced a positive impact to net welfare across GB and Ireland. Across all scenarios the projected gain for Irish consumers more than offsets the potential losses to Irish generators and the owners of other interconnectors, ranging from €200 million in the most conservative (low renewables penetration) scenario to €2.5 billion in the most optimistic scenario. However, the net benefit was also sensitive to the introduction of another interconnector, like the Celtic interconnector. The CBA found that the Celtic interconnector would erode projected consumer gains from Greenlink due to imports from France driving down costs for consumers, but Greenlink would still drive some welfare gains through wholesale market revenues for renewable generators. The promoter argued that the CBA demonstrated strong economics with a cap and floor regime, with the project making payments to consumers at the cap under higher renewable penetration scenarios, and consumers making only small payments to Greenlink under a low renewables future.

This would be the first time the regulator had to perform a revenue review for a proposed merchant-owned interconnection asset. It requested the government to issue a detailed policy statement on interconnection, in addition to the high-level ambitions noted in the 2015 White Paper. Clearly, the White Paper and EU directives and regulations did not provide sufficient certainty and detail for CRU to execute its regulatory function whilst tensions between national interest and aims of the regional internal energy market had been noted (ESRI, 2018). The DCCAE issued a public consultation in 2018 and finalised a national policy statement by June 2018 (Department of Communication Climate Action and Environment, 2018c, 2018b). By this point there was general agreement that the greater the scale of electricity demand and renewable electricity ambition, the higher the level of interconnection needed and that interconnection capacity had to be calibrated to Ireland's 2030 RES-E target. This target was still being developed at the time (refer to Sections 4.5.8 and 4.5.10). In its 2017 scenario planning, Eirgrid had estimated that Ireland required 500 to 1950 MW of interconnection by 2030 in order to deliver on its renewable energy ambitions. However, RES-E ambition was increasing rapidly during 2018 and 2019. The crux of the policy issue came down to what the appropriate amount of investment in interconnection infrastructure needed to be and the methodology for determining this. The government noted:

"The Department considers that if the Irish electricity consumer is to underwrite – or part underwrite – the costs associated with electricity interconnection, then there must be a supporting evidence base underpinning the public investment decision. … [It is expected] that the CRU adopts a transparent approach to its assessment process and decision. … Fundamentally important too is that Ireland invests in the appropriate amount of interconnection to meet system, market and future policy needs. … Should investment levels be too low, then security of supply is threatened. So too is investor confidence. However, if too much investment is made, then costs for consumers are increased, potentially up to a point where competitiveness is challenged."

The regulator's policy would be to facilitate sufficient interconnection to maintain security of supply and investor confidence, whilst limiting cost to consumers. Methodologically, the national policy statement directed it to follow the guidance set out in EU Regulation 347/2013 assessing PCIs based on a harmonised energy system-wide cost-benefit analysis at Union level and the approach proposed by ENTSO-E's TYNDP. The regulator would assess the impact of each proposed interconnector on the wider energy system, including competition between interconnection and Irish generators and how scarce transmission grid capacity is allocated. The regulator would determine the public benefit of each interconnector proposal through its impacts on Irish energy policy, the electricity market and system. It would have to do this through the building of several long-term scenarios of the Irish energy system, with sensitivity analysis to demonstrate a robust case across different futures.

The above requirements set the bar high for project promoters. For instance, in order to assess the application (and accompanying CBA) that the Greenlink promoters submitted, CRU commissioned another consultancy, CEPA, to perform a separate CBA based on ENTSO-E TYNDP scenarios and its own assumptions.[77] CRU's analysis differed from Element Power's on a few technical points. For instance, in its conservative decarbonisation scenarios Greenlink would fail to benefit Irish consumers. However, the overall results were consistent between the two assessments and the regulator decided that the Greenlink proposal did pass the public interest test. It also agreed that another interconnector to France would significantly reduce consumer benefits from Greenlink.

[77] CRU utilised ENTSO-E TYNDP 2016 scenarios for one scenarios and draft 2018 scenarios for two more Greenlink scenarios.

The economic assessments of Greenlink and Celtic demonstrated the complex distribution of costs and benefits over a spread of future scenarios and consumers, generators and system operators in different markets. Interconnection could not be justified on the long-term aspiration of exporting significant amounts of OFW. Below I provide selected findings from the Celtic interconnector to demonstrate this. In 2018, Eirgrid and RTE completed the pre-consultation analysis for the Celtic Interconnector. Eirgrid formally notified An Bord Pleanála that it would commence the permit granting process (Eirgrid, 2018b) and submitted a funding request to CRU (Eirgrid, 2018a). The funding request, a 113-page document, demonstrates the details of the justification for further interconnection and provides a helpful demonstration of the socio-economic considerations needed to secure the required regulatory approval for financing additional interconnection. In terms of my research study framework, it demonstrates the framework and the exact specifications for a technically feasible and normatively acceptable solution for interconnection. In the case of OFW, it shows the connection between Eirgrid's expectations of future electricity transmission scenarios, the final technology specifications for the infrastructure, and the demonstration of costs and benefits of interconnection and how these might accrue to different actors. It also demonstrates the constraints under which financial viability had to be demonstrated and the conditions for rendering the project financially viable. I will therefore describe this in some detail.

In general terms Eirgrid justified investment in interconnection based on several but related arguments. Firstly, increased electricity trade with France would result in downward pressure on the cost of electricity for Irish consumers. Secondly, it would demonstrably enhance security of supply through diversification of generation sources and an additional supply of power. Thirdly, it would facilitate the development of variable renewable sources in Ireland and thus contribute to national emissions reduction. Central to bringing these general claims together in a request for funding was presenting a positive economic Net Present Value (NPV) for the project across different planning scenarios for 2030. The NPV would monetize the value of security of supply, socio-economic welfare and system losses, but not certain externalities. The promoters used four scenarios developed in the ENTSO-E TYNDP 2018.[78] Similar to policy scenarios utilised by energy systems modellers (see Chapter 4.5.2 and 4.5.10) each scenario consists of imagined interaction of economic parameters (including economic growth, fuel prices, and CO_2 prices), a generation portfolio, and electricity demand forecast (including the impact of efficiency measures, rate of growth, and the shape of demand curve) over multiple time horizons out to 2030.

The economic NPV was very sensitive to the scenarios and varied greatly between the two jurisdictions for each scenario. Across all imagined futures, Ireland had a positive NPV, implying no foreseen risks for Irish consumers. However, France had negative NPV for two of the four scenarios, with a negative NPV on average across the four scenarios. Particularly in the scenarios where progress towards climate and energy targets were slower, or where large gains in energy efficiency drove down demand, the economic NPVs were significantly lower primarily due to over-capacity. The assessment concluded that if costs were shared equally between the project promoters and benefits accrue as projected, France would be subject to net negative impacts in the “EUCO” and “Slowest Progress” scenarios as well as on the average of the four base case scenarios. The Celtic Interconnector carried a noteworthy risk for French consumers.

Table 9: NPVs for France and Ireland when SEW, Losses and SoS value are monetised (assuming a 50/50 split in costs)

NPV (M€)	Sustainable Transition	Distributed Generation	EUCO	Slowest Progress	Mean Value
France	70	15	-235	-180	-83
Ireland	420	260	215	145	260

Figure 19: Summary of Net Present value in € millions for the Celtic Interconnector across four imagined futures. Source: (Eirgrid, 2018a)

[78] This included a ‘Sustainable Transition’ scenario that sought a ‘quick and economically sustainable’ pathway to reaching the EU goal of 80-95% CO2 reduction by 2050; a ‘EUCO’ scenario that modelled the achievement of the 2030 climate and energy targets as agreed by the European Council in 2014, and included an energy efficiency target of 30% (EUCO utilises a scenario from the PRIMES model and the EU Reference Scenario 2016 as a starting point); and a ‘SlOFWst Progress’ scenario where there would be no European decision on how to reach the CO2-emission reductions and the 2030 electricity generation mix would not be on track to meet the 2050 goal.

Furthermore, the surplus benefits that would accrue to consumers and producers would vary widely between scenarios and between the two jurisdictions.[79] This distribution of net benefits was estimated at 35% for France and 65% for Ireland. By far the largest surplus would be for Irish consumers amounting to 85 % of the overall economic surplus from the project. Furthermore, increasing wind penetration on the Irish grid would increase the surplus to Irish consumers at the expense of French consumers. In France, the remainder of the surplus would largely accrue to producers and TSOs (through congestion rent). Furthermore, any further interconnection between the UK and Ireland would totally erode the surplus accrued to Irish consumers from the project.

Table 33: Surplus analysis for base case and increased IE-GB interconnection and SEM wind sensitivities

	France			Ireland		
M€	**Base Case**	**Increased GB-IE (+0.5 GW)**	**SEM Wind**	**Base Case**	**Increased GB-IE (+0.5 GW)**	**SEM Wind**
Consumer	-2	-20	-33	47	-38	69
Producer	19	42	53	6	83	-15
Rents	20	11	14	4	-10	-2
Total	**37**	**33**	**34**	**55**	**35**	**53**

Figure 20: Summary of surplus analysis for the Celtic Interconnector between the Base Case Scenario and a scenario with further interconnection between Ireland and the UK. Source: (Eirgrid, 2018a).

The economic benefit of the Celtic Interconnector largely resulted from the improved integration of variable renewables on the all-island grid and access for Ireland to the competitive continental market. During periods of high wind generation in Ireland, it could export this rather than curtail it, and during peak demand periods in Ireland, it could import cheaper electricity from the continental market offsetting higher cost thermal generation in Ireland (Figure 21).

There was an additional positive but non-financial externality to the Celtic interconnector: European solidarity and unity in response to Brexit. After Brexit Ireland would lack interconnection with any EU states if it did not complete the Celtic interconnector. Interconnection with at least one EU member state was

[79] These are surpluses in € millions for Socio Economic Welfare (SEW), Security of Supply (SoS) and

necessary to deliver on the fully-integrated common electricity market and Energy Union.

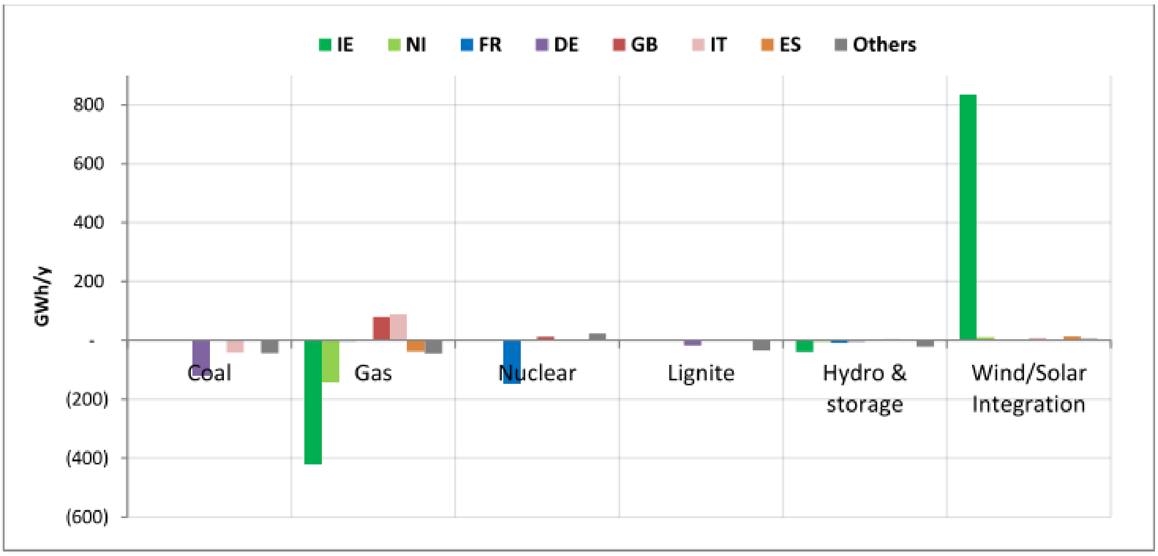


Figure 9: The effect of the Celtic Interconnector on different fuel types for Sustainable Transition

Figure 21: The effect of the Celtic Interconnector on different fuel types for Sustainable transition scenario. Source: (Commission for Regulation of Utilities, 2018b).

Finally, the assessment demonstrated that despite its economic benefits and positive externalities, the project was not financially viable. The Celtic assessment also highlighted other important constraints. It limited interconnector capacity on the Irish side to make large grid reinforcements or operational changes unnecessary. In spite of this, the project had a negative Financial NPV and negative Financial Internal Rate of Return, proving commercially non-viable for both RTE and Eirgrid. Eirgrid and RTE estimated that the interconnector would cost € 930 million and assumed a 50/50 ownership and cost share arrangement. Over the lifetime of the project, Eirgrid would lose € 137 million (FIRR of -5.7%) and RTE €147 million (FIRR -4.7%). The full investment cost would be a burden on Irish consumers, given the relatively small size of the Irish market, through increased transmission tariffs and reduce the economic benefits in terms of electricity price reduction. All of the above, taken together, were sufficient for EirGrid and RTE to justify the maximum available support from the European Union: 50 % of the project cost and the limit of CEF funding which could be mobilized for a PCI.

It took the regulator and the TSO several years to approve Greenlink's funding regime. The extent and nature of delays were such that the UK regulator, Ofgem, granted Greenlink a reprieve on their deadline to access the GB market under *force majeur* (Borland, 2021). The CRU clearly did not have the requisite capacity to process interconnection applications in a timely manner alongside its other regulatory functions.

What the Greenlink and Celtic cases demonstrate are the complex constraints that project promoters (whether TSO or merchant) faced in justifying additional interconnection to the regulator in the context of liberalising and interconnecting regional markets. I did not find evidence that larger investments in interconnection to establish Ireland as a significant net-exporter of OFW would pass the public benefit test and entice continental counterparties.

For mass offshore wind export, squaring the circle of who pays and who gains had not yet been solved. A demonstration that Irish consumers would benefit from further interconnection or that, even if the direct beneficiaries would be generators, there was a way to redistribute costs and benefits between tax payers, generators and the transmission system operator. Furthermore, work to secure necessary counterparts in the UK or mainland Europe to such interconnection also appear lacking. The case for the Celtic interconnector demonstrates a few necessary conditions for interconnection between France and the European continent. Firstly, a counterpart in Europe (this time France) with a TSO willing and able to take significant risk on behalf of consumers on its national grid when the immediate financial benefit are uncertain or ambiguous, even if generators in its jurisdiction are likely to benefit. This case does not demonstrate what would happen if generators in a neighbouring jurisdiction would be significantly disadvantaged by cheaper electricity from Ireland. Secondly, significant grant funding is necessary to bridge the gap between the financial NPV (which may well be negative for more costly interconnections directly to the European continent) and the economic NPV, which may be positive but vary significantly for one or more of the parties to the interconnection.

A shorter and less costly interconnection to Wales could be driven by private investment in virtue of a positive NPV of such a project and sufficient return to investors. Yet public grant funding was still important in the early phases of project development when uncertainties and risks were too high for private capital. However, the source of these public grants coming from the EC practically circumvented the Irish state and there was little political interest in the project.

The expectation of higher penetration of variable renewables drove the case for interconnection, but this had significant public benefit under both high uptake of renewable scenarios (to meet ambitious emissions targets) and lower or slower uptake of renewables. The case for the 700MW interconnector stood regardless of whether Ireland met its 2030 target or not, although the higher the penetration of VRE the higher the benefit to Irish consumers. All considered scenarios showed a benefit and hence there were no noteworthy risks to Irish consumers. The project also demonstrated the allocation of responsibilities between the various institutions under Irish electricity legislative and policy regime. The planning of interconnection was wholly in the domain of the private sector or the TSO. Government could provide a policy signal through climate and energy policy in general, largely by driving policy and legislation on emissions reduction and support for renewable generation. However, it was up to the TSO to assess how this translates into the need for further interconnection.

If interconnection didn't keep up with the decadal scenario planning it would therefore send a negative signal to the government and the generation market, but interconnection would not be a 'pull factor' in opening a window for OFW directly. Progression on the Celtic Interconnector and Greenlink provided assurance to government and the generation market that new OFW would not face significant curtailment.

By the end of 2018, the rationale for OFW provided by Eirgrid was still solely to meet national demand by 2030, and its rationale for interconnection to make a future with high variable renewable penetration on the all island system more economically for consumers. In October 2019 the European Commission announced that it would provide €530 million in grant funding to the Celtic interconnector project, with Eirgrid receiving 65% of that and RTE 35%.

The detailed investment request that Eirgrid developed and submitted to the regulator reveals the rationale for undertaking further interconnection in detail. It exemplifies the kind of rationale provided for the east-west interconnector as well.

In Ireland, over the period, slow and incremental progress characterized interconnection. This lagged behind the significant acceleration in renewable energy and climate change target setting. Interconnection policy was the preserve of the regulator and largely driven by the TSO's interests.

Over time, some politicians increased their understanding of the economics of interconnection. Debates between the Green Party (as opposition) and the government largely revolved around the lack of ambition of interconnection. But calls from Green Party TDs for greater ambition on interconnection and an offshore transmission network, had no influence on the government, TSO or regulator agendas.

4.6. Case 3: process tracing result summary

The explanation for OFW's rise on to the political agenda in 2018 bears little resemblance to 2007. Figure 22 summarises the causal mechanisms and contextual conditions for Case 3 along with an interpretation of these in terms of MSF concepts.

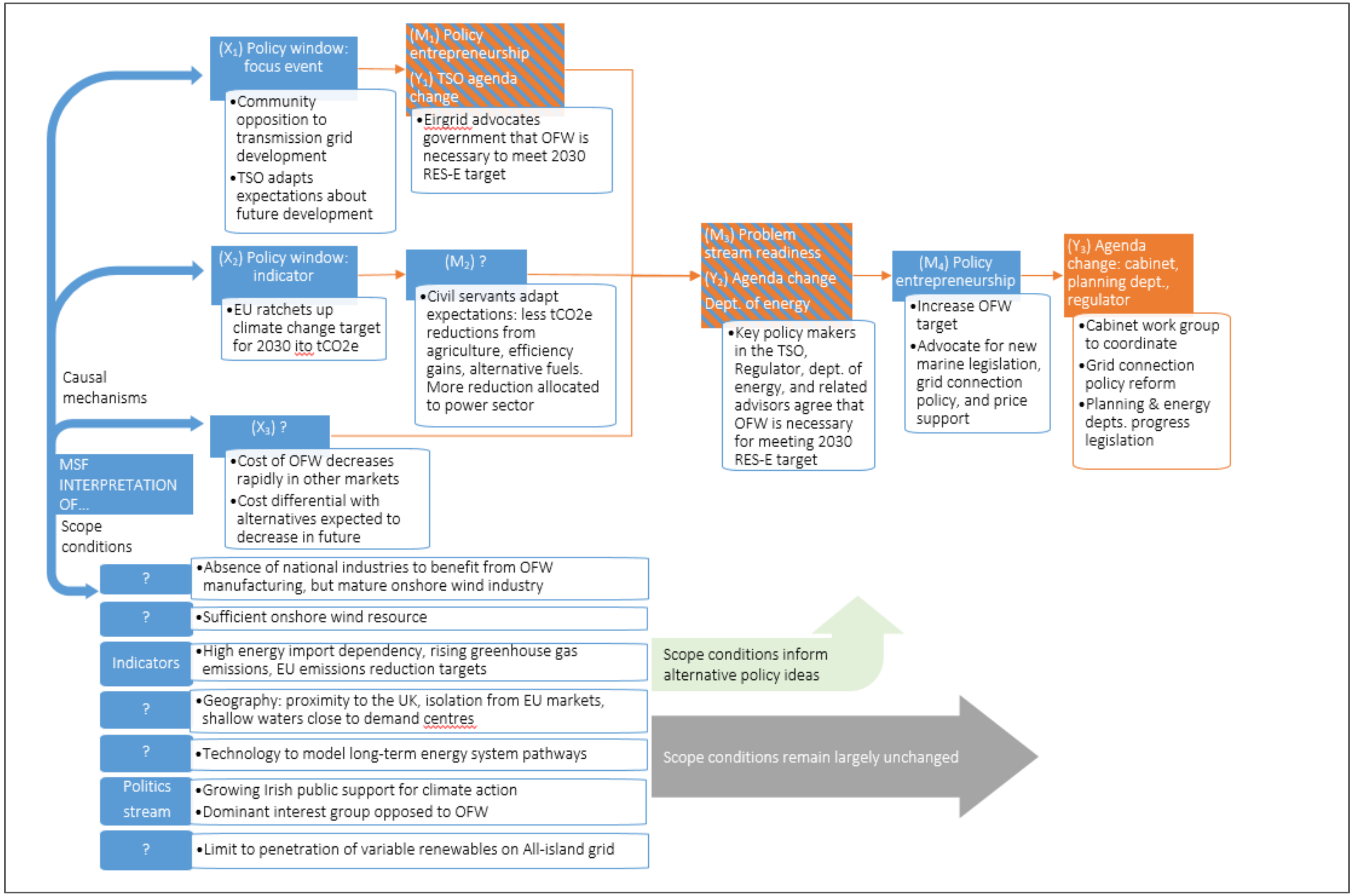


Figure 22: Case 3 summarized as causal mechanisms and scope conditions with Multiple Streams Framework interpretation. ? = MSF does not provide a generic interpretation of mechanism or condition.

In 2017, actors within the TSO were the first to start advocating the prioritisation of policy support for OFW. They had three reasons for doing this. Firstly, their long-term grid development plan, largely aimed at connecting more onshore wind to the all-island system, was lagging far behind schedule due to opposition from affected communities. Secondly, they expected that the government would adopt a new, more ambitious decadal RES-E target for 2030. At this point, policy makers were considering a 55% RES-E target. Thirdly, the most feasible sites for OFW lay close to demand centres and existing transmission infrastructure in the east of Ireland. Grid planning specialists and senior executives in the TSO convinced civil servants that OFW was a necessary part of the generation mix to reach the proposed 2030 target, given the social resistance it was likely to face extending the grid westward onshore. For the TSO, the much shorter path between demand centres and east coast OFW sites was clearly very seductive, even if at that point the wind industry in Ireland was not supportive of a pivot in policy.

By the end of 2017, the ESRI gave further support to the TSO's case for diversifying the renewable energy generation mix, when its analysis concluded that a diversified scenario with OFW would only be moderately more expensive than a strict least-cost capacity expansion by 2030. The Irish policy community was taking note of declining costs of OFW in the UK and updating their expectations that the price differential between offshore and onshore wind would continue to decrease.

Towards the end of 2017, civil servants were updating their expectations about the feasible policy alternatives for reaching the national 2030 climate change target (to meet a carbon budget of 378 $MtCO_2e$). Up until the second half of 2017, the accepted pathway to the 2030 target largely rested on increasing energy efficiency in the services, residential and transport sectors, which would require less renewable capacity by 2030 than was required to meet the 2020 target. However, shortly after civil servants abandoned this pathway, because they deemed it unfeasible to achieve the energy efficiency gains. Emissions reductions in other sectors may have been cheaper, but not deemed feasible. Relative to other sectors, the power sector was the only sector where the state could point to a success story. Simultaneously, the onshore wind industry remained bullish about the prospects of onshore wind (notwithstanding the TSO's challenges). Industry analysis indicated that a 70% RES-E target was feasible by 2030, largely by increasing onshore wind generation capacity, and could be cost neutral to consumers compared to a 40% RES-E scenario. Ultimately, a few civil servants in the department of energy made a judgement that the electric power sector was the area where government policy could have most leverage to drive decarbonisation, and that consequently renewable generation capacity would have to make a larger contribution to the 2030 national emission reduction target than had been previously proposed.

Civil servants, under pressure to find pathways to meet the mitigation reduction target, struck a compromise: The TSO had to accept a higher RES-E target than it had previously been willing to, and the wind industry had to accept a pivot to OFW as recommended by the TSO.

The above sequence coincided with a shift in public support for more ambitious climate change action that picked up in 2016 and lasted throughout the government's term (refer to Appendix A). However, there was not yet a public opinion or mood on the topic of OFW. Rather, public pressure was building more generally on the government to find policy solutions for decarbonisation in line with Ireland's commitment under the Paris Agreement. However, the study did not uncover causal mechanisms from the citizens assembly on climate change and general increase in public support for climate action to support for OFW. This appeared to function more as a scope condition than a causal mechanisms in bringing OFW on to the political agenda.

The complex process that eventually elevated OFW on the political agenda could also potentially be collapsed into a single causal mechanism: Agreement between several key actors within the policy-making community, across several institutions, that OFW was a necessary and significant part of the solution to reach a decadal decarbonisation target. Different actors had different, but sometimes overlapping, reasons for thinking OFW to be a solution, based on how the decarbonisation target affected their institutional objectives. Agreement between the system operator and civil servants were central. Over a period of roughly two years, through sustained discussion, scenario planning initiatives, commissioned reports, and expert judgements a shared problem framing grew within the policy community, and largely separate from (and running ahead of) the objectives and priorities of government and the discourse of elected officials at the time.

It is highly unlikely that OFW would have risen on the agenda at the time if the TSO had managed to develop the onshore grid according to plan and if it expected it could facilitate the proposed RES-E target purely through onshore grid development. In Ireland, commercial onshore wind was the least-cost renewable generation option, Ireland had a sufficient onshore wind resource to meet a 70% RES-E target, and the mature onshore wind industry drove an extensive pipeline of project development. It is also highly unlikely that OFW would have risen on the political agenda at the time if civil servants in the department of energy were not tasked with submitting a plan (draft by December 2018) for meeting a legally binding decadal emissions reduction target. It was the timeline as well as the ambition of the target, agreed by EU member states, which created the urgency in the civil service to find policy solutions. It is also unlikely that OFW would have entered the political agenda if the civil servants remained confident that the state could develop and implement policies for a ‘least cost’ decarbonisation pathway as per the modelling for the NMP (2017). For several years, the Irish energy modelling community had proposed an ‘all energy system least cost’ pathway, largely based on energy efficiency gains, and the increased use of biofuels for reaching national energy targets. These pathways did not require new generation capacity between 2020 and 2030, and only required OFW in very high mitigation scenarios towards 2050. For several years, civil servants accepted these pathways, which formed a large part of the evidentiary basis for the 2015 White Paper on Energy and the 2017 NMP. However, by 2018, civil servants no longer believed these pathways to be technically feasible or socially acceptable.

As with the previous cases, there are some causal mechanisms and scope conditions for Case 3 that is not easily interpreted into MSF concepts. I return to the question of a wider interpretation of the results in terms of agenda setting theory in the discussion chapter.

5. QCA analysis

In this chapter I present the results of the QCA analysis of necessity and sufficiency. I first present the full QCA dataset, followed by the pre-analytic diagnostics, before turning to the results of the analysis. This analysis *partially* answers research questions two and three (RQ2 and RQ3) and the second objective of this study, namely to offer a more general explanation of the conditions that can elevate offshore wind on political agendas (or keep it off agendas) and drive decision-making.[80]

To perform the QCA I utilise two key packages in R, Set Methods and QCA (Oana and Schneider, 2018; Dusa and Adrian, 2019). All of the R code used to run the analysis is available in the supplementary files folder.

5.1. Calibration

Table 8 presents the QCA dataset generated for this study. The qualitative data that provided the evidence base for the preceding process tracing cases in Chapter 4, including the appendices referred to in the case narratives, also served as the evidence for calibrating most of the set scores for the QCA analysis. Appendix B provides detailed justifications for set definitions and anchors along with additional data for calibration for some sets (ENIMP, CO2, MOOD, and CHG_GOV). Appendices I – M build on the case narratives in Chapter 4 and provide summary explanations for all set scores in Table 8 in blocks of time:

Appendix	Case_Time	Page
Appendix I	1999S1 – 2001S2	366
Appendix J	2002S1 – 2006S2	379
Appendix K	2007S1 – 2010S2	391
Appendix L	2011S1 – 2015S2	402
Appendix M	2016S1 – 2020S1	412

[80] The remainder of the response to the aforementioned is contained in Chapter 0, where I bring the process tracing and QCA results together in the discussion.

Table 8: QCA calibration - dataset generated from study data according to definitions set out in Table 7. [81]

CASE_TIME	WIND_PR	INDI	ENIMP	CO2	RET	FB	FB_GRID	FB_MAR	FB_PRICE	EVENT	WIND_POL	CHG_GOV	MOOD	PRO_STR	POL_STR	GOV_PRG	INGRP	POLY_STR	SOL_PRICE	SOL_GRID	SOL_MAR	ENTRE	ENTR_OWE	ENTR_PRICE	ENTR_GRID	ENTR_MAR	AG_CHG
1999S1	0.3	0.56	0.67	1	0	0.33	0	1	0	0	0.33	0	0.33	0.33	0.34	0.67	0	0.67	1	1	0	0.75	1	0	1	1	0
1999S2	0.41	0.89	0.67	1	1	0.33	0	1	0	0	0.33	0	0.33	0.33	0.34	0.67	0	0.67	1	1	0	0.75	1	0	1	1	0.33
2000S1	0.37	0.89	0.67	1	1	0.22	0	0	0.67	0	0.33	0	0.33	0.33	0.34	0.67	0	1	1	1	1	0.75	1	0	1	1	0.33
2000S2	0.41	1	1	1	1	0.22	0	0	0.67	0	0.33	0	0.33	0.33	0.34	0.67	0	1	1	1	1	0.75	1	0	1	0	0.33
2001S1	0.37	1	1	1	1	0.56	1	0	0.67	0	0.33	0	0.33	0.33	0.17	0.33	0	1	1	1	1	0.75	1	0	1	0	0.33
2001S2	0.37	1	1	1	1	0.56	1	0	0.67	0	0.33	0	0.33	0.33	0.17	0.33	0	1	1	1	1	0.75	1	0	1	0	0.33
2002S1	0.37	0.89	1	1	0.67	0.22	0	0	0.67	0	1	1	1	0	0.34	1	0	1	1	1	1	0.25	1	1	0	0	0.33
2002S2	0.37	0.89	1	1	0.67	0.22	0	0	0.67	0	0.33	0	0.33	0	0.34	1	0	0.67	1	0	1	0	0	0	0	0	0.33
2003S1	0.37	0.89	1	1	0.67	0.22	0	0	0.67	0	0.33	0	0.33	0	0.34	0.67	0	0.67	1	0	1	0	0	0	0	0	0.33
2003S2	0.67	0.89	1	1	0.67	0.67	1	0	1	0	0.33	0	0.33	0	0.34	0.67	0	0.33	0	0	1	0	0	0	0	0	0.33
2004S1	0.67	1	1	1	1	0.67	1	0	1	0	0.33	0	0.33	0	0.34	0.67	0	0.33	0	0	1	0	0	0	0	0	0.33
2004S2	0.67	1	1	1	1	0.67	1	0	1	0	0.67	0.67	0.33	0	0.17	0.33	0	0.33	0	0	1	0	0	0	0	0	0
2005S1	0.67	1	1	1	1	0.33	0	0	1	0	0.67	0	0.67	0	0.17	0.33	0	0.67	0	1	1	0	0	0	0	0	0
2005S2	0.67	1	1	1	1	0.67	1	0	1	0	0.67	0	0.67	0	0.17	0.33	0	0.67	0	1	1	0	0	0	0	0	0
2006S1	0.33	1	1	1	1	0.33	1	0	0	0	0.67	0	0.67	0	0.17	0.33	0	1	1	1	1	0	0	0	0	0	0
2006S2	0.3	0.89	1	1	0.67	0	0	0	0	0	0.67	0	0.67	0	0.17	0.33	0	1	1	1	1	0	0	0	0	0	0
2007S1	0.22	0.67	1	0.67	0.33	0	0	0	0	0	0.67	0	0.67	0	0.17	0.33	0	1	1	1	1	0.25	1	0	0	0	0
2007S2	0.22	0.67	1	0.67	0.33	0	0	0	0	0	1	1	0.67	0.67	0.67	1	0	1	1	1	1	0.75	1	1	0	0	1
2008S1	0.33	0.67	1	0.67	0.33	0.33	1	0	0	0	0.67	0	0.67	0.67	0.67	1	0	0.67	1	1	0	0.75	1	1	0	1	1
2008S2	0.33	0.89	1	0.67	1	0.67	1	1	0	0	0.67	0	0.67	0.67	0.67	1	0	0.67	1	1	0	0.75	1	1	0	1	1

[81] It is worth reiterating that POL_CHG and its constituent sets (noted in Table 7) were not used in the QCA given the skewness of these sets; i.e. policy change was too rare across the 43 cases to enable a robust analysis.

CASE_TIME	WIND_PR	INDI	ENIMP	CO2	RET	FB	FB_GRID	FB_MAR	FB_PRICE	EVENT	WIND_POL	CHG_GOV	MOOD	PRO_STR	POL_STR	GOV_PRG	INGRP	POLY_STR	SOL_PRICE	SOL_GRID	SOL_MAR	ENTRE	ENTR_OWE	ENTR_PRICE	ENTR_GRID	ENTR_MAR	AG_CHG
2009S1	0.41	0.89	1	0.67	1	0.33	0	1	0	0	1	1	0.67	0.67	0.67	1	0	0.67	1	1	0	0.75	1	1	0	1	0.67
2009S2	0.37	0.78	1	0.33	1	0.33	0	1	0	0	0.33	0	0.33	0.67	0.17	0.33	0	0.67	1	1	0	0.75	1	1	0	1	0.67
2010S1	0.37	0.78	1	0.33	1	0.33	0	1	0	0	0.33	0	0.33	0.67	0.17	0.33	0	0.67	1	1	0	0.75	1	1	0	1	0.67
2010S2	0.37	0.78	1	0.33	1	0.33	0	1	0	0	0.33	0	0.33	0	0.17	0.33	0	0.67	1	1	0	0.25	1	0	0	1	0
2011S1	0.33	0.67	1	0.33	0.67	0.33	0	1	0	0	1	1	0.33	0	0	0	0	0.33	1	0	0	0.25	0	0	0	1	0
2011S2	0.33	0.67	1	0.33	0.67	0.33	0	1	0	0	0.33	0	0.33	0	0	0	0	0.33	1	0	0	0.25	0	0	0	1	0
2012S1	0.3	0.55	1	0.33	0.33	0.33	0	1	0	0	0.33	0	0.33	0	0	0	0	0.33	1	0	0	0.25	0	0	0	1	0
2012S2	0.3	0.55	1	0.33	0.33	0.33	0	1	0	0	0.33	0	0.33	0	0	0	0	0.33	1	0	0	0.25	0	0	0	1	0
2013S1	0.3	0.55	1	0.33	0.33	0.33	0	1	0	0	0.33	0	0.33	0	0	0	0	0.33	1	0	0	0.25	0	0	0	1	0
2013S2	0.26	0.44	0.67	0.33	0.33	0.33	0	1	0	0	0.33	0	0.33	0	0	0	0	0.33	1	0	0	0.25	0	0	0	1	0
2014S1	0.33	0.44	0.67	0.33	0.33	0.33	0	1	0	0.67	0.33	0	0.33	0	0	0	0	0.33	1	0	0	0	0	0	0	0	0
2014S2	0.33	0.44	0.67	0.33	0.33	0.33	0	1	0	0.67	0.67	0.67	0.33	0	0	0	0	0.33	1	0	0	0	0	0	0	0	0
2015S1	0.33	0.56	0.67	0.67	0.33	0.33	0	1	0	0.67	0.67	0	0.67	0	0	0	0	0.33	1	0	0	0	0	0	0	0	0
2015S2	0.63	0.56	0.67	0.67	0.33	0.67	1	1	0	0.67	0.67	0	0.67	0	0	0	0	0.33	1	0	0	0	0	0	0	0	0
2016S1	0.71	0.56	0.67	0.67	0.33	0.89	1	1	0.67	0.67	1	1	1	0	0.17	0.33	0	0	0	0	0	0	0	0	0	0	0
2016S2	0.63	0.67	0.67	1	0.33	0.56	0	1	0.67	0.67	1	0	1	0	0.17	0.33	0	0	0	0	0	0	0	0	0	0	0
2017S1	0.78	0.67	0.67	1	0.33	0.67	0	1	1	1	1	0.67	1	0.67	0.17	0.33	0	0	0	0	0	0	0	0	0	0	0
2017S2	0.89	0.67	0.67	1	0.33	1	1	1	1	1	1	0	1	0.67	0.17	0.33	0	0	0	0	0	0.25	1	0	0	0	0.33
2018S1	0.85	0.89	0.67	1	1	0.67	0	1	1	1	1	0	1	0.67	0.67	0.33	1	0.33	0	1	0	0.25	1	0	0	0	0.67
2018S2	0.85	0.89	0.67	1	1	0.67	0	1	1	1	1	0.67	1	1	0.67	0.33	1	0.67	1	1	0	0.75	1	0	1	0	0.67
2019S1	0.85	0.89	0.67	1	1	0.67	0	1	1	1	1	0	1	1	0.67	0.33	1	0.67	1	1	0	0.75	1	0	1	1	1
2019S2	0.96	0.89	0.67	1	1	1	1	1	1	1	1	0	1	1	0.67	0.33	1	0.67	1	1	0	0.75	1	0	1	1	1
2020S1	0.96	0.89	0.67	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0.67	1	1	0	0.75	1	0	1	1	1

5.2. Pre-analytic diagnostics

Prior to QCA analysis, I performed three types of checks on the dataset to ensure it aligns robustly with the qualitative data and methodological requirements. I first checked for sets with membership scores of 0.5. By definition, these could not be in the fundamental sets as I defined their anchors. However, ambiguity can and does appear in the sets associated with higher-order MSF concepts, where an averaging of the constituent sets resulted in an ambiguous set score (refer to Appendix B). In QCA, a set score of 0.5 means that the case is neither in nor out of a set. This is also referred to as the point of 'maximum ambiguity'. This will influence any analysis of superset or subset relations. Further inspection of within-case data is needed to adjust these cases as either in or out (Oana, Schneider and Thomann, 2021). I found several cases where the averaging of constituent sets to calibrate a higher-order MSF concept set produced an ambiguous score. This was mainly the case when calibrating the scores for a policy window, the readiness of the policy stream, or the extent to which policy entrepreneurship occurred across several policy elements. I inspected each of these cases individually, returning to the qualitative research to re-calibrate the scores up or down. Justification for these few *re*calibrations are included in Appendix N.

Next, I checked the cases for potential outcome 'drift' between cases. These were periods where there is strong evidence that changes in certain conditions led to a change in the agenda status of OFW, but where the agenda change falls in a subsequent QCA case. For instance, certain conditions may have changed between January and June of a particular year, but the evidence demonstrates how the associated agenda change only occurred somewhere between July and December. It is not necessary to check every QCA case for this. The process tracing narratives and initial QCA calibrations clearly establishes that OFW was more off than on the political agenda for two extended periods, roughly 1999S1 – 2007S1 and 2010S1 – 2017S2. Conversely, it was more on than off the agenda for roughly 2007S2 – 2009S2 and 2018S1 – 2020S1. The cases of interest are therefore those on the cusp, either before or after the changes in agenda status. A closer look at the qualitative within-case data is the most sophisticated way to trace the changes of conditions associated with agenda change at these margins. I therefore consider the following pairs: 2007S1 – 2007S2, 2009S2 – 2010S1, 2017S2 – 2018S1.

To be clear, the objective of these interrogations is to see if the configurations in conditions in the first (prior) case in a pair explains the new agenda status in the subsequent case in the pair. Where this is the case, I adjust AG_CHG in the updated dataset to accommodate this explanation in the QCA analysis. For example, there is very strong evidence that the general election and change in government in 2007S1 (a policy window opening in the politics stream) directly contributed to OFW moving up the political agenda in 2007S2. However, in the original calibration case 2007S1 has AG_CHG scored as 0 (because OFW was not yet on the agenda) and 2007S2 has AG-CHG scored as 0.67. Recalibrating for this drift, I rescore AG_CHG as 0.67 for case 2007S1. I do not rescore 2007S2 as AG_CHG remained on the political agenda for an extended period, although that particular policy window closed in 2007S1 with the formation of the new government and the adoption of the new programme for government. Full explanations for drift corrections are presented in Appendix O.

Thirdly, once correcting for ambiguous sets and temporal drift, I ran skewness checks on all sets. I followed the heuristic proposed by Oana et al, confirming that for each set more than 20% of cases are more in than out (or more out than in) (Oana, Schneider and Thomann, 2021). Fortunately, none of the sets in the dataset is excessively skewed. Appendix E contains results of the skewness checks.

It is worth noting that although two of the above checks requires me to revisit the qualitative data, none of them entail changing the process tracing. However, for isolated sets such as MOOD and ENIMP, the QCA takes account of additional information not covered in the case narrative (refer to Appendix B).

5.3. Analysis of necessary conditions

I first consider the necessity of individual conditions for agenda change, after which I consider causally complex relations of necessity.

5.3.1. Single necessary conditions for agenda status

Table 9 displays the results of the analysis of necessity; i.e. the parameters of fit for the necessity of individual conditions. There are no individual MSF conditions that pass the 0.9 threshold for consistency of necessity ('Cons.Nec' in the table). In other words, there is no single condition for which at least 90% of cases hold a superset relation to the outcome.

	Cons.Nec	Cov.Nec	RoN
WIND_PR	0.753	0.468	0.666
WIND_POL	0.897	0.437	0.522
PRO_STR	0.797	0.861	0.949
POL_STR	0.759	0.823	0.936
POLY_STR	0.821	0.438	0.577
ENTRE	0.738	0.649	0.845
~WIND_PR	0.609	0.357	0.594
~WIND_POL	0.383	0.304	0.700
~PRO_STR	0.458	0.192	0.324
~POL_STR	0.586	0.245	0.338
~POLY_STR	0.433	0.301	0.651
~ENTRE	0.493	0.227	0.403

Table 9: Analysis of necessity for individual MSF conditions for agenda change. Cons.Nec = Consistency Necessity, Cov.Nec = Coverage Necessity, RoN = Relevance of Necessity.

Only WIND_POL (Cons.Nec = 0.897) comes close to the 0.9 threshold for consistency necessity. It would make the threshold if it was rounded to the second decimal. It is worth inspecting this condition further. The coverage (Cov.Nec = 0.437) and Relevance of Necessity (RoN = 0.522) scores are low. This indicates that the relation of necessity is potentially trivial. The Cov.Nec score indicates that the condition set (WIND_POL) is much bigger than the outcome set (AG_CHG). When interrogating the underlying calibration, this is largely because of the sustained high support for climate action by the Irish public for many years (see MOOD in dataset). High levels of public support for climate action was present for more than eleven years over the 20-year period. When taken together with changes in government, we find a policy window open in the politics stream in 56% of cases (refer to skewness check results in Appendix E). Therefore, there are more instances where POL_WIND is associated with *no* agenda change than with agenda change. Figure 23 offers a visual demonstration of the triviality. Many cases are distributed between the top right quadrant (where agenda change is associated with a policy window) and the bottom right quadrant (where no agenda status is also associated with a policy window).

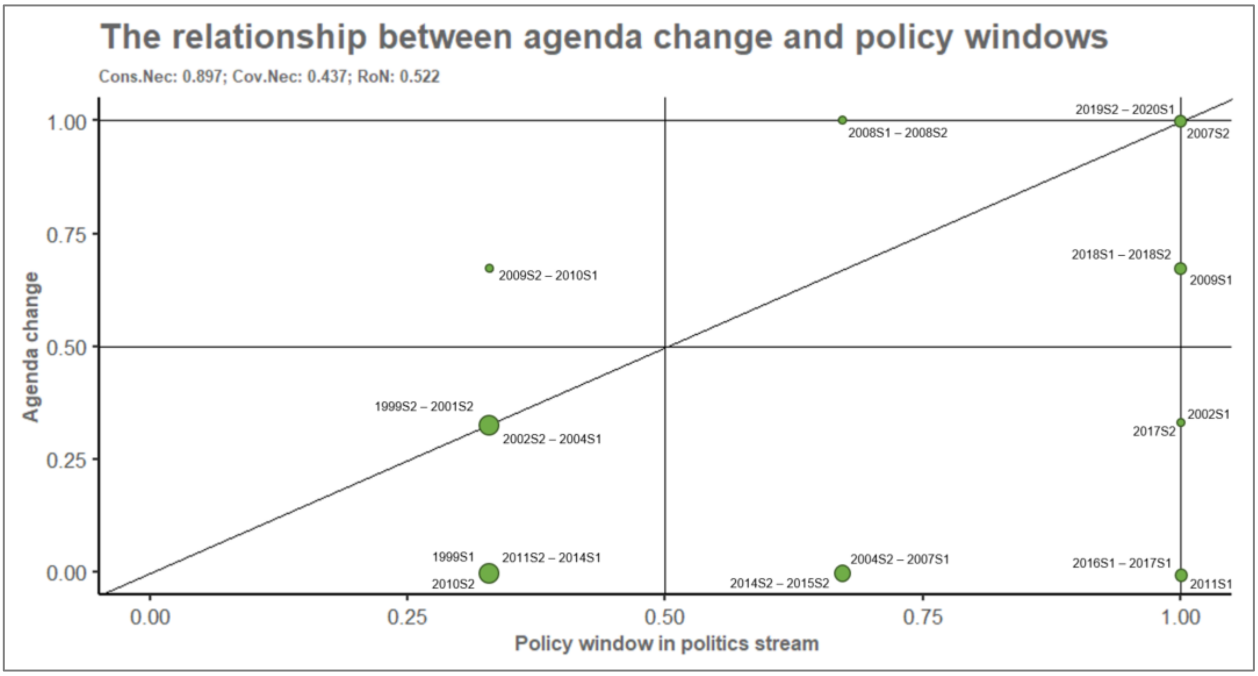


Figure 23: Plotting the results of the analysis of necessity for WIND_POL to AG_CHG

Good practice in QCA recommends returning to deviant cases to confirm the nature of the triviality and departure from consistency. There are four cases that depart from the relation of necessity (2008S1, 2008S2, 2009S2, 2010S1). It may be that some of these cases are merely deviant by degree and not fundamentally undermining the conceptual relationship. For instance during the period 2008S1 – 2008S2, OFW was both on the agenda and a policy window was open in the politics stream. In the QCA, the fact that AG_CHG > WIND_POL therefore does not undermine the proposed conceptual relationship between policy windows and agenda status. This can be interpreted as the fact that OFW was on the agenda of at least three institutions whilst the policy window in the politics stream was only somewhat open. Or more exactly, for OFW to make it on to the agendas *of several institutions*, it is necessary that *a small majority* of the public support more ambitious government action on climate change. Such differences in degree do not fundamentally undermine the relation of necessity. The period 2009S2 – 2010S1 does, however, present deviance in kind. Here OFW was on the agenda of two institutions, but only a minority of the public supported more ambitious action on climate change. The case narrative in Chapter 4.1.7 provides an explanation for this. OFW was still on the agenda for the department of energy as it awaited state aid approval for the OFW REFIT and an assessment by ESRI of the costs of the proposed REFIT to the Irish consumer. It was also still on the agenda of the Oireachtas Joint Committee that had drafted a proposal for new marine planning legislation. It had submitted this to the government and was (with much frustration) awaiting a much delayed response. However, by the following semester (2010S2) both the Joint Committee and the department had moved on to other matters as the unfolding financial crisis precipitated a dramatic shift in political agendas. A fall in public support for more ambitious climate action may have preceded political work on OFW by about a year. The lingering of the issue on political agendas may also have indicated that both institutions were following through on work they largely completed by 2009S1. The department had largely completed the technical work on the REFIT by 2008S1 and the joint committee had completed the proposal for legislative reform by 2009S1. Whilst political agendas somewhat lagged public opinion, the deviancy does not significantly undermine the identified relation of necessity. A final caveat on this interpretation is that the MSF concept of a policy window opening in the politics stream includes two distinct elements, public mood and changes in government. The identified relation with WIND_POL is therefore blind to the distinct pathways through which these distinct mechanisms might open a policy window and influence agenda change. A more nuanced analysis of the QCA dataset would be required for this.

Even if one grants that most of the deviant cases are so by degree, and hence that policy windows in the politics stream may in fact be necessary for OFW to attain agenda status, the relationship of necessity that holds between WIND_POL and AG_CHG is still empirically trivial (as noted above). The QCA analysis highlights that windows in the politics stream are as much associated with no agenda status for OFW, as they are associated with agenda status. This finding recommends revisiting the MSF concept of policy windows and potentially revising either its general definition or how it is operationalised for the issue of OFW. I return to this in the discussion chapter.

5.3.2. Necessary disjunctions for agenda status

Next, I consider more causally complex relations of necessity. Here the analysis inspects whether there are any 'SUIN conditions'. This is a condition that is a Sufficient but Unnecessary part of a factor that is Insufficient but Necessary (SUIN) for an outcome. These are also referred to as necessary disjunctions of conditions. Table 10 present the results of this analysis. Two necessary disjunction of conditions pass the consistency necessity threshold and have acceptable coverage and RoN (i.e. may not be trivial relation).

Table 10: QCA analysis of necessity, SUIN conditions. Displayed results cut at inclN = 0.9, RoN = 0.5, and covN = 0.5

		inclN	RoN	covN
1	WIND_PR + PRO_STR	0.924	0.637	0.515
2	PRO_STR + POL_STR	0.924	0.894	0.785

Taken together a factor that includes a policy window in the problem stream *or* problem stream ripeness is necessary for agenda change. Alternatively, a disjunction between problem stream ripeness or politics stream ripeness is necessary for agenda change.

However, it is not clear that these disjunctions represent coherent underlying concepts. As Oana et al argue, "by combining many conditions into one disjunction, we need to provide conceptual arguments regarding what this disjunction stands for, that is, we need to meaningfully interpret the SUIN conditions as functional equivalents of a higher-order concept (Schneider and Wagemann, 2012; Schneider, 2018). This underlying concept, which the necessary disjunction represents, is then the actual necessary condition" (Oana, Schneider and Thomann, 2021, p. 83).

MSF theoretical literature does not provide higher-order concepts for these kinds of disjunctions. On the contrary, MSF theory explicitly distinguishes the three streams, ripeness of the streams and policy windows as analytically separate concepts. In operationalising MSF, this study also distinguished carefully between the three streams as separate structural concepts with distinguishable observable implications, and between streams, policy windows and the agency of entrepreneurs. If the disjunctions found in the SUIN analysis are functional equivalents of a higher-level concept, this could fundamentally undermine the coherence of the MSF hypothesis. Figure 24 and Figure 25 present the alternative disjunctions of SUIN conditions. It is clear that these disjunctions do not resemble any concept in the MSF. It is not clear whether they resemble any other meaningful theoretical construct either. What is clear is that the analysis of necessity reveals that almost no MSF concepts (as operationalised in this study), except for perhaps policy windows in the politics stream, are necessary for the agenda status of OFW over a twenty year period. The QCA analysis also did not reveal anything resembling the SUIN conditions that the MSF hypothesis would lead us to expect.

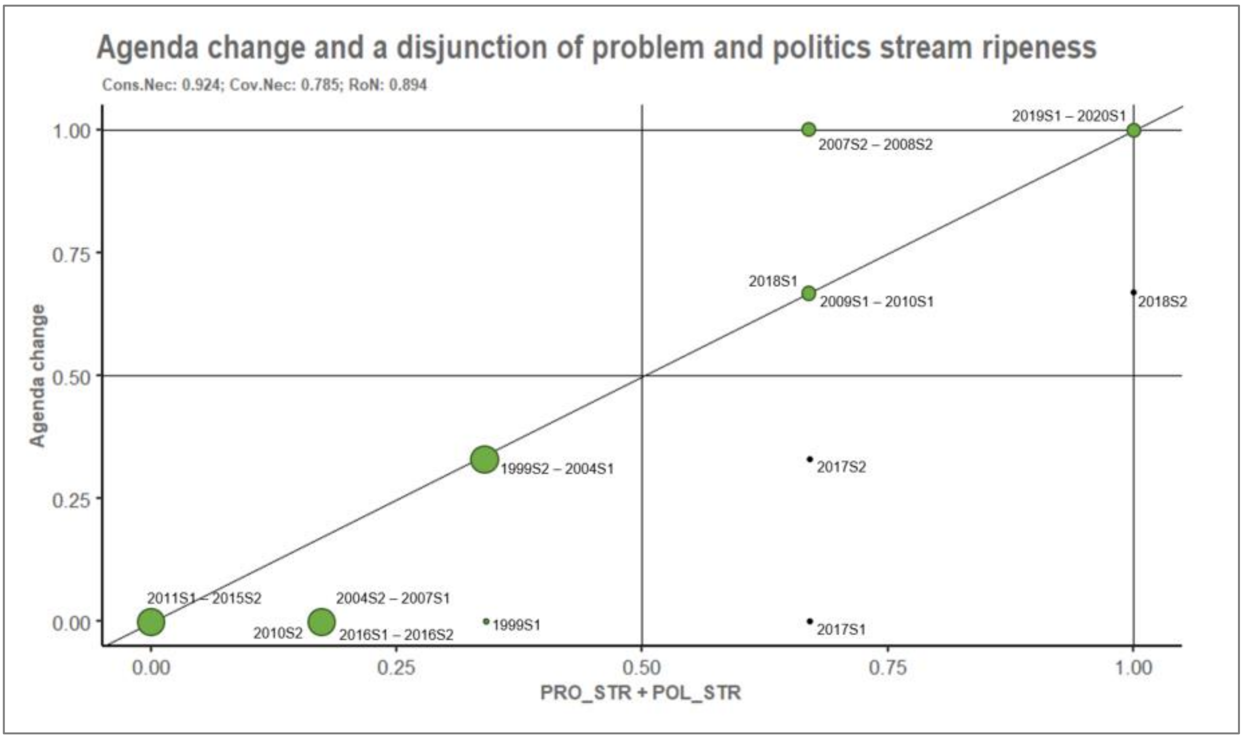


Figure 24: QCA analysis of necessity for SUIN conditions PRO_STR + POL_STR

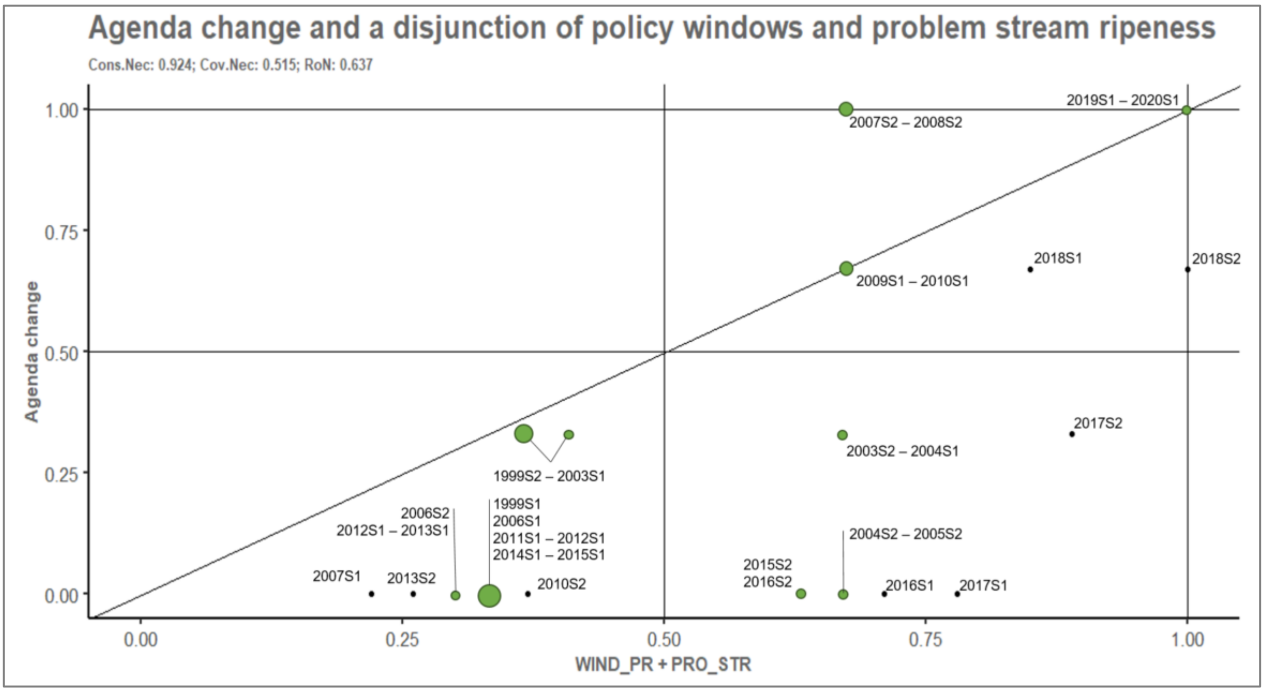


Figure 25: QCA analysis of necessary SUIN conditions WIND_PR + PRO_STR

5.3.3. Manual specification of the hypothesis

In Chapter 3.5.4 (p. 89), I introduced the MSF hypothesis as either a statement of necessity or sufficiency. The statement of necessity, Hypothesis (1), can take one of two forms, depending on whether a policy window opens in the problem stream or the politics stream:

1.1 **WIND_PRO** * PRO_STR * POL_STR * POLY_STR*ENTRE ← AG_CHG
1.2 **WIND_POL** * PRO_STR * POL_STR * POLY_STR * ENTRE ← AG_CHG

Another way to test the departure between theoretical expectations and empirical findings is to manually specify the above conjunctions that the MSF hypothesis would have us think are necessary for the outcome. In each case, this consists in manually combining the conditions into conjunction and then testing the each of the two (slightly different) conjunctions.[82]

Running an analysis of necessity on each variant gives the results depicted in Figure 26 (for H1.1) and Figure 27 (for H1.2). For both hypotheses, the results

[82] These are simply logical operations, but the reader may want to refer to the R code to clarify the steps in the process.

clearly indicate that the empirical evidence does not support the MSF as a statement of necessity in its strictest form (H1.1: Cons.Nec = 0.454, H1.2: Cons.Nec = 0.561). For a relation of necessity to hold at least 90% of cases, that is 39 / 43 cases, need to be consistent with a superset relation. However, the result indicates that only around half of the cases hold this relation for either hypothesis.

However, in order to clarify what exactly this means it is necessary to interrogate the deviant cases. Given that both the outcome and input condition are fuzzy sets, the deviations from necessity may be by degree, rather than kind. If it is merely by degree, the case for the MSF hypothesis may not be significantly undermined.

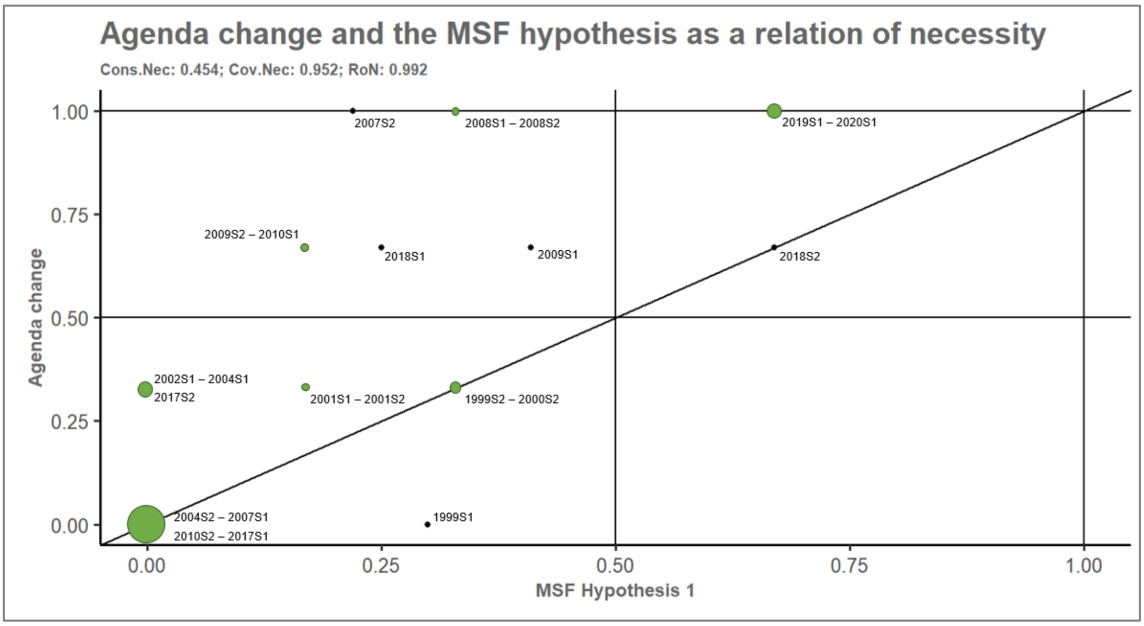


*Figure 26: Analysis of MSF hypothesis 1.1. Manually specifying the MSF conjunction with a window opening in the problem stream (WIND_PRO * PRO_STR * POL_STR * POLY_STR*ENTRE ← AG_CHG)*

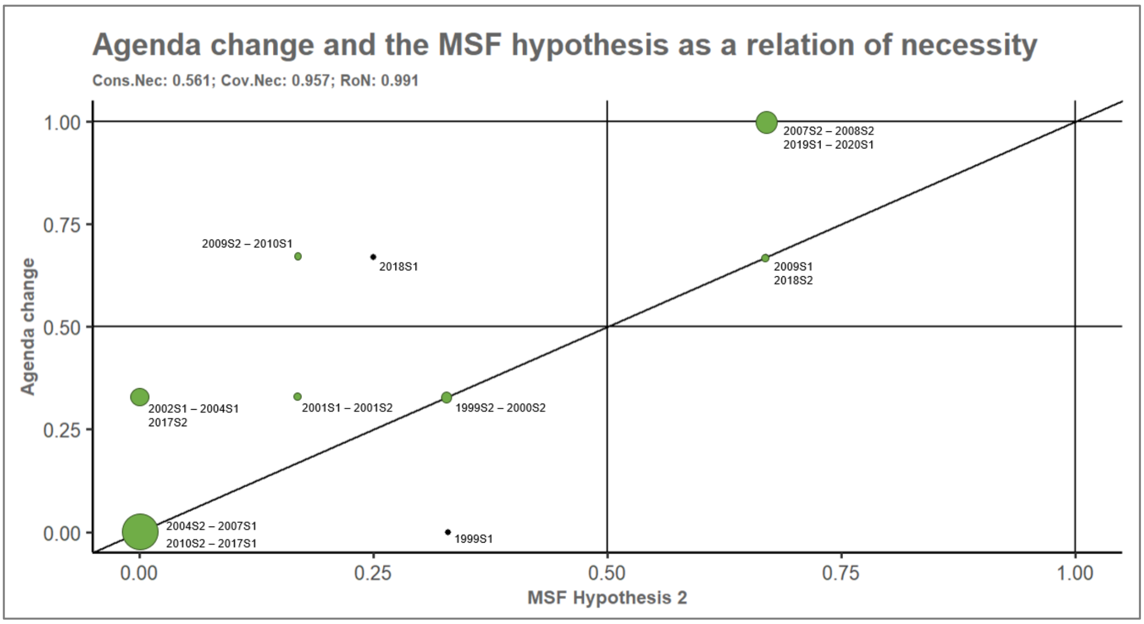


*Figure 27: Analysis of MSF Hypothesis 1.2. Manually specifying the MSF conjunction with a window in the politics stream (WIND_POL * PRO_STR * POL_STR * POLY_STR * ENTRE ← AG_CHG)*

The findings plotted in Figure 26 and Figure 27 suggest interrogating three clusters of deviant cases separately. Firstly, those cases where both AG_CHG and Hypothesis 1.1 or 1.2 < 0.5, but where AG_CHG > MSF_HN; i.e. where OFW was on the agenda of one institution, but at least one of the conditions that make up H1.1 or H1.2 < 0.33. This cluster of cases span the periods 2001S1 – 2004S1, and 2017S2 (for both H1.1 and H1.2). Secondly, those cases where AG_CHG > 0.5, but H1.1 or H1.2 < 0.5. These are cases where OFW was on the agendas of two or three institutions, but where one or more of the MSF conditions that make up H1.1 or H1.2 were absent (at least one condition < 0.5). This cluster spans the periods 2007S1 – 2010S1, and 2018S1 for H1.1, and 2009S2 – 2010S1, and 2018S1 for H1.2. Thirdly, those cases where both AG_CHG and H1.1 or H1.2 > 0.5, but where AG_CHG > H1.1 or H1.2. These are cases where OFW was on the agenda of at least three institutions, but one or more of the MSF conditions had a set score of 0.67. This cluster spans the periods 2007S2 – 2008S2 and 2019S1 – 2020S1.[83]

On to the first cluster (refer to Chapter 4.1 for the Case 1 narrative for more information). During the period 2001S1 – 2004S1, OFW was on the agenda of the DMNR. At least one civil servant in the department took sufficient interest in the matter to have analysis commissioned by the SEI to lay out technology-

[83] It is worth noting the temporally contiguous nature of the cases within the clusters, and how they form longer contiguous sequences that traverse clusters between temporally consecutive cases. In this sense the narrative can be read as unfolding across a two dimensional space.

specific price support instrument alternatives for OFW under the AER auction scheme. This analysis informed the department's eventual decision to issue Ireland's first OFW auction. However, triangulating the data sources also places the above agenda status into context. The analysis supported and informed the predominant view in the nascent renewable energy policy community that OFW was merely a very expensive alternative to onshore wind energy. The auction therefore only sought to support a couple of demonstration projects. OFW was a 'side show' compared to efforts aimed at supporting the commercial deployment of onshore wind energy. In turn, renewable energy in general was still a 'side show' to the overall departmental energy agenda which was primarily focused on gas policy (to serve strategic energy security objectives) and the liberalisation of the power market (to serve objectives of competition and compliance with EU Directives). The QCA calibration for these cases reflects that OFW was more off the agenda than on the political agenda, by being on the agenda of only one institution (hence AG_CHG = 0.33, more out than in). However, it could be argued that even within this one institution, although its agenda status was sufficiently high to commission some analysis and drive some policy change on the margin, it was relatively low down the departmental priorities.

When inspecting the conditions responsible for the low H1.1/H1.2 score for the same cases, the calibration reveals two contributors. In the first instance, the deviancy is attributable to the politics stream not being ripe for 2001S1 – 2001S2 (POL_STR = 0.17). This is because OFW was not on the government's PfG, nor was the balance of influence between the key interest groups in its favour. The first few OFW developers had not yet formed a sectorial association to campaign for its interests (NOW Ireland had not yet formed), and IWEA was representing the interests of onshore wind developers; at the time a zero-sum game between the two wind technologies. From 2002S1 – 2004S1, the deviancy is attributable to the problem stream being completely unripe (PRO_STR = 0). This is because no one in the energy policy community over this period was making the case that OFW was necessary to solve any of the policy problems occupying agendas. The primary challenge occupying the renewable energy policy community was target attainment at least cost. Over this period the attention shifted from the 2005 target to the 2010 target. There was consensus throughout the policy community that OFW was not necessary to attain the 2010 target; onshore wind being an abundantly available and much cheaper alternative. A full inspection of the conditions reveals that if POL_STR was excluded for 2001S1 – 2001S2 and PRO_STR was excluded for 2002S1 – 2004S1, that these cases would no longer deviate from the relation of necessity; AG_CHG = H1.1 and H1.2 = 0.33.

When taking all of the above into account, I conclude that the period 2001S1 – 2004S1 does not offer a strong reason to reject the MSF hypothesis in this form. OFW had a marginal status in one line department, largely due to the active advocacy of the first OFW developer in Ireland. One or two civil servants afforded it sufficient time to develop a price instrument to support two demonstration projects, even though no one in the policy community thought it would be a solution to their pressing problems. The central MSF hypothesis that you need all, or almost all, of several conditions present to drive agenda status for OFW is not seriously undermined by this.

On to the second cluster of cases (in the top left quadrant of Figure 26 and Figure 27). These may present more challenging instances for the MSF hypothesis as OFW was more on the agenda than off (i.e. two or three institutions had it on the agenda), whilst three of the MSF conditions were not met. Again it is necessary to return to the qualitative data and narrative to interpret these deviant cases. Some of these cases also diverge for H1.1 and H1.2 and requires considering such periods separately.

For H1.1, these cases span the periods 2007S2 – 2010S1, and 2018S1. For the period 2007S2 – 2009S2 OFW was very much on the political agenda, but there was no policy window open in the problem stream. Indicators were somewhat favourable (in that Ireland had a high energy import dependence and greenhouse gas emissions were not on track to meet the national target), but Ireland was largely on track to meet its renewable energy target for 2010, which was the predominant focus of the relevant policy community. There were no focusing events that favoured OFW deployment, nor were there wider policy failures on grid connection policy (Gate 3) or the renewable generation price support instrument (REFIT) to open a window for OFW. In fact both policies were working quite well. In short, OFW was a policy solution looking for a problem. These cases disconfirm this variant of the MSF hypothesis: MSF could make it on to the agenda of several institutions without a policy window in the problem stream.

Within this cluster, the results for H1.1 and H1.2 align for the periods 2009S2 – 2010S1, and 2018S1, so I'll consider them together. For 2009S2 – 2010S1, OFW was still on the agenda of the DCNR and the Oireachtas Joint Committee on Climate Change and Energy Security. However this came at the tail-end of a period of elevated agenda status and would have been significantly demoted as the fallout of the financial crisis started dominating more institutional agendas. As noted in Chapter 4.3, the inference is that OFW was still on these two agendas given sporadic debates on the Oireachtas record. However, as noted before, it is also clear that the Joint Committee had concluded the brunt of its work by December 2008 and was awaiting the government's response to its legislative proposal in 2009. The DCNR had also concluded the brunt of the work on the REFIT and was ostensibly awaiting EU state aid approval, or more likely the findings of ESRI's report on the cost of the announced REFIT on consumers. Whilst Ryan was still claiming progress on the marine legislation throughout 2009, the lack of a heads of bill casts doubts on whether this was even still on the departmental agenda in 2009S2. I therefore grant that the calibration of these two cases on the margin is uncertain and contestable. Additional evidence, i.e. further key informant interviews or an FOI could provide the necessary evidence to have more confidence in the calibration. However, with the data available to this study, it is possible to contest this calibration.

Turning to the conditions for this set, there are three conditions that are not satisfied (with scores < 0.5) throughout this period. There was no policy window open in either the politics or the problem stream, and the politics stream was not ripe for coupling. The narrative elaborates on this extensively and, unlike in the calibration of the agenda status of OFW over this period, there is a high confidence in the calibration of these conditions. It may be interpreted as temporal lag. OFW was still on the agenda for 6 months to a year, but its star was waning due to the changes in underlying conditions; i.e. the policy window in the politics stream that had brought it on to the agenda had closed and the politics stream was no longer ripe. As with the period 2007S2 – 2009S2, there was similarly no policy window open in the problem stream for the reasons already noted. If the interpretation of the agenda status of OFW is maintained, then these cases may offer deviant cases in kind, disconfirming the MSF hypothesis. However, noting the uncertainty in how the actual agenda status of OFW declined over the period, judgement may have to be suspended on these cases.

On to the third cluster of deviant cases (above the diagonal in the top right quadrant of Figure 26 and Figure 27). These span the periods 2007S2 – 2008S2 for H1.2. and 2019S1 – 2020S1 for both H1.1. and H1.2. These cases may all be interpreted naively as being more on the agenda than the underlying conditions would warrant, purely based on the chosen set definitions and anchors. Over the period 2007S2 – 2008S2, OFW's agenda status had scored the maximum on the scale (at least three institutions implicated in OFW policy were paying attention to the issue). Although there was a policy window open in the politics stream (H1.1.), none of the three streams were fully ripe on their respective scales (though they were more ripe than unripe). Following the general election, the policy window in the politics stream was also no longer fully open (though it was still more open than closed).

Over this period OFW had quickly moved on to the agendas of the DCENR, the cabinet and the Oireachtas Joint Committee. Civil servants in the DCENR were developing the OFW REFIT, the cabinet had to approve this, and the Joint Committee was concerned with understanding long-term climate targets. Following the announcement of the REFIT and the associated offshore wind rush, cabinet had to decide on an approach to new marine legislation which resulted in the splitting of functions between different departments, and the Joint Committee took it upon itself to develop a legislative proposal whilst the cabinet decision was stuck in bureaucratic delays. The DCENR also commissioned the OREDP and the ISLES project to establish options for an offshore transmission grid in the Irish Sea.

All the while, the politics stream had only been slightly ripe. The PfG explicitly included the consideration of support for OFW, but the balance of influence with interest groups remained in favour of onshore wind energy. The commitment in the PfG was also vague. Although Ryan and the Green Party had clear policy intentions, the dominant coalition partners were passively supportive but non-committal on the issue. The recalibration of these sets provides a reason for judging the stream more ripe than unripe (refer to Appendix B), but it is worth stressing the ambiguity of the stream status over this period.

Similarly, the problem stream was only partially ripe. Some civil servants in the DCENR and a cross-party cohort of elected officials on the Joint Committee were promoting a problem framing in which OFW was a necessary solution to decadal renewable energy target attainment for 2020. By implication, it required policy action in the short term. However, none of the other institutions implicated in the issue had adopted a similar rationale for action. DAFF and DHPLG were infamously slow in their response to the cabinet's decision on marine legislation. The TSO and regulator were non-committal and the ESRI was explicitly sceptical.

The period 2007S2 – 2008S2 therefore offers deviant cases by degree, but a closer look at the underlying qualitative data provides strong reasons for seeing these as disconfirming the MSF hypothesis by degree. It appears to illustrate that a small group of advocates can have significant influence on government agendas, even when systemic conditions are not particularly favourable for policy change on a particular issue. However, the case narrative also provides a detailed account of the limits to such influence, and how institutions and system factors ultimately constrain policy adaptation (refer to Case 2 narrative, Chapter 4.3).

The period 2019S1 – 2020S1 provide similar deviant cases for both H1.1 and H1.2. Over this period, OFW was again on the agendas of four to five institutions, but the politics and policy streams where only somewhat ripe. By 2019S1, OFW was on the agenda of the department of energy, the department of planning, the cabinet, and the system operator. The regulator followed shortly after in 2019S2. The case narrative offers an extensive account of how this came about (refer to Chapter 4.4). This level of political interest was unprecedented in Irish history.

The politics stream was only partially ripe in 2019 as the PfG had made no explicit commitment to support OFW and remained reluctant and non-committal on key issues such as a technology-specific price support instrument. However, the qualitative narrative also shows how the government's commitment to act ambitiously on climate change, particularly to set and reach a demanding 2030 target opened it to taking certain actions in support of OFW. Most notably, within the politics stream the position of IWEA, the key interest group vis-à-vis wind energy, shifted to supporting deployment of OFW. Although the strict calibration of the politics stream (equally weighting the government PfG and the influence of interest groups) renders the stream only partially ripe over this period, the case narrative suggests that it was in fact very conducive to coupling. However, the case narrative also reveals the sequence of events that indicate that the politics stream became riper for coupling once OFW was already on the agenda. IWEA appeared to have followed the lead of the TSO and civil servants on the issue of OFW. This further ripening of the politics stream contributed to a further rise of OFW on the agenda as more institutions paid attention to it.

The policy stream was also only somewhat ripe over this period. As noted, this is because the policy community had found general solutions for a new price support instrument and a new grid connection, but had not yet solved the problem of marine planning legislation (in general). The case narrative, along with the analysis of individual conditions' necessity, does cast some doubt on its relevance for agenda change. As the case narrative makes clear over an extended period of time, it is the agenda status of OFW that has been the primary driver of legislative reform for marine planning legislation. No government over a twenty year period was willing to allocate resources towards the development of complex legislation, unless there was a significant problem driving it. The absence of OFW deployment first needs to become a problem, before policy makers start to consider policy solutions for this.

The cluster of cases where OFW is fully on the agenda and the MSF conditions are partially met offers some of the more problematic cases for the MSF hypothesis. Although the deviations are only by degree, it is the fact that several of the underlying conditions are only somewhat fulfilled which casts some doubt on the necessity of all or almost all conditions for agenda change.

However, when we consider all of the deviant cases in detail, we find the empirical support for MSF hypothesis H.1.2 much improved. Most of the deviant cases by degree can be explained satisfactorily, and the few deviant cases by kind rest on uncertain and contestable information.

In conclusion, the empirical evidence does not offer strong support for the MSF hypothesis as a statement of necessity. No *single* MSF condition is necessary (and empirically non-trivial) for agenda change. When considering complex configurations of conditions as necessary, the analysis reveals two disjunctions but it is not clear that these disjunctions represent coherent higher-order concepts. If they do, it would undermine fundamental theoretical distinctions in MSF theory.

However, when manually specifying the MSF hypothesis as a necessary conjunction of all the conditions and opting for a policy window in the politics stream (H.1.2), the analysis finds that most deviant cases are matters of degree, and do not outright contradict the hypothesis. The degree of agenda status for OFW is not fully matched by the degree of favourability in the underlying conditions.

When manually specifying the MSF hypothesis as a necessary conjunction of all the conditions and opting for a policy window in the problem stream (H.1.1), the analysis finds that some cases are deviant in kind, and outright contradict the hypothesis. In particular, OFW can enjoy political agenda status even when deteriorating indicators, feedback on policy favours, and Focusing events do not provide reasons for problem framing in favour of technology adoption. I return to this issue in the discussion chapter.

5.3.4. Single necessary conditions for no agenda status

As noted in Chapter 3.5.4, a theoretical assumption underpinning QCA is that causation is not symmetrical. Conditions that explain the non-occurrence of an outcome may not be the mirror image of the conditions that explain the occurrence of an outcome. I now inspect the data to see if there are any single necessary conditions for the negation of the outcome; i.e. no agenda change.

Table 11 below displays the parameters of fit for this.

Table 11: Analysis of necessity of individual conditions for no agenda change. Cons.Nec = Consistency Necessity, Cov.Nec = Coverage Necessity, Relevance of Necessity.

	Cons.Nec	Cov.Nec	RoN
WIND_PR	0.526	0.757	0.814
WIND_POL	0.621	0.699	0.671
PRO_STR	0.166	0.414	0.815
POL_STR	0.220	0.551	0.852
POLY_STR	0.566	0.698	0.717
ENTRE	0.272	0.554	0.811
~WIND_PR	0.631	0.855	0.867
~WIND_POL	0.500	0.918	0.952
~PRO_STR	0.944	0.915	0.820
~POL_STR	0.929	0.899	0.793
~POLY_STR	0.544	0.876	0.913
~ENTRE	0.828	0.880	0.813

In this instance there are two individual conditions, ~PRO_STR (Cons.Nec = 0.944) and ~POL_STR (Cons.Nec = 0.929) that pass the threshold for consistency necessity. For both conditions the Cov.Nec and RoN scores are also high, indicating that this is not an empirically trivial relationship.

MSF theory and case data also demonstrate that these are conceptually meaningful relations. The QCA analysis indicate that for OFW not to be on the political agenda, it is necessary that the problem stream is not ripe. That is, if most of the policy community does not accept a problem framing that prioritizes OFW as the solution to a particular policy problem, then it is very unlikely that OFW will get on to the political agenda or stay there. Alternatively, for agenda change not to happen it is necessary that the politics stream is not ripe; i.e. if either the programme for government is opposed to it or the balance of influence between interest groups is not in favour of OFW deployment, then it is unlikely that OFW will get on to the political agenda or stay there. Figure 28 and Figure 29 plot these two relationships.

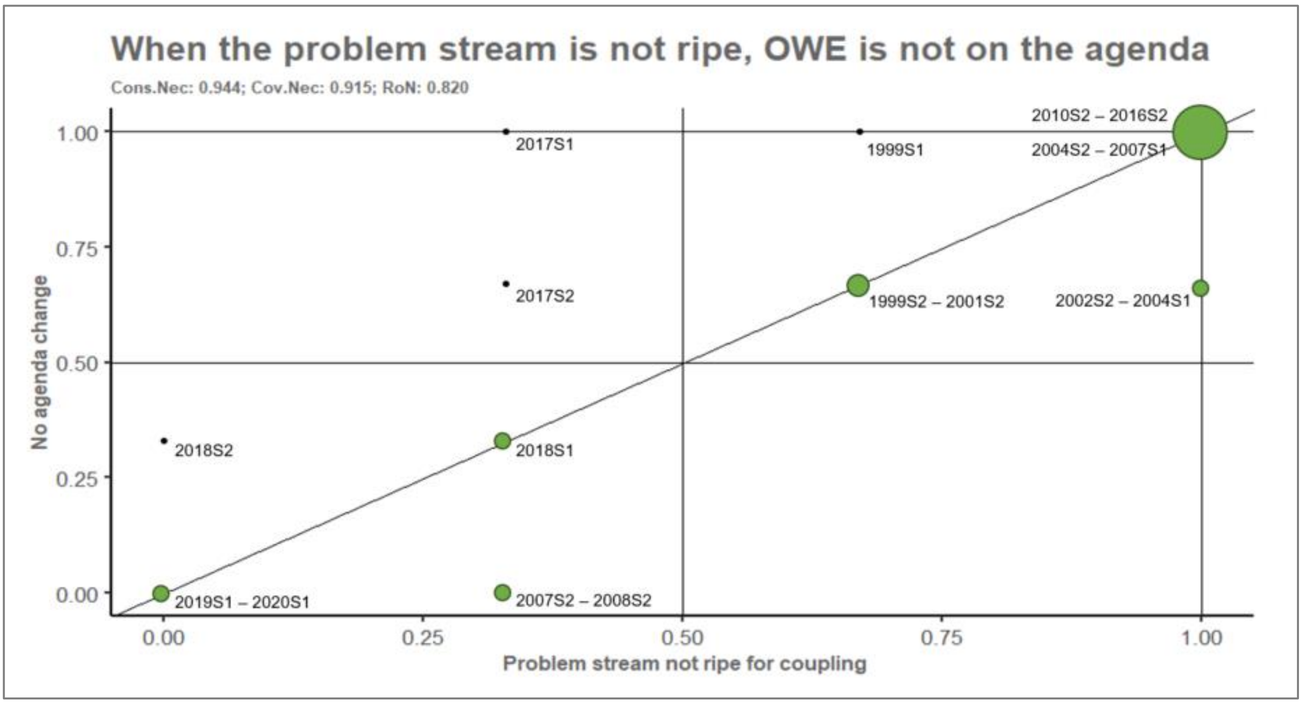


Figure 28: Analysis of necessity for no agenda change, ~PRO_STR as single necessary condition

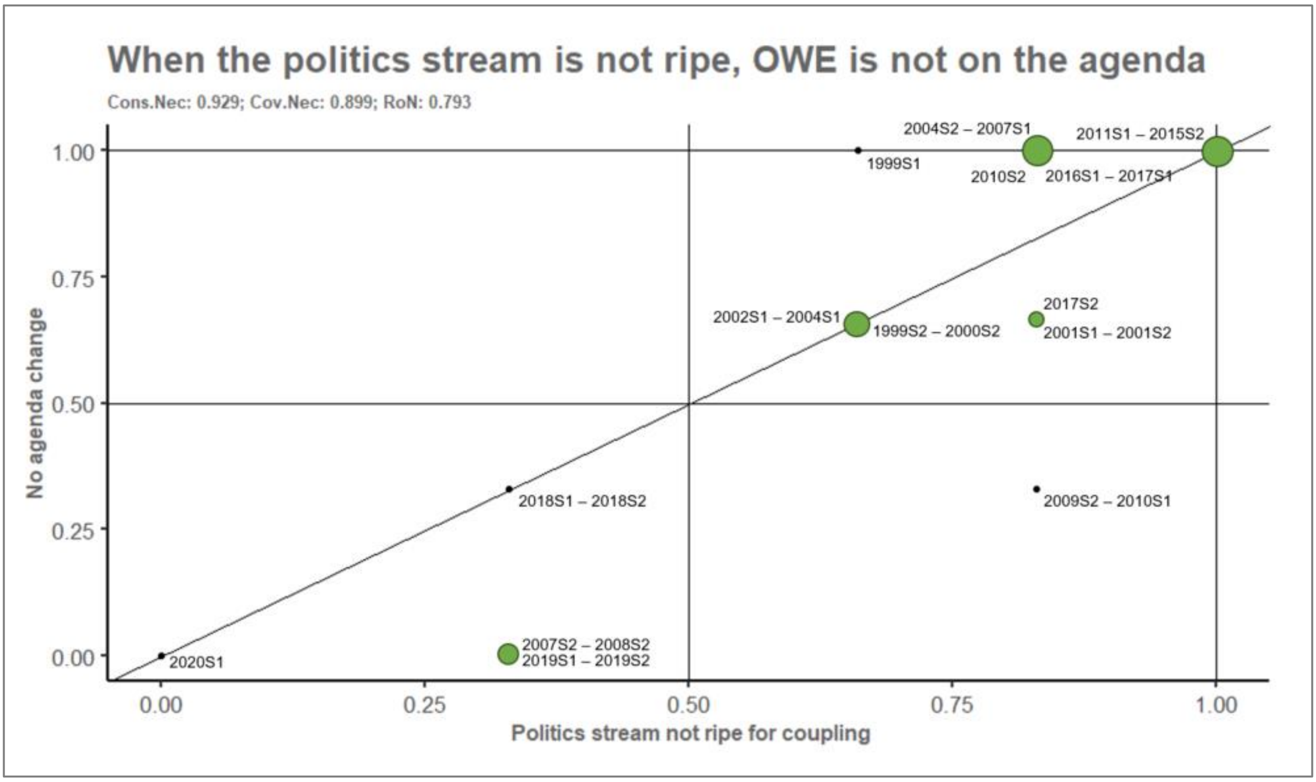


Figure 29: Analysis of necessity for no agenda change, ~POL_STR as single necessary condition

It is necessary to interrogate the deviant cases. For ~PRO_STR 1999S1, 2017S1 – 2017S2, and 2018S2 deviate from the relation of necessity, i.e. ~AG_CHG > ~PRO_STR. In 1999S1 OFW was neither on the agenda nor was the problem stream ripe. However, in the earliest days of OFW discussions in Ireland, the Minister of Public Enterprise did briefly consider OFW as one solution to increase north-south cooperation following the Good Friday Agreement. Shortly thereafter, at least one senior civil servant and the minister of DMNR thought it was an urgent priority to facilitate the surveying and leasing of the Irish seabed to support the nascent industry. In spite of these peripheral activities, as the narrative and the calibration for the period show, the policy stream was definitely not ripe. This case is therefore a difference by degree without contradicting the MSF hypothesis.

In 2017, OFW was still not on the political agenda, but the problem stream had ripened somewhat. Civil servants in the DCENR and staff in the TSO had adopted the problem framing that OFW was necessary to meet a 2030 RES-E target. However, their efforts had not yet succeeded to move OFW on any institutional agendas other than the TSO's. It would only be in 2018 that OFW entered the agenda of more institutions. During this transition phase, as OFW moved back on to the political agenda after about eight years off the agenda, it is not surprising that agenda status lagged the status of the problem stream. Chapter 4.5.2 and 4.5.9 provide a detailed account of this. However, these deviant cases do point out the limits of the QCA method to account for the sequence of changing conditions at the cusp of agenda change.

In 2018S2 the problem stream had completely ripened as per the set definition and anchors for PRO_STR, but OFW was not yet fully on the agenda (again, as per the set definition and anchors for AG_CHG). Most policy makers now accepted that OFW was necessary to reach the 2030 target and it was on the agenda of two institutions. The deviancy here is a matter of degree, down to how the QCA sets are defined and anchored and due to the empirical data that demonstrates how changes in the problem stream precede agenda change.

For ~POL_STR, the analysis also presents several deviant cases. For the periods 2004S2 – 2007S1 and 2016S1 – 2017S1 in particular there appears to be deviancy by degree. In the first instance, OFW was neither on the political agenda, nor was the politics stream ripe, However the programme for government was not explicitly opposed to it (GOV_PRG = 0.33). Over this period, the programme for government would had to have been opposed to it (as it was in 2011) for the politics stream to be completely hostile. As with many of the previous case this deviancy is a matter of degree. It is not surprising that no political institutions paid attention to OFW whilst the PfG neglected it, if not outright opposed it.

The preceding analysis of necessity provides strong evidence that OFW can't make it on to the political agenda, or stay on the agenda, if most of the policy community does not agree that it is a solution to a pressing policy problem. Alternatively, it can't make it on to the agenda if the government programme for government and the influence of interest groups are not supportive.

5.3.5. Necessary disjunctions for no agenda status

Lastly, I investigate any SUIN relations to no agenda change. Table 12 presents the results of the analysis.

Table 12: Analysis of necessity for no agenda change, including SUIN conditions

		inclN	RoN	covN
1	~PRO_STR	0.944	0.820	0.915
2	~POL_STR	0.929	0.793	0.899
3	~WIND_PR + ~ENTRE	0.912	0.639	0.829
4	~WIND_POL + ~ENTRE	0.917	0.726	0.867

The SUIN analysis reveals two disjunctions necessary for no agenda change. However, similar to SUIN conditions for agenda change, clarifying higher-order concepts that encapsulate each disjunction for no agenda change is conceptually challenging. The finding does not imply that there is necessarily a deeper concept, but highlights that there could be. If no policy window or a lack of entrepreneurship were functional equivalents, what deeper concept/mechanism may their disjunction represent? This may be a conceptually meaningless finding. As noted in Chapter 5.3.2, it may also point to a deeper challenge of coherence for the MSF theory. Windows in the problem stream and the politics stream, and entrepreneurial action can't be functional equivalents, they need to be sufficiently distinguishable for the theory and hypothesis to be coherent.

5.4. Analysis of sufficient conditions

Next, the study turns to testing the MSF hypothesis as a statement of sufficiency. Drawing on the general hypothesis in Chapter 3.5.4, there are again two options for this, depending on the nature of the policy window:

1. WIND_PRO*PRO_STR*POL_STR*POLY_STR_ENTRE → AG_CHG
2. WIND_POL* PRO_STR*POL_STR*POLY_STR_ENTRE → AG_CHG

In this section, I present the QCA analysis of sufficiency for agenda change. The analysis of sufficiency for *no* agenda change is included in Appendix G. I apply the Enhanced Standard Analysis (ESA) to minimize the logical remainder for the truth table solutions, in line with current best practice (Oana, Schneider and Thomann, 2021).

5.4.1. The conservative solution for agenda change

Table 13 displays the Truth Table for agenda change. I have chosen a consistency threshold of 0.8 and a PRI threshold of 0.51 for sufficiency, in line with current best practice (Oana, Schneider and Thomann, 2021). The results show that four ‘primitive expressions’ are sufficient for the outcome (OUT = 1):

a) Row 64: WIND_PR*WIND_POL*PRO_STR*POL_STR*POLY_STR*ENTRE
b) Row 61: WIND_PR*WIND_POL*PRO_STR*POL_STR*~POLY_STR*~ENTRE
c) Row 32: ~WIND_PR*WIND_POL*PRO_STR*POL_STR*POLY_STR*ENTRE
d) Row 12: ~WIND_PR*~WIND_POL*PRO_STR*~POL_STR*POLY_STR*ENTRE

Table 13: Analysis of sufficiency, truth table including all logical remainders. PRI = Proportional Reduction in Inconsistency

	WIND_PR	WIND_POL	PRO_STR	POL_STR	POLY_STR	ENTRE	OUT	n	incl	PRI	cases
64	1	1	1	1	1	1	1	4	0.952	0.917	40,41,42,43
32	0	1	1	1	1	1	1	4	0.936	0.883	18,19,20,21
12	0	0	1	0	1	1	1	2	0.915	0.792	22,23
61	1	1	1	1	0	0	1	1	0.883	0.791	39
57	1	1	1	0	0	0	0	2	0.698	0.442	37,38
4	0	0	0	0	1	1	0	6	0.437	0.147	1,2,3,4,5,6
51	1	1	0	0	1	0	0	2	0.428	0.103	13,14
19	0	1	0	0	1	0	0	4	0.388	0.095	7,15,16,17
3	0	0	0	0	1	0	0	3	0.357	0.072	8,9,24
33	1	0	0	0	0	0	0	2	0.338	0.090	10,11
49	1	1	0	0	0	0	0	4	0.331	0.066	12,34,35,36
17	0	1	0	0	0	0	0	3	0.311	0.068	25,32,33
1	0	0	0	0	0	0	0	6	0.281	0.071	26,27,28,29,30,31
2	0	0	0	0	0	1	0	0			
5	0	0	0	1	0	0	0	0			
6	0	0	0	1	0	1	0	0			
7	0	0	0	1	1	0	0	0			
8	0	0	0	1	1	1	0	0			
18	0	1	0	0	0	1	0	0			
20	0	1	0	0	1	1	0	0			
21	0	1	0	1	0	0	0	0			
22	0	1	0	1	0	1	0	0			
23	0	1	0	1	1	0	0	0			
24	0	1	0	1	1	1	0	0			
34	1	0	0	0	0	1	0	0			
35	1	0	0	0	1	0	0	0			
36	1	0	0	0	1	1	0	0			
37	1	0	0	1	0	0	0	0			
38	1	0	0	1	0	1	0	0			
39	1	0	0	1	1	0	0	0			
40	1	0	0	1	1	1	0	0			
50	1	1	0	0	0	1	0	0			
52	1	1	0	0	1	1	0	0			
53	1	1	0	1	0	0	0	0			
54	1	1	0	1	0	1	0	0			
55	1	1	0	1	1	0	0	0			
56	1	1	0	1	1	1	0	0			
9	0	0	1	0	0	0	?	0			
10	0	0	1	0	0	1	?	0			
11	0	0	1	0	1	0	?	0			
13	0	0	1	1	0	0	?	0			
14	0	0	1	1	0	1	?	0			
15	0	0	1	1	1	0	?	0			
16	0	0	1	1	1	1	?	0			
25	0	1	1	0	0	0	?	0			
26	0	1	1	0	0	1	?	0			
27	0	1	1	0	1	0	?	0			
28	0	1	1	0	1	1	?	0			
29	0	1	1	1	0	0	?	0			
30	0	1	1	1	0	1	?	0			
31	0	1	1	1	1	0	?	0			
41	1	0	1	0	0	0	?	0			
42	1	0	1	0	0	1	?	0			
43	1	0	1	0	1	0	?	0			
44	1	0	1	0	1	1	?	0			
45	1	0	1	1	0	0	?	0			
46	1	0	1	1	0	1	?	0			
47	1	0	1	1	1	0	?	0			
48	1	0	1	1	1	1	?	0			
58	1	1	1	0	0	1	?	0			
59	1	1	1	0	1	0	?	0			
60	1	1	1	0	1	1	?	0			
62	1	1	1	1	0	1	?	0			
63	1	1	1	1	1	0	?	0			

This is consistent with features of causal complexity; i.e. equifinality and conjunctural causation. At first glance, it appears that only statement (a) is consistent with the MSF hypothesis (Row 64) whilst the others contradict it.

Logical minimization produces simpler conjunctions, removing redundant conjuncts and redundant prime implicants. Table 14 presents the 'conservative solution' to this minimization. This only considers those logical combinations of conditions for which the sample of cases provide some proof; i.e. there is at least one case to test a particular combination of conditions sufficient for the outcome.

Table 14: Analysis of sufficiency for agenda change, minimization of logical remainders. PRI = Proportional Reduction in Inconsistency, covS = Coverage Sufficiency, covU = Unique Coverage.

	inclS	PRI	covS	covU	cases
WIND_POL* PRO_STR* POL_STR* POLY_STR* ENTRE	0.957	0.934	0.561	0.266	18,19,20,21; 40,41,42,43
~ WIND_PR* ~ WIND_POL* PRO_STR* ~ POL_STR* POLY_STR* ENTRE	0.915	0.792	0.275	0.096	22,23
WIND_PR* WIND_POL* PRO_STR* POL_STR* ~ POLY_STR* ~ ENTRE	0.883	0.791	0.245	0.045	39
Solution	0.948	0.919	0.702		

The 'Solution' in Table 14 is a disjunction of three primitive statements. The first confirms what we would expect for the MSF hypothesis; i.e. the conjunctions of all MSF conditions is sufficient for agenda change in these cases. It holds for eight cases, spanning most of the two periods where OFW was on the political agenda. This is a promising result. The second and third primitive expressions are less supportive of the MSF hypothesis, but only hold for three cases between them (2009S2 – 2010S1, 2018S1). This requires a further investigation of these cases to establish how the case data produces this unexpected outcome. Figure 30 – 34 visualise the three subsidiary statements in radar charts.

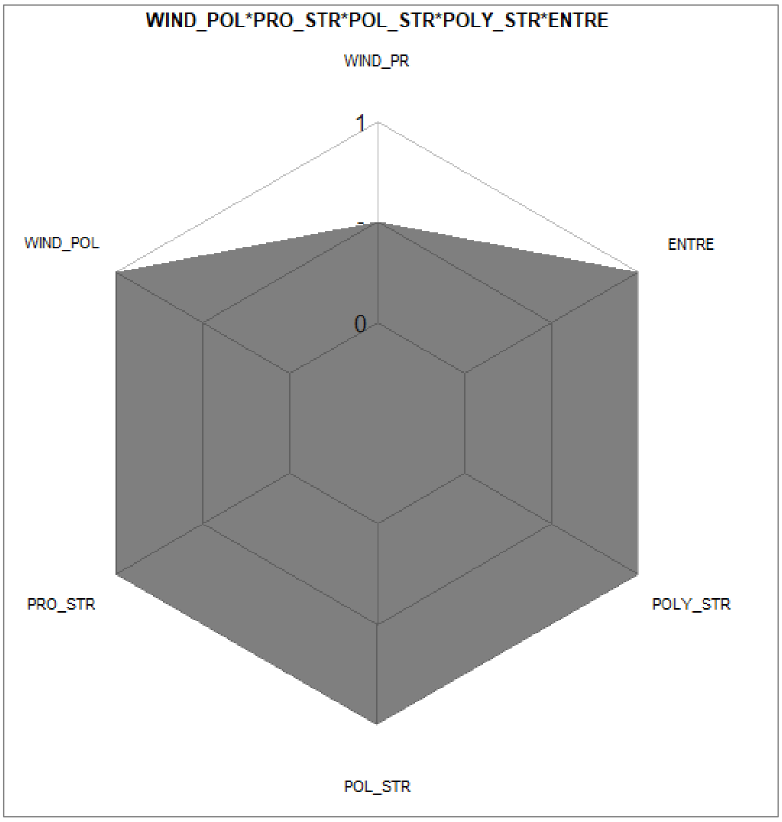


Figure 31: Analysis of sufficiency, radar graph for cases 2007S2 - 2009S1, 2018S2 – 2020S1. '-' = condition is not part of the sufficient conjunct. '0' = negation of condition. '1' = condition present.

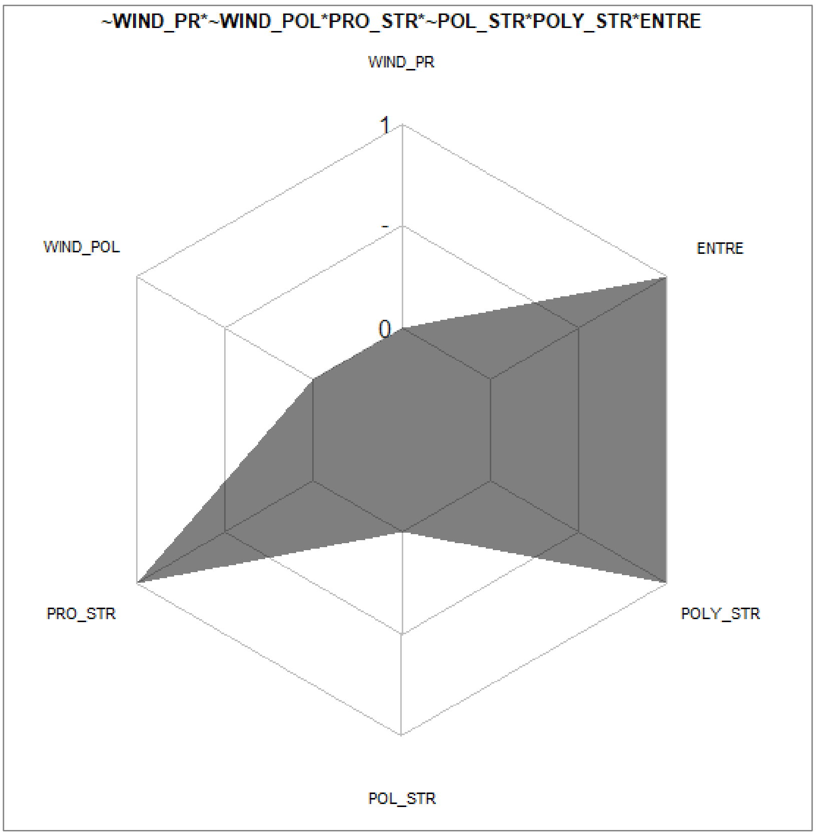


Figure 30: Analysis of sufficiency, radar graph for cases 2009S2 - 2010S1

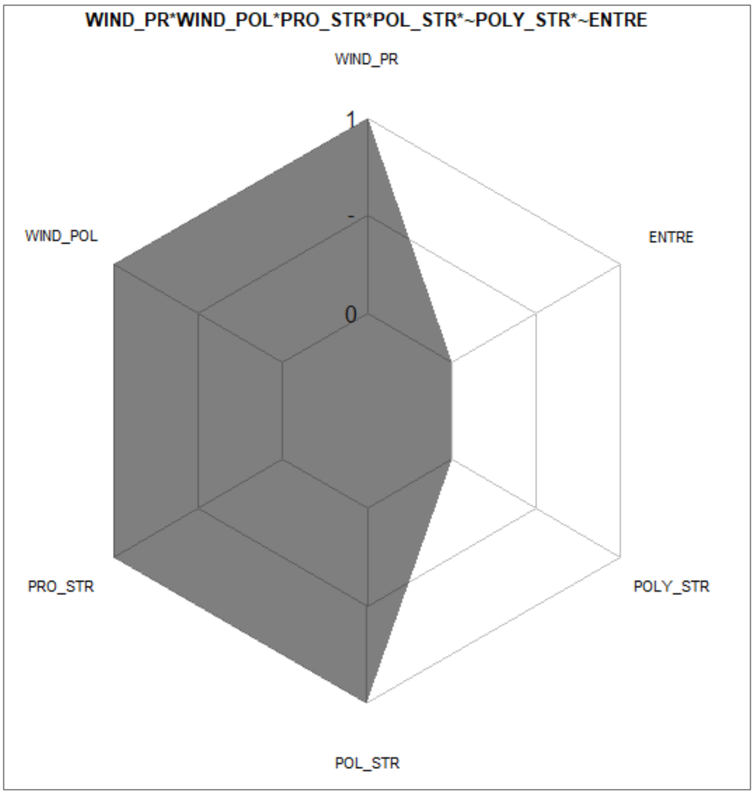


Figure 33: Analysis of sufficiency, radar graph for 2018S1

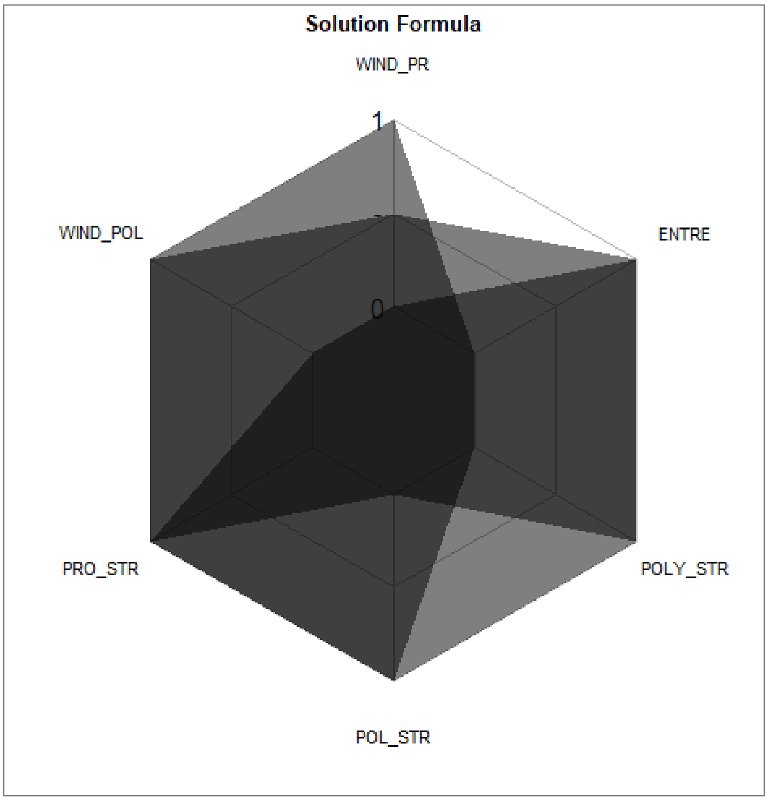


Figure 32: Analysis of sufficiency, radar graph for full solution

The analysis returns to 2009S2 – 2010S1 and 2018S1 to understand the extent to which results for these cases undermine the MSF hypothesis. For 2009S2 –

2010S1 there was no policy window, either in the politics or problem stream, nor was the politics stream ripe, and yet OFW was on the agenda. The empirical issue here is the same as discussed in the previous analysis of necessity (refer to Chapter 5.3.3). For this year, there is not a lot of confidence in the calibration of AG_CHG. There is some evidence that OFW was still on the agenda, but also some evidence that it had waned sufficiently not to receive much substantial attention. Even if the assumption is that it did still enjoy substantial attention from the Joint Committee and the DCENR, does this contradict the MSF hypothesis? The case study evidence also suggests an interpretation that some elected officials and civil servants continued sporadic work on the matter, even though the original policy window which brought it on to their agendas had closed and conditions in the politics stream had changed. They may have sought to complete or at least progress the work they had started for some time whilst it was uncertain how the drastically changing political agendas of 2009 would play out. Agenda status for them may have trailed but ultimately tracked changes in the status of the policy window and politics stream. The fact that they failed is indicative of the limits of entrepreneurship amidst changing systemic barriers which the MSF may offer some explanation of from 2010S2 onwards as OFW was then clearly off the agenda. The QCA analysis is blind to such temporal shifts, though this study has sought to make a couple of small adjustments for temporal drift (refer to Appendix D).

For the period 2018S1 OFW was back on the agenda, but the policy stream was not ripe and there was no entrepreneur, as per the calibrations for POLY_STR and ENTRE. ENTRE = 0.25 for this case because only some officials within Eirgrid and the DCENR were promoting OFW as a solution to reaching the 2030 climate and renewable energy targets, but there were as yet no entrepreneurs promoting a technology-specific grid connection policy, price support instrument, or urgent reform of marine planning legislation. For ENTRE > 0.5, there would have to be policy entrepreneurship in three policy areas. POLY_STR = 0.33 for this case as there were as yet no policy solutions for a renewable price support instrument or marine planning legislation. This case does present a deviant case in kind for the MSF hypothesis as operationalised in the QCA. OFW made it on to the political agenda of the TSO and the line department for energy without the above conditions being met. Revisiting the narrative in Chapter 4.4 provides a detailed alternative account of the conditions that elevated it on these agendas. One primary point is that there seems to be a two-step logic to understanding OFW's agenda status. First, OFW needs to be framed as a necessary solution to a pressing policy problem. Once most of the policy community agrees on this, the absence of OFW then becomes the problem that requires further policy solutions, like technology specific grid connection, price support, and marine planning policy. I return to this discussion in the next chapter, but suffice to say adjustments in how MSF is operationalised to account for this is necessary.

5.4.2. The parsimonious solution for agenda change

It is also necessary to address the issue of the limited diversity of cases in the study. The truth table in Table 13 indicates many logical remainders for which there is no case data to test (OUT = "?" in the table). We may consider counterfactual claims of sufficiency by including the logical remainders in a 'parsimonious solution'. Including these in the logical minimization gives us the simplest possible summary of the empirical facts.[84] Table 15 and Table 16 present the results of this minimization; two simpler alternatives for sufficiency.

*Table 15: Solution M1: PRO_STR*POL_STR + (PRO_STR*POLY_STR) -> AG_CHG - Analysis of sufficiency for agenda change using an enhanced parsimonious solution.*

	inclS	PRI	covS	covU	cases
PRO_STR* POL_STR	0.943	0.915	0.632	0.045	18,19,20,21; 39; 40,41,42,43
PRO_STR* POLY_STR	0.963	0.942	0.669	0	22,23; 18,19,20,21; 40,41,42,43
Solution	0.944	0.915	0.752		

[84] "…'Simplest possible' means that no single conjunct can be dropped from any of the sufficient conjunctions without violating information contained in the truth table. Because of its property of non-redundancies, the most parsimonious solution is sometimes considered the only solution type that can be interpreted causally because for each of its conjuncts there is empirical evidence at the cross-case level that it does make a difference to the outcome (Baumgartner, 2008, 2015)."

*Table 16: Solution M2: PRO_STR*POL_STR + (PRO_STR*ENTRE) -> AG_CHG - Analysis of sufficiency for agenda change using an enhanced parsimonious solution.*

```
==========================================================================
                  inclS  PRI   covS  covU               cases
--------------------------------------------------------------------------
PRO_STR* POL_STR 0.943 0.915 0.632 0.045  18,19,20,21; 39; 40,41,42,43
PRO_STR* ENTRE   0.957 0.932 0.700 0.018 22,23; 18,19,20,21; 40,41,42,43
Solution         0.944 0.915 0.752
--------------------------------------------------------------------------
```

When we consider all the possible configurations of conditions, including the logical remainders (i.e. counterfactuals), we find that simpler hypotheses to the MSF hypothesis could be sufficient to explain agenda status for OFW for the empirical data in the QCA.

Having both the problem stream and the politics stream ripe for coupling is sufficient for explaining agenda change in almost all of our cases. This is a potentially powerful conclusion: If most policy makers agree that OFW is a solution to a particular policy problem they've identified, and either the programme for government or the balance of influence between industry groups are supportive of OFW, then OFW will make it on to the political agenda of multiple institutions. In such instances policy entrepreneurship (on most of the policy elements), extant policy solutions, and indeed policy windows are not necessary to explain agenda change.

Alternatively, having both the problem stream and policy stream ripe, or having the problem stream ripe with entrepreneurial effort on multiple policy elements may also be sufficient to put OFW on the political agenda.

In each instance, most of the MSF conditions appear redundant for a parsimonious explanation of sufficiency. Therefore, whilst the empirical evidence supports the MSF claim that a conjunction of all the MSF conditions are sufficient for agenda change, the consideration of counterfactuals consistent with the empirical findings suggests that there are even simpler relationships of sufficiency possible. I return to the implications of this finding in the discussion chapter.

5.4.3. The conservative solution for no agenda change

Table 17 displays the truth table for no agenda change. The results indicate eight 'primitive expressions' are sufficient for the outcome (OUT = 1).

Table 17: Analysis of sufficiency for outcome 'no agenda change', consistency threshold of 0.8 and a PRI threshold of 0.51

	WIND_PR	WIND_POL	PRO_STR	POL_STR	POLY_STR	ENTRE	OUT	n	incl	PRI	cases
49	1	1	0	0	0	0	1	4	0.952	0.934	12,34,35,36
3	0	0	0	0	1	0	1	3	0.950	0.928	8,9,24
17	0	1	0	0	0	0	1	3	0.949	0.932	25,32,33
1	0	0	0	0	0	0	1	6	0.945	0.929	26,27,28,29,30,31
19	0	1	0	0	1	0	1	4	0.936	0.905	7,15,16,17
33	1	0	0	0	0	0	1	2	0.934	0.910	10,11
51	1	1	0	0	1	0	1	2	0.934	0.897	13,14
4	0	0	0	0	1	1	1	6	0.903	0.853	1,2,3,4,5,6
57	1	1	1	0	0	0	0	2	0.760	0.558	37,38
12	0	0	1	0	1	1	0	2	0.677	0.208	22,23
61	1	1	1	1	0	0	0	1	0.558	0.209	39
32	0	1	1	1	1	1	0	4	0.513	0.117	18,19,20,21
64	1	1	1	1	1	1	0	4	0.465	0.083	40,41,42,43
5	0	0	0	1	0	0	0	0			
6	0	0	0	1	0	1	0	0			
7	0	0	0	1	1	0	0	0			
8	0	0	0	1	1	1	0	0			
18	0	1	0	0	0	1	0	0			
20	0	1	0	0	1	1	0	0			
21	0	1	0	1	0	0	0	0			
22	0	1	0	1	0	1	0	0			
23	0	1	0	1	1	0	0	0			
24	0	1	0	1	1	1	0	0			
26	0	1	1	0	0	1	0	0			
28	0	1	1	0	1	1	0	0			
30	0	1	1	1	0	1	0	0			
34	1	0	0	0	0	1	0	0			
36	1	0	0	0	1	1	0	0			
37	1	0	0	1	0	0	0	0			
38	1	0	0	1	0	1	0	0			
39	1	0	0	1	1	0	0	0			
40	1	0	0	1	1	1	0	0			
42	1	0	1	0	0	1	0	0			
44	1	0	1	0	1	1	0	0			
46	1	0	1	1	0	1	0	0			
48	1	0	1	1	1	1	0	0			
50	1	1	0	0	0	1	0	0			
52	1	1	0	0	1	1	0	0			
53	1	1	0	1	0	0	0	0			
54	1	1	0	1	0	1	0	0			
55	1	1	0	1	1	0	0	0			
56	1	1	0	1	1	1	0	0			
58	1	1	1	0	0	1	0	0			
60	1	1	1	0	1	1	0	0			
62	1	1	1	1	0	1	0	0			
2	0	0	0	0	0	1	?	0			
9	0	0	1	0	0	0	?	0			
10	0	0	1	0	0	1	?	0			
11	0	0	1	0	1	0	?	0			
13	0	0	1	1	0	0	?	0			
14	0	0	1	1	0	1	?	0			
15	0	0	1	1	1	0	?	0			
16	0	0	1	1	1	1	?	0			
25	0	1	1	0	0	0	?	0			
27	0	1	1	0	1	0	?	0			
29	0	1	1	1	0	0	?	0			
31	0	1	1	1	1	0	?	0			
35	1	0	0	0	1	0	?	0			
41	1	0	1	0	0	0	?	0			
43	1	0	1	0	1	0	?	0			
45	1	0	1	1	0	0	?	0			
47	1	0	1	1	1	0	?	0			
59	1	1	1	0	1	0	?	0			
63	1	1	1	1	1	0	?	0			

Table 18 below shows the conservative solutions for no agenda change. The conservative solution show three conjunctions, each of them sufficient to explain many of the observed cases. Taken together, the solution explains all of the observed cases.

Table 18: Analysis of sufficiency for no agenda change, the conservative solution.

	inclS	PRI	covS	covU	cases
WIND_POL* ~ PRO_STR* ~ POL_STR* ~ ENTRE	0.955	0.940	0.532	0.081	25,32,33; 7,15,16,17; 12,34,35,36; 13,14
~ PRO_STR* ~ POL_STR* ~ POLY_STR* ~ ENTRE	0.966	0.957	0.474	0.090	26,27,28,29,30,31; 25,32,33; 10,11; 12,34,35,36
~ WIND_PR* ~ WIND_POL* ~ PRO_STR* ~ POL_STR* POLY_STR	0.947	0.926	0.396	0.110	8,9,24; 1,2,3,4,5,6
Solution	0.960	0.949	0.732		

Before exploring the conjunctions, it is worth noting that two contain conditions that do not match theoretical expectations. Whilst the study does not propose a hypothesis for lack of agenda status for OFW, it would be consistent with the MSF to see the absence of the specified conditions in the conjunctions. Not having one or more of the conditions hypothesised as enabling agenda change would be expected for cases where OFW is not on the agenda. This is mainly the case with the three conjunctions in Table 18. However, the first conjunction contains WIND_POL and the third contains POLY_STR. How is it that having policy solutions for OFW may combine with an absence of the other conditions to contribute to a lack of agenda status? How is it that a supportive programme for government and support from interest groups may combine with the absence of the other enabling conditions to contribute to lack of agenda status? Although neither WIND_POL nor POLY_STR may be necessary or sufficient for OFW to gain agenda status, it is also not clear how they may be mechanisms contributing to keeping OFW off the agenda. There is a ‘directional expectation’ that the absence of these conditions may contribute to lack of agenda status or even be irrelevant, but not that their presence may actively contribute to this outcome. I therefore exclude these conditions from the minimization when looking for a parsimonious solution

5.4.4. The parsimonious solution for no agenda change

Once excluding these directional expectations based on the case data and theory and minimizing, the results show a simplified solution as per Table 19.

Table 19: Analysis of sufficiency for no agenda change, intermediary solution.

	inclS	PRI	covS	covU	cases
~ PRO_STR* ~ POL_STR* ~ ENTRE	0.968	0.960	0.745	0.360	26,27,28,29,30,31; 8,9,24; 25,32,33; 7,15,16,17; 10,11; 12,34,35,36; 13,14
~ WIND_PR* ~ WIND_POL* ~ PRO_STR* ~ POL_STR	0.955	0.940	0.464	0.080	26,27,28,29,30,31; 8,9,24; 1,2,3,4,5,6
Solution	0.965	0.956	0.824		

If neither the problem stream nor the politics stream is ripe and there is no entrepreneurial activity, then OFW will not be on the political agenda. The period 2010S2 – 2016S2 demonstrates this conjunction. There was no one in the policy community framing the lack of OFW as policy problem, or in other words no policy makers thought that OFW was a solution to any of the policy problems they were occupied with. In this instance, it was challenges with meeting the 2020 target and, to a lesser degree but increasingly from 2013 onwards, how best to set and reach 2030 and 2050 goals. Programmes for government over the period were not supportive of OFW, and the balance of influence with interest groups lay with the onshore wind energy industry.

Alternatively, if neither of these streams are ripe and there is no policy window, then OFW will not be on the political agenda. The period 1999S1 – 2003S1 demonstrates this conjunction. Considering the state of relevant indicators, feedback on policy implementation, and Focusing events together, these did not on the whole open an opportunity for policy entrepreneurs to push OFW. Neither was there a majority of the public supportive of more ambitious government action on climate change. Almost no policy makers were framing OFW as a solution to any of the pressing policy issues at the time, and the balance of interest group influence on the matter was in favour of onshore wind deployment (and against OFW deployment).

6. Discussion

Individuals in and around states and governments may have different reasons for paying attention to particular power generation technologies. Whether the rationales include climate change mitigation, energy security, economic development, or efficient markets, governments continuously pass policies favouring some technologies over others. People in and around governments, utilities, electricity system operators, and regulators, pay attention to some technologies, sometimes for extended periods of time, at the expense of other technologies. As Smil notes, energy transitions are fundamentally prolonged, multi-decadal processes of technology switching, replacement or accretion (Smil, 2016). Regardless of the political or economic rationales, the current energy transition is ultimately defined as the replacement of systems relying overwhelmingly on fossil fuels with biofuels and electricity generated from nuclear and/or renewable sources. In this context, offshore wind energy is one of the newest entrants to the set of power generation technologies deployed at commercial scale. In a few national jurisdictions this technology has already been central to decarbonisation, energy security, and/or economic development. In the future it is likely to play this role in many more jurisdictions. However, as the literature review pointed out, very little academic research has given a detailed account of how OFW becomes an issue on a government's agenda in the first instance, or how complex configurations of policies crystalize to support its deployment. This is the broader context and general gaps in knowledge that motivated this study.

This chapter therefore critically considers the contribution to knowledge arising from the empirical research, recommendations for future research, and limitations of this study. I divide the discussion in five parts.

Firstly, I discuss the contribution of this study to our understanding of agenda and policy change (refer to RQ2, Figure 1, p. 9). In particular, I discuss how OFW as an object of political attention interacts with extant institutions and the policy process. I suggest an alternative to Herweg et al.'s model of the policy process, inspired by MSF. I also provide a new characterisation of a grid connection policy cycle as an example of a policy process that energy generation technologies must interact with in a liberalised power sector *en route* to deployment.

Secondly, I discuss whether the results support a general theory of agenda setting as advanced by the MSF hypothesis (refer to RQ3, Figure 1, p. 9). I do this by considering the results of the process tracing and QCA.

Thirdly, I reflect on the value of my novel methodological approach that combined process tracing with QCA to address the study objectives.

Fourthly, I make recommendations for future research. This takes the form of new hypotheses that may be tested comparatively to progress understanding of agenda change and policy change for OFW.

Finally, I note the caveats and limitations of this research.

6.1. How does OFW behave as a political object and interact with policy processes and institutions?

In this section I discuss the results from the process tracing and QCA to fulfil the second objective and research question of this study.

At the outset, I framed this study around the interaction between a particular technology and the politics shaping its deployment and being (to a lesser degree) shaped by it. Indeed, although the research questions were drawn from the policy process discipline (Weible and Sabatier, 2017), the object of analysis differed markedly from most empirical policy studies (Herweg, Huß and Zohlnhöfer, 2015; Zohlnhöfer, Herweg and Zahariadis, 2022). One of the attributes of empirical and conceptual MSF literature is that it focuses on a particular ‘policy proposal’, often a piece of legislation that has to pass through the legislature, as the fundamental object of analysis. It is policy-oriented rather than issue-oriented or institution-oriented. This study took a different object of analysis; OFW as a type of renewable power generation technology that becomes the focus of politics and policy actors.

In the domain of energy policy, there are good reasons to change the object of analysis. In short, this study demonstrates that asking “How did this REFIT or that marine planning bill rise on the political agenda?” or “How was the final terms of that energy Act agreed?” is demonstrably different from asking “How did wind power rise on the political agenda?” or “How were policies decided to support the commercial deployment of OFW?” For political and policy analysis to offer a realistic sense of the political and temporal scale and nature of the current transition, a much greater number of coherent national case studies are needed that trace the entire period of agenda setting and policy making accompanying the displacement of one (or more) fossil fuels by new fuel sources or power generation technologies.

Instead, one distinguishing characteristic of empirical studies of the current energy transition from within the discipline of public policy is that the object of analysis is almost always a single policy/legislation, or alternatively relatively brief periods of agenda setting associated with the passing (or not) of a policy. As this study makes clear, a focus on individual policies and legislation, which almost always is temporally narrowed to a couple of years, will be subject to historical revisionism very shortly. Auction schemes may be implemented and fail. REFITs may be announced, and spur an offshore ‘wind rush’, only to be abandoned. Maritime leases may be granted only to be hoarded. Grid connection policies will be implemented, only to have unintended consequences. Grid connection offers will be made, only to be refused. All the while years and even decades will pass. There is no platonic form for policy instruments or legislation necessary or sufficient for the deployment of a renewable energy technology. Rather, over time, this study demonstrates a diverse set of mechanisms, and complex and shifting configurations of conditions.

The relative lack of political regard globally for technology-neutral policy approaches to decarbonisation further lends support to a technology-oriented focus in policy analysis. For instance, a carbon tax has long been demonstrated as the most effective and efficient policy instrument to drive decarbonisation (in theory), yet uptake of this instrument has been slow since the 1990s (Köppl and Schratzenstaller, 2023). Instead, a widespread political pre-occupation with supporting some technologies (often fossil fuels) at the expense of others is evident. Few countries have adopted a carbon tax, but most countries like to pick winners and losers in the energy sector. Politicians and political systems seem to prefer picking technological winners and losers.

Tracking a particular technology necessary for a national energy transition, from the moment it entered the arena of political contestation through to a substantial series of policy decisions that, when taken together, resulted in its commercial deployment is therefore key. By keeping the object of focus firmly on the technology, research can prioritise milestones and relations consequential for understanding the energy transition. If MSF and other theories of the policy process are to serve the interests of research communities focused on energy transitions or the decarbonisation of the energy sector better, a sustained application on technology change, rather than (singular) policy change, as the object of analysis is required.

6.1.1. Conditions that shape problem framing vis-à-vis offshore wind energy

So what has this study contributed to the understanding of OFW as a political object? The first contribution is to explain how the presence or absence of contextual (or scope) conditions influence different legitimating narratives (problem framing or partial coupling in MSF terms) for and against political support for its commercial deployment. Drawing from the process tracing results, Table 20 summarises the scope conditions. These conditions constituted the inputs to the battle of ideas that shaped OFW's political status over a twenty year period. Some of these conditions remained stable throughout, whereas others shifted notably at different intervals and in uncoordinated ways.

Table 20: General conditions that shape the agenda status and policy adoption of offshore wind energy; manifestation in the Irish context 1999 – 2020.

General condition	Manifestation in Irish context
Extant industry	*Absence of national industry to benefit from OFW-related manufacturing and deployment*
Renewable generation alternatives	*Cost differential between OFW and available onshore wind resource*
Scale of power market	*Relatively small island power system, isolation of island market from other European power markets*
Greenhouse gas emissions and public support for mitigation	*High and rising greenhouse gas emissions (per capita) and strong public support for mitigation*
Grid-related constraints	*Limits to penetration of variable renewables on system, decadal expectations of synchronous-non-synchronous penetration potential*
Grid expansion and reinforcement	*Spatial constraints and opportunities onshore and offshore*

Long-term forecasting capacity	*Availability/absence of power and energy systems modelling tools and modellers for long-term scenario planning*
Energy import dependence	*Relative scarcity of national fossil fuel resources, high level of imports*
Renewable energy targets	*Successive, legally binding decadal targets*

Between 1999 – 2020, opportunities for national industrial development was never an important justification for OFW deployment in Ireland, simply because it lacked the path dependencies created by manufacturing industries such as those in Denmark, Germany, the Netherlands, and China (Kamp, 2006; Fornahl *et al.*, 2012; Dawley, 2014; MacKinnon *et al.*, 2019). Neither did the re-development of marginal and declining (sub-national) regions serve as a justification as it has done in the UK and US (Westgard-Cruice and Aoyama, 2021). This had been evident at the outset of this study. Consequently, the QCA coded the problem framing around energy (in)security, climate change and renewable energy target attainment, feedback on extant policies (particularly looking at related policy failures) and Focusing events that may serve to legitimate OFW.

Indeed, it is tempting and intuitive to think that climate action and energy (in)security have collectively driven the political fortunes of OFW in Ireland and elsewhere since the early 2000s. Much research either assumes this as an article of faith or constructs a case in broad brush strokes in support of this claim (Kern *et al.*, 2014; Banet, 2018; Motta, 2021; Do *et al.*, 2022; MacKinnon *et al.*, 2022). However, a consistent analysis of these factors did not explain OFW's shifting political agenda status in Ireland over a period of two decades. The QCA demonstrates that a policy window, constructed around an aggregation of the above terms, were neither necessary nor sufficient for OFW to make it on to the political agenda. Neither did detailed process tracing reveal that these factors acted as causal mechanisms (on their own). At best, the ratcheting up of an increasingly ambitious decadal emissions target for 2030 was a necessary but not sufficient causal mechanism to explain OFW's rise on the agenda in 2018/19. Furthermore, energy (in)security served as a general scope condition that played into certain problem frames, but over a multi-decadal time-horizon, could not be directly linked to political action to progress OFW in the Irish case.

The above discussion is not peculiar to Ireland. It is only very recently that some researchers have started paying closer attention to the complexities of agenda-setting for offshore energy as an object of political interest (Kusters, van Kann and Zuidema, 2023). Kusters demonstrates how, in the Netherlands, incumbents 'locked-in' agendas across multiple agenda-setting arenas to steer policy innovation for offshore energy whilst the government sought to remain technology-neutral as far as possible, given their wider energy systems goals, delaying a commitment to particular technologies in their long-term planning for as long as possible.

This study supports several of Kusters et al.'s findings and expands on others. If we want an answer to questions of the type "Why offshore wind energy at this point and not 10 years earlier or 10 years later?" it is necessary to consider the interests of multiple institutions, including the system operator, regulator, civil servants, specialist economic and energy advisors and successive governments within the context of a liberalized power sector, alongside the beliefs and expectations of multiple actors spread across the aforementioned institutions. This study reveals that actors across these institutions adopt a more complex problem framing centred on the expected capacity of the electricity grid to accept penetration of various variable renewables, and the expected availability and cost differentials between different competing technologies to meet energy targets.

In the Irish case, the above rationale was often termed a 'least cost technology neutral' approach to renewable energy policy making, though the term often specified an ideal rather than the actual terms of the policies that ultimately emerged. Indeed, most civil servants from within the department of energy and politicians in successive governments over two decades sought to maintain an energy systems perspective as far as possible and delay support for OFW (and other generation technologies such as utility scale solar) for as long as possible within their long-term planning, as advised by economic and energy systems specialists in the energy policy community. This ultimately manifested as a preoccupation with policy support for the deployment of onshore wind power as the cheapest available renewable source.

Within this paradigm, decadal renewable energy targets (more recently derived from climate change emissions reductions targets) and the capability of specialists to model long-term energy pathways become key to justifying support for particular technologies at particular points in time. In Ireland, between 1999 and 2010 this paradigm manifested itself notably through seven-year power demand/supply forecasts issued by the system operator (with economic input from ESRI) and a loose approximation of the pipeline of forthcoming wind projects from industry (a signal from the market). This paradigm manifested itself firstly through the choice of terms for the price support instrument, which became the main battle ground for competing ideas. However, from 2011 this paradigm underwent a step-change in the time-horizon of planning and in the sophistication of the models used to simulate all energy systems (and electricity demand/supply as a sub-system within the energy system), with the emergence of an Irish energy systems modelling community and the Irish TIMES Model. This led to a shift in power to a more prescriptive approach in steering future supply.

Finally, this study serves as another demonstration of how the lack of social acceptance of certain technologies can have a knock-on effect on other technologies. In Denmark, Germany and the UK the decline of available land-based sites, partially driven by social opposition to onshore wind energy broadly contributed to the political support for OFW (Hays, 2005; Ernst & Young, 2015)(Kern *et al.*, 2014). In Ireland, it was social opposition to onshore grid development, aimed at connecting the expected future onshore wind sites, that was the earliest cause of the TSO's shift to advocating for a pivot to OFW, and was a necessary part of the problem framing. This preceded the ratcheting up of the climate change target for 2030 and the emergent expectations that the cost differential between onshore and offshore wind would decrease significantly by 2030. OFW may receive a boost up the political agenda if the cheapest available offshore sites are close to (onshore) demand centres and are expected to be less problematic to connect than onshore renewable energy sites that may be far from demand centres and complicated to connect.

6.1.2. Shifting terms of personal agency and institutional power

The longitudinal nature of this study also sheds light on the shifting relations between institutions and personal agency in the selection of energy technologies for political agendas. Over two decades, the increasing sophistication of various models (and networks of modellers) to assess bigger sets of technologies and optimize technology mixes to meet specified emissions targets at least cost and subject to grid-related constraints ultimately became the locus of problem framing and technology legitimation.

In 2007 a single elected official (with some tacit support from a few other elected officials) from a minor party in a coalition government could put a renewable energy technology on the political agenda, despite the fact that most conditions were not favourably disposed to its deployment, including the opinions of most experts in the renewable energy policy domain. The idea being put forward was that climate change targets would become increasingly ambitious and that the government ought to prioritise OFW with the eye on long-term decarbonisation and electricity export. But who knew what the world would look like in 2020? At this point, the central forecasting tool was the TSO's seven-year demand and supply forecast. This was the practical horizon for justifying the political prioritisation of electricity generation projects to serve national demand. Furthermore, the national TSO held a *de facto* monopoly on the legitimation of investment in further interconnection, constrained by the emergent norms set by the regulator. Given the uncertainty, there was little a political entrepreneur could do to justify the additional cost to electricity consumers. In the battle of ideas it only required one well-placed cost benefit analysis, comparing an offshore wind REFIT with the status quo, to dissuade most of the political support for the measure as a solution to future national demand. A dedicated political entrepreneur could put OFW on political agendas, but the TSO, regulator and market ultimately determined the terms of policy, or lack thereof.

Ten years later, it appeared that the agency of political entrepreneurs (i.e. elected officials) had eroded even more; it appears unlikely that any politician or party could put a particular power generation technology on political agendas. What emerged in the intervening spell was an ever larger cast of national and international specialists controlling ever more sophisticated modelling tools pushing temporal horizons out to several decades. Norms around an evidence-based, all-energy systems, least-cost approach to inform policy making had emerged (refer to Chapter 4.5.2, p. 153). The time-horizon within which prioritisation of certain electricity generation technologies could be justified also shifted out to over a decade, perhaps 12 – 13 years. Civil servants and elected officials could not propose solutions, or pick technologies, without these being de facto vetted by the outputs of some long-term, scenario modelling project that considered a technology alongside many others. These new norms came with its own incumbents or gatekeepers, whether the TSO, particular universities, or private sector consultancies (refer to Chapter 4.5.9, p. 175). In turn the power shifts to the modellers who are both priests and prophets, defining and weighing alternatives and delivering the visions of possible energy futures along with credibility to civil servants and elected officials who employ their analysis. Power rests with civil servants and elected officials in as far as they have a choice to commission analysis from one groups of experts over another (refer to Chapter 4.5.10, p. 183). In this, policy entrepreneurship and agency, when it comes to technology selection, appears to become diffused across wide networks of collaborating or coordinating experts that share model input data and assumptions.

In summary, since the late 1990s agency in the selection of renewable power generation technologies, both for the political agenda and the adoption of policies, has shifted away from the vertically integrated public utility and to a diffuse network of specialists that span the system operator, specialist private sector and university consultants and researchers developing and operating increasingly sophisticated power and energy system models. Civil servants and the elected official heading the department of energy have agency in as far as they can commission such specialists, and in the case of civil servants mediate the interests of the TSO, regulator and government in the assumptions that inform the scenario modelling projects.

6.1.3. Offshore wind energy and the policy process

The findings of this study also suggest revisions to some generic models of the policy process. Here recent refinements in MSF theory serve as a useful example. Zohlnhöfer, Herweg and Zahariadis make a general proposal for distinguishing between the ‘agenda setting’ and ‘decision making’ phases within the policy process and the implications for the legislature in the decision making phase (refer to Chapter 2.3.8 for discussion and Figure 2, p. 36). They have advanced these theoretical refinements in multiple papers and textbooks on theories of the policy process, so it stands as a recent exemplar of the state of the art in using MSF (Herweg, Zahariadis and Zohlnhöfer, 2017; Zohlnhöfer, Herweg and Zahariadis, 2022). However, the findings of this study suggest that their general distinction, between 'agenda setting' that delivers 'worked out proposals' for the phase of 'decision making' concerned with bargaining the 'concrete design' of a selected proposal, is of limited use when considering several policies across several institutions, all implicated in supporting the deployment of a particular technology. These contradictions are due to conditions that may apply to policy processes aimed at supporting certain renewable generation technologies in the context of a parliamentary democracy with a liberalised electricity sector.

From the results of this study, it is possible to propose an alternative, generic two-part logic on how a renewable power generation technology gains agenda status and ultimately how policy outputs are adopted. Agenda status is largely determined by framing the technology as a necessary solution to a particularly pressing policy problem (refer to Chapter 4.1.8, p. 123 and Chapter 4.5.9, p. 175). When there is widespread agreement in the policy community on this problem framing, or among particular political entrepreneurs who adopt it, then the technology gains agenda status. At this first stage, the nature of agenda status for technology X is largely a function of the associated problem framing and the policy community, or individual entrepreneur(s), driving it. The absence of technology X then becomes the policy problem for which further policy solutions are required. Because the development of alternative technology-specific proposals spanning price support, grid connection, and marine planning legislation are technically and politically complex as well as resource intensive, the policy-making community will generally not work out proposals for supporting a particular technology until the technology is firmly on the agenda (refer to Chapter 4.3, p. 128) and Chapters 4.5.11p. 189). Once institutional mandates are given, the policy community will set out developing technology-specific proposals, often drawing on extant general solutions, for decision-making.

The extent to which substantial policy decision on detailed terms are deferred to the so-called ‘decision making’ stage depends on the type of policy and the institutional mandate. For price support instruments, for instance, civil servants and their commissioned experts may work out close to all of the detailed terms of a particular instrument, and elected officials (i.e. the line minister and the cabinet) will have very few if any substantial contributions. In the Irish case, such price support instruments, a cornerstone for renewable energy deployment, do not pass through the legislature. For legislation, such as terrestrial or marine planning bills, elected officials may still negotiate and alter substantial clauses of a draft bill. For connection policy, the regulator’s final decision may be substantially different from the draft proposal of the system operator, due to stakeholder consultation and its interpretations of its legal responsibilities. For grid connection policy, most of the consultation and refinement of terms are done during the final ‘decision making’ window. However, for price support, most of the consultation and associated decisions are completed during the softening up stage within the policy stream. Furthermore, when policy makers are concerned with some or all of the policy elements together, their development may occur in more or less coordinated ways. Several types of intended and unintended ‘spillovers’ may occur.

From the results of this study, I propose an alternative framework (Figure 34). It maintains the MSF’s structural distinctions of three largely separate streams and the functions of policy and political entrepreneurship, but incorporates the conditions and institutional dynamics that characterize the rise of a renewable generation technology on the agenda and pathways through to policy adoption.

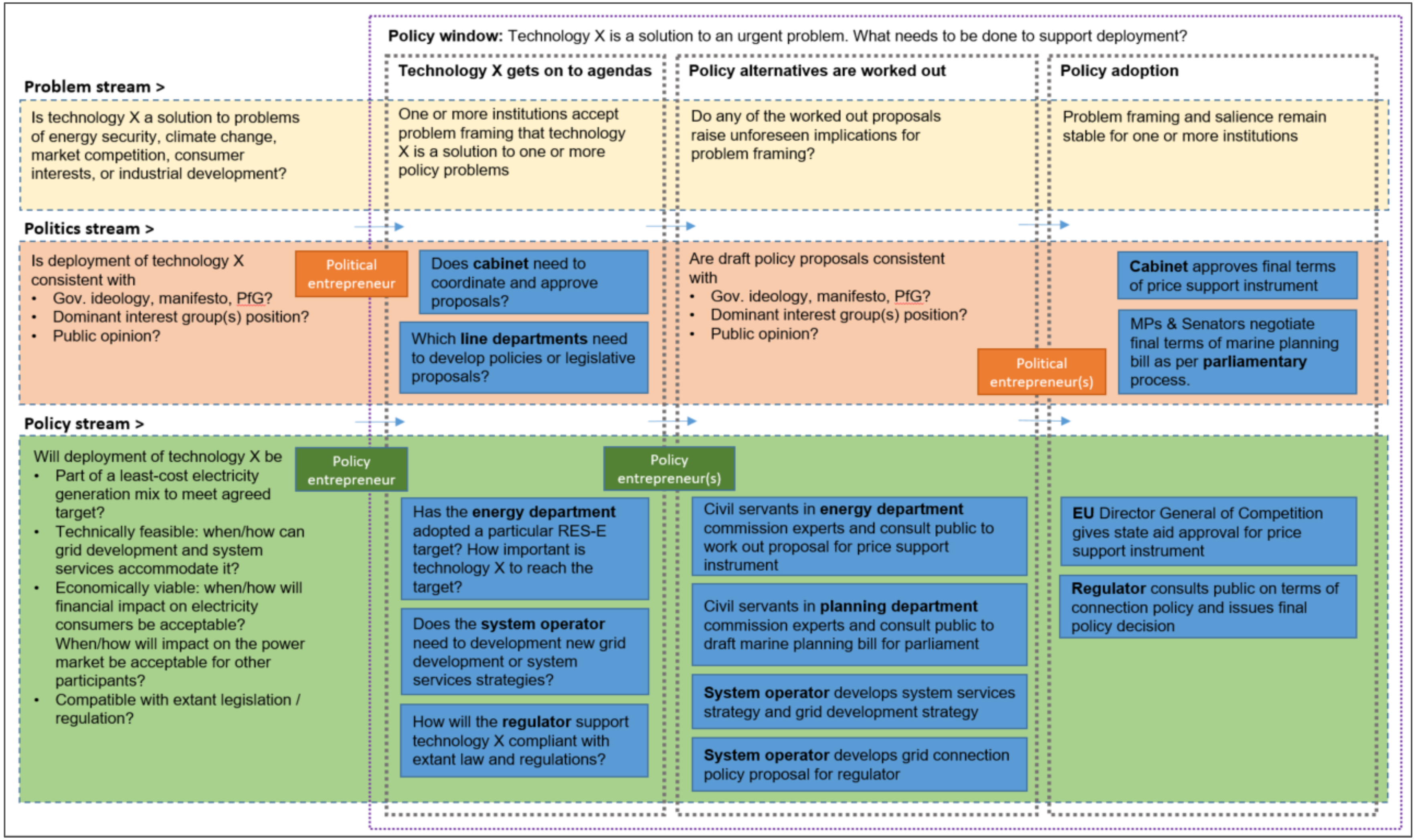


Figure 34: A new framework for how a particular energy generation technology moves through the policy process

The proposed framework demonstrates the primary importance of the policy stream in establishing the agenda status of energy generation technologies (Chapters 4.5.9 and 4.5.10). Increasingly, decadal climate and/or energy target setting structures cycles of renewable energy policy-making. Consequently, policy makers rely more on long-term scenario modelling to provide the evidence base for justifying certain policy proposals, including the prioritisation of certain generation technologies. It is the long-term pathways generated by the energy and power systems models that provide answers to the questions: How much of this generation technology and when? The case also demonstrates how the modelling outputs can vary greatly in the proposed pathways based on who conducts the modelling, which stakeholders are involved and which assumptions constrain the modelling. Variations in the aforementioned can significantly alter the importance and timing of particular generation technologies in national energy transitions. The problem that civil servants faced in Ireland (and are facing in many other jurisdictions) are: how does country X reach a renewable energy target in MW or % of generation terms? How does country X reach an emissions target in kgCO2e terms? The more ambitious these targets, the more they push the system models and modellers. New generation technologies then begin to receive attention from more policy makers, the more the scenario modelling affirm their place in the future energy mix at the decadal horizon. In the Irish case, it was firstly the scenario planning of the system operator that started foregrounding the role of OFW in the 2030 generation mix. The department of energy in its draft National Energy and Climate Plan, followed shortly after. Subsequently, modellers from McKinsey, commissioned by the department of energy and under pressure to propose a plan for meeting an increasingly ambitious climate change target for 2030, allocated more of the emissions mitigation burden to electricity and OFW in particular. This would serve projected demand in 2030 if there was extensive electrification of residential heating and transport sectors. These latter assumptions on demand were themselves based on the ‘top down’ requirement to meet an emissions reduction target, rather than ‘bottom up’ assumptions on how these sectors may reasonably be expected to electrify.

Increasingly, from about the mid-2010s onwards, it is through scenario planning processes like these that the case is made for prioritising policy attention on particular technologies at particular points in time. This generalisation may hold, not merely for OFW, but for other generation technologies and for any jurisdiction with long-term energy or climate change targets and/or a mature policy making community with sufficient technical capacity for long-term power system planning in the system operator, civil service, and energy modelling community.

The observations of this study (and the proposed framework) also contradict two fundamental MSF claims: that policy windows are temporally brief and that policy windows do not open in the policy stream (Herweg, Zahariadis and Zohlnhöfer, 2017). This may have been the case for energy technologies prior to the systemization of long-term climate and energy systems modelling and planning, as was observed in the Irish context in 2007 (Case 1). However, subsequently agenda windows for specific technologies open in the policy stream, rather than the problem or politics stream. Although an initial problem window based on climate change or energy targets may be a precursor, it may not be clear for some time (potentially years), what the optimal power generation technology mix would be for meeting such a target. If we take climate change target setting as the policy window for particular renewable technologies, then such windows clearly span several years. If, by definition, we take windows to be brief opportunities, then these may only open for a particular technology as agreement in the policy community coalesces around the contribution of the electricity sector to meeting an emissions reduction target, and consequently how particular generation technologies contribute to the power mix for this target, but then a policy window clearly emerges from within the policy stream. For power generation technologies like OFW, policy windows are either brief and open in the policy stream, or they open in the problem or politics stream and endure for many years. This interpretation is consistent with the finding from the process tracing and QCA that policy windows in the problem stream did not form part of either a causal mechanism, or a necessary or sufficient configurations of conditions for OFW’s agenda status. Although concerns over energy security and climate change are evidently drivers for the current energy transition, their collective historical ebb and flow may not be temporally closely associated with OFW’s movement on and off the political agenda. As noted before, they may at best be scope conditions. It is the experts within the policy stream, along with their increasingly sophisticated modelling tools, that have come to occupy a dominant position in bringing particular technologies on to the political agenda. The process by which this occurs may take years, even when ‘ruptures’ in the relation between modellers and policy makers precipitate relatively large shifts in the solution configuration, as was noted in Case 3.

The other challenge to the generic MSF problem-solution logic to agenda status is that it does not account for some of the reasons policy makers may have *against* supporting the deployment of OFW (or other generation technologies). The most important may be the availability of a cheaper alternative generation technology and thescarce capacity and resilience on the power grid for variable renewable penetration. A situation may persist for multiple decades where commercial deployment of OFW would be at the expense of other renewables, given grid and market related constraints. Given the large scale of individual OFW projects, this is particularly the case for relatively small grids and markets. In as far as policy makers are careful to support target attainment at least cost to electricity consumers, reasons against supporting a more expensive technology may persist for a long time. If we want to have a theory or framework that provides a more accurate indication of how and when particular energy generation technologies are likely to gain political recognition, it must incorporate reasons against a particular issue gaining agenda status. The generic MSF does not appear to do this very well.

My proposed framework, although more restricted in its domain to agenda setting for power generation technologies, achieves this. The fsQCA developed for this study operationalised a relatively nuanced conception of policy windows opening in the problem stream (consisting of seven sets, aggregated to three MSF concepts). This is much more nuanced than any extant empirical study of this nature. Yet it still failed to capture the complexity of the problem-solution logic that policy makers and experts in the renewable energy policy domain employed. Much of the logic rests on expectations of the future, at least a decade in advance.

1. Does technology X form part of a ‘least-cost’ generation mix to meet projected demand in a decade’s time?

2. Will improvements in the transmission grid and grid resilience accommodate commercial deployment of technology X in a decade's time?

If policy makers in the system operator and regulator do not answer both of these questions in the affirmative, it is unlikely that they would consider a power generation technology as a solution to policy problems of energy security, liberalisation, or decarbonisation. They will dissuade any elected official or civil servant who disagrees.

In one sense, the MSF is too limited to accommodate such considerations. The framework and hypothesis are concerned with policy proposals that are already accepted (to some degree) as solutions to policy problems, not the extent to which constraints keep proposals from being considered as solutions in the first place. Alternatively, MSF consigns such considerations to the 'primordial soup' in which policy ideas compete for survival in the policy stream. Proposals to support particular technologies may suffer defeat here on grounds of not being technically feasible or economically viable compared to available alternatives.

However, as the two-part logic proposed above makes clear, such considerations in the policy stream tend to precede problem brokering vis-à-vis a particular technology. Therefore, as an alternative, such dynamics can be operationalised in the problem stream as indicators or feedback on policy implementation. For instance, an MSF-driven QCA may define the expected cost-differential between a technology and other generation technologies as an indicator that influences policy window dynamics. If policy makers expect a particular technology to remain significantly more expensive than available alternatives, then it may serve to close a technology-specific policy window in the problem stream (or keep it from opening). If policy makers expected that it was unlikely that a particular technology could be connected to the future grid within the current grid planning horizon, or if connected, would be significantly curtailed, this may also serve to keep a policy window from opening in the problem stream and from the stream being ripe for coupling. It is difficult to reduce this to a single indicator, although the Irish case demonstrated the importance of SNSP as an indicator that shaped policy expectations and decisions for well over a decade. This may also be interpreted as feedback within the problem stream on the implementation of the TSO's grid development and system services strategies.

6.1.4. Developing and adopting technology-specific policies for deployment

Even if a range of policy makers agree that the state should prioritise a particular energy generation technology and that new technology-specific policies are needed to this end, the interaction between the new technology and extant policy sub-systems may heavily influence how it moves from enjoying agenda status to policy adoption. This study lends support for distinguishing distinct policy streams for price support instruments, marine planning legislation and grid connection policy, given the different actors, ideas, institutions, and varying degrees of coordination between the streams. In this section I take grid connection policy as an example. I draw on the process tracing narratives and the appendices to demonstrate how grid connection policy has its own sub-domain specific drivers that may characterise it over several decades and in turn effect the accommodation of a new generation technology.

Drawing on the results of this study, Figure 35 characterizes the drivers that determine the dynamics in the policy stream for grid connection, and influence the politics and problem stream. Variable interaction between these drivers contributed to very different treatments of OFW over the past two decades. The central legislated norms governing regulatory decisions remained largely unchanged for two decades (Article 9(4)a highlighted in the Figure 35). However, given changing conditions, the interpretation of these terms led to remarkably different policies vis-à-vis connecting OFW. Between 2003 and 2011 the regulator refused to provide any separate policy or technology-specific terms for OFW under any of the Gate 1 – 3 policies, that processed all grid connection applications for wind power plant. However, in 2019, the regulator issued an *ad hoc* direction to the system operator to process several OFW projects separately from onshore wind energy applications. Narrowly, this demonstrates how a forthcoming auction-based price support instrument, and ultimately attainment of a decadal climate target, may drive an *ad hoc* technology-specific connection policy. However, what the results of this study make clear is that a confluence of all the factors in Figure 35 informed the regulator's decisions vis-à-vis OFW in each instance.

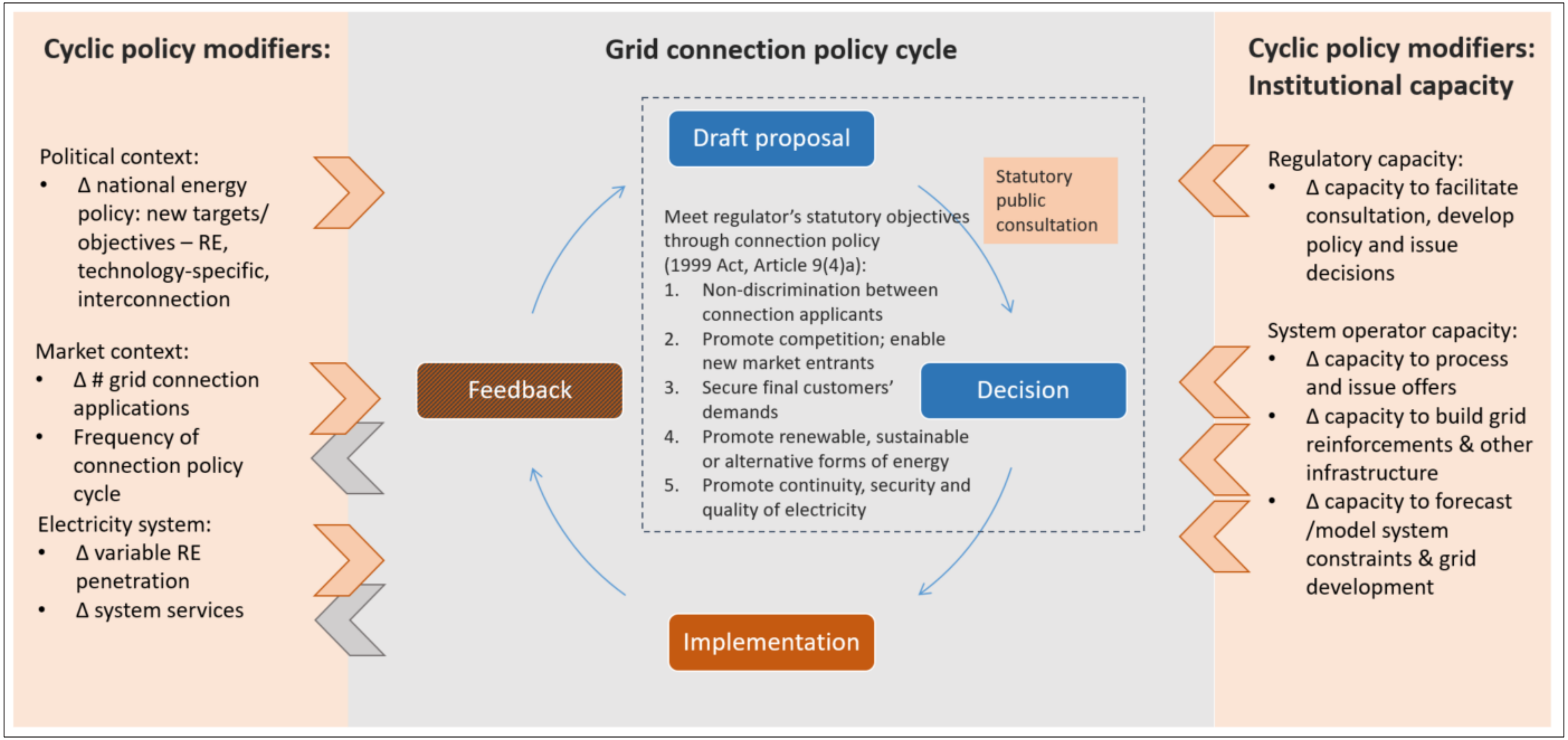


Figure 35: The grid connection policy cycle for the Ireland all-island power system, generated from study results. The structure of the policy cycle and the status of cyclic modifiers affect how (and when) a particular generation technology comes to enjoy technology-specific terms. Δ = mathematical symbol delta denoting change in a modifier.

The above findings are generalizable in form; the dynamics shaping the policy stream for grid connection policy, and its influence on policy adoption for OFW (or other new power generation technologies) may hold for any jurisdiction with an independent regulator subject to similar legal constraints and cyclic modifiers.[85]

6.2. Does the evidence support a general theory of agenda setting?

I consider evidence from both methodological approaches in answering RQ2. I first consider the evidence for MSF as a hypothesis about causal mechanisms and scope conditions, after which I consider evidence for MSF as a hypothesis about a complex configuration of conditions.

6.2.1. A mechanistic interpretation of MSF

The process tracing results do not provide strong support for the MSF hypothesis, interpreted as the functioning of particular causal mechanisms in particular contexts. This is because several of the causal mechanisms and most of the scope conditions identified by the process tracing can't be easily interpreted in MSF concepts.

Case 1 (Figure 7, p. 125) and Case 3 (Figure 22, p. 215) present two alternative causal mechanisms that can put OFW on a political agenda. Conversely, Case 2 presents the mechanisms that can cause OFW's fall from an agenda (Figure 8, p. 148).

[85] The detailed examination of the data enabled an extraction of this theory of the connection policy process. The QCA operationalised segments and directional status of the cycle (the area in grey in the diagram) through the concepts of policy feedback on and solutions for grid connection. Structured cycles of consultation constituted feedback on policy implementation failures and success and contributed to opening a policy window (in the problem stream) for the period between the publication of a new draft connection policy and a final decision. This policy window is also more clear-cut because procedural legal constraints also circumscribe how the regulator interacts with the policy community, industry, government and the system operator(s). New draft grid connection policy proposals contributed to policy stream ripeness whenever an extant (implemented) policy enabled connection of wind power plant. Yet, the QCA cannot capture why it is that the regulator refused technology specific terms for OFW for almost twenty years, only to change course in 2019. For those the cyclic modifiers (the areas in orange in the diagram) are required for explanations. Alternatively, the process tracing only selectively includes those elements of the cycle as and when it causally related to OFW. In addition, detailed consideration of grid connection policy processes, included in Appendices 2F – H, enabled this fuller understanding. The figure for grid connection policy can be drawn with confidence; the case draws on data from six connection policy cycles (one before the regulator intervened, and five subsequently). On the matter of marine planning legislation reform, there was no similar repeated cycle of legislative reform from which to draw a general characterization with confidence. The distinction in policy streams is evident when comparing Figure 35 to marine planning legislation in Ireland, for which there is no comparable schematic

For Case 1 (Figure 7, p. 125), every link in the causal mechanism can be abstracted to MSF concepts. In this sense, this case plays to the strengths of MSF as it requires a causal explanation that draws on both structural mechanisms (policy windows and spill overs) and personal agency (significant entrepreneurial efforts by individuals) to explain agenda change.

For Case 2 (Figure 8, p. 148) the causal mechanism (in its entirety) cannot be abstracted to MSF concepts, as MSF cannot account for one of the constitutive parts. A focusing event (the financial crisis) triggered a change in the expectations of key policy makers (elected officials in government and opposition parties) regarding future material changes (decrease in demand for electricity, public opposition to increases in electricity costs). This coincided with policy entrepreneurship against OFW (ESRI demonstrating that an OFW REFIT would have a significant impact on consumers). The two factors taken together led the government to deprioritise support for OFW. It may be tempting to interpret the aforementioned as a policy window opening in the problem stream (to push OFW off the agenda). However, a necessary part of the mechanism was the change in expectations of key policy makers and the uncoupling of OFW from the 2020 RES-E target (see M_2 in Figure 8). This cannot be reduced to a deterioration of indicators or feedback on policy implementation failures. Simply put, MSF's concept of a policy window in the problem stream struggles to capture the causal mechanism identified as ultimately a complex ideational change (informed by material scope conditions) that certain politicians underwent vis-à-vis OFW at the time.

Case 3 (Figure 22, p. 215) also presents a causal mechanism that cannot be wholly explained by the MSF hypothesis. The rapidly decreasing cost of OFW in other jurisdictions alongside the complex evolution of policy makers' expectations about the contribution of different sectors to national climate change target attainment played essential causal functions to push OFW on to the agenda, but neither can be abstracted to MSF concepts (X_3 and M_2, Figure 22).[86]

[86] To recap and clarify the Case 3 results: When the EU ratcheted up the climate change target for 2030, it was by no means clear that OFW was necessary to reach it. Indeed, the dominant policy position was that OFW was only needed for deep decarbonisation scenarios in 2050. In spite of these pathways, some policy makers began to change their expectations on the

Furthermore, several MSF concepts are redundant for the identified causal mechanisms. Neither the readiness of the politics stream nor readiness of the policy stream play a causal function in any of the three cases, whilst the readiness of the problems stream only play a causal function in Case 3. These concepts are either irrelevant or may even have been countervailing forces for OFW's rise on the political agenda. For instance, the lack of availability of policy solutions across the implicated areas did not stop entrepreneurs from pushing the technology on to the agenda in the early 2000s. The fact that very few, if any, policy makers thought the lack of OFW was a problem deserving policy attention (problem stream readiness) also did not dissuade entrepreneurs for OFW policy in their efforts at agenda setting in the early 2000s.

In addition, very few of the scope conditions identified for the three cases could be interpreted in MSF-terms. High energy import dependence, rising national greenhouse gas emissions, and performance against EU-imposed decadal renewable energy targets all constituted deteriorating indicators that formed pervasive scope conditions over twenty years, but none appeared to do any causal work as a mechanism that brought OFW on to the agenda. This is because of the more complex logic of problem framing discussed in Chapter 6.1. Furthermore, the readiness of the politics stream could be conceived as a scope condition in this case, but its influence on the causal mechanism remains ambiguous. Public support for climate action clearly explains some of the Green Party's electoral success as well as the general cross-party support for action on the issue of climate change. Some parties translated this into acceptance of OFW if not an active prioritisation of political action on the matter. However, the

feasibility of implementing several policies that would make up a 'least cost' approach to decarbonisation. They no longer expected the agriculture sector to cut emissions, nor did they think measures to significantly improve energy efficiency of industry and housing, or the switch to biofuels would achieve the modelled emissions reductions. Generically, MSF would classify the aforementioned as part of the 'softening up' process by which many policy alternatives are reduced to a few. However, when OFW is the object of analysis, softening up would apply to the process of identifying alternatives for its deployment. Rather, the step in question happened before OFW was even on the agenda. Furthermore, it was a particular idea, belief or expectation that serves as the clearest articulation of the causal mechanism, rather than a process of reducing alternatives. Secondly, MSF also struggles to interpret the decrease in the cost of OFW in other jurisdictions, a structural mechanism that directly drove consensus in the Irish policy community on the future prospects of the technology in Ireland. At a stretch, one might classify this as a change in an indicator. However, MSF literature emphasises the deterioration of an important indicator as contributing to problem framing. In this case, the cost differential between onshore and offshore wind had not been an indicator of political import, nor did it present a particular political problem.

dominant interest groups in the energy sector, most notably onshore wind energy developers, were not in favour of the deployment of OFW. MSF conceives these distinct conditions as linked elements that constitute the politics stream and determine its readiness (Herweg, Zahariadis and Zohlnhöfer, 2017). However, the case data makes clear how interest groups and public opinion exercise influence through different causal pathways and in different directions. Most notably, in the context of a liberalised power sector, the actions of power generation developers became increasingly aimed at the regulator and the transmission system operator. The new and emergent institutional arrangement that spilled over from the liberalisation of the electricity sector largely mediated the effect of interest groups. On the other hand, the effect of public opinion manifested through the stance of political parties and individual elected representatives. During this period, there was no public that had emerged around the issue of OFW in particular, affording agency to political parties to select particular policy issues aligned with public support for climate action. In this sense, the 'politics stream' appears to be an incoherent concept when trying to give a causal explanation of agenda change.

Arguably, the most noteworthy challenge for MSF is to account for scope conditions that may influence the functioning of causal mechanisms to bring OFW on to political agendas. The findings make clear how scope conditions informed two divergent ideas about the appropriate political response to OFW, most notably an argument against policy support for OFW. It was the two competing ideas that constituted the necessary discursive component of policy and political entrepreneurship. In the case of the 'pro OFW' camp, it served as the coupling discourse. These competing problem frames for and against OFW drew heavily on scope conditions that mostly cannot be reduced to MSF concepts of indicators, feedback, or focusing events. MSF theory, in reducing the problem/solution logic underlying coupling to these three concepts, appears unable to account for the structural conditions that inform problem framing and coupling. How shall one classify electricity grid-related constraints, geographic proximity/isolation, the cost of OFW and availability of cheaper alternatives, and the absence of industrial development within the MSF? In this case, the evidence does not support any claims that these conditions can be classified as indicators, feedback or a focusing event.

6.2.2. Complex configurations of conditions

The QCA results are mixed. It disconfirms certain interpretations of the MSF hypothesis whilst confirming other interpretations. Most notably, the results do not support the formulation of the MSF hypothesis as a statement of necessity as advance by Zohlnhöfer et al. They claim that the hypothesis "could be falsified by showing that agenda change has occurred although (at least) one of the streams was not ripe, or there was no policy-window or no policy-entrepreneur pushed for the change" (Zohlnhöfer and Rüb, 2016, p. 6). Interpreted thus, this study falsifies MSF. However, the QCA also enables other interpretations of the hypothesis, and provides more empirical support for these.

Firstly, the QCA finds that no individual MSF element, on its own, nor a conjunction of all of the elements is necessary (and non-trivial) for OFW to make it on to the political agenda. This disconfirms any theoretical claims that policy windows, or ripeness of one or more of the streams, or even policy entrepreneurship across most of the implicated areas of a policy issue, is necessary for policy change in this domain. On the contrary, neither a policy window in the problem stream, nor policy entrepreneurship across most of the implicated policy areas, nor very favourable conditions in any of the three streams were, in and of themselves, necessary for OFW's agenda status when considered over a period of more than 20 years.

The QCA also finds that a conjunction of all the MSF elements is not necessary for OFW's agenda status. Although the quantitative analysis does not find a relation of necessity, a qualitative interrogation of the deviancy reveals that most deviant cases are matters of degree, and do not outright contradict the hypothesis.[87] In other words, the degree of agenda status for OFW is not fully matched by the degree of favourability in the underlying conditions, but the

[87] Because this is a logical conjunction of all the MSF conditions, it means that there is at least one condition with a lower set score than the outcome set. For some cases, this may merely mean that one of the MSF concepts is less favourable than the outcome. In these cases, a conjunction with four out of the five conditions (without the 'lagging' condition) would be necessary for agenda change. I interpret such cases as still offering relatively strong evidence for the MSF hypothesis. For other cases, more than one of the conditions have a lower set score than the outcome. The more conditions are absent, the more disconfirming the case becomes. Furthermore, for each of the deviant cases, a different condition may be responsible for the deviancy. Because this study is interested in testing the hypothesis in general across many cases, an analysis that discards the lagging condition from each case in an ad hoc manner would be unacceptable.

directionality of the conditions does not outright contradict the hypothesis. A visual inspection of the result illustrates the deviancy (refer to Figure 26).

The general interpretation of the QCA analysis for MSF as a necessary conjunction of conditions therefore runs at follows: OFW can be on the political agenda of several institutions even if a policy window is only somewhat open, and/or one or more of the streams are only somewhat ripe, and policy entrepreneurship covers some (but not all) of the implicated policy areas. OFW is usually on the political agenda to a greater degree than the conjunction of conditions are favourable, but not directly contradicting the hypothesis.[88]

The analysis of the non-occurrence of the outcome is also a significant contribution of this study to the MSF literature. However, extant literature does not include an MSF hypothesis for no agenda or policy change.[89] When considering the absence of OFW on the political agenda, this study found two relationships of necessity. If OFW is not on the political agenda we can infer that most of the renewable energy policymaking community do not agree that it is a solution to an urgent policy problem; i.e. the problem stream is not ripe. Alternatively, we can infer that the politics stream is not ripe; i.e. taken together, the programme for government and the balance of influence with interest groups are not in favour of supporting OFW. The relationships of necessity of

[88] This means one of two things. When OFW is on the agenda of at least three institutions, one or more of the conditions are only partially, but not fully, favourable. When OFW is on the agenda of only one institution (so more off the agenda than on it), at least one of the conditions is completely unfavourable. Here, referral back to an illustrative case example may assist. Throughout 2019 OFW was on the political *tout court.* The TSO was advocating explicitly for its contribution to the 2030 target, and commissioning offshore grid development studies for the east coast. The department of energy had included OFW targets and related actions in the Climate Action Plan and the National Energy and Climate Plan. It was working with the department of planning to progress the National Marine Planning Bill, and the cabinet was driving a cross-departmental effort on this. OFW's agenda status was therefore as favourable as it could be on the QCA set calibration. Yet, the PfG had not been supportive of OFW when the government's term started, so the politics stream was only partially ripe. There was not yet a policy solution for marine planning legislation, so the policy stream was only partially ripe. No policy entrepreneur was yet promoting a technology-specific price support instrument under the RESS auctions (though there was entrepreneurship in other areas), so entrepreneurship was not yet fully extended to all the policy elements necessary for OFW deployment. All of the aforementioned conditions were more favourable than unfavourable, but not as favourable as they could have been on the respective set calibrations.

[89] The implicit assumption may be that agenda or policy change is less likely the fewer of the MSF conditions are present. However, if one was to fully invert the positive hypothesis as the negative hypothesis it would be the strong statement that none of the conditions are present: Agenda/policy change is less likely if a policy window does not open, the streams are not ripe for coupling, and a policy entrepreneur does not promote agenda change. The dataset for this study was too skewed to consider a full analysis of this option (refer to Appendix P, p. 413). However, analysis of individual conditions were possible.

these two conditions to the outcome is much stronger than, and not symmetrical to, the relations of necessity for the inverse outcome, highlighting the asymmetry of causally complex relations on this issue.

Turning to the MSF hypothesis as a statement of sufficiency, the study also generated mixed results. A conjunction of all the MSF conditions is sufficient for OFW's agenda status, but there are also simpler explanations consistent with the empirical data.

The 'conservative solution' found that the MSF hypothesis explains almost all of the cases for OFW being on the agenda. This is a positive result that confirms the general MSF hypothesis, and provides more confidence for inference in other cases of OFW. If we observe a window in the politics stream, three ripe streams, and policy entrepreneurship across most of the policy elements, then we can infer that OFW is on the political agenda of several institutions.

However, the QCA analysis also enables the computation of more parsimonious conjunctions that are consistent with the empirical data. When we consider all the possible configurations of conditions, including the logical remainders (i.e. counterfactuals), we find that simpler hypotheses to the MSF hypothesis could be sufficient to explain agenda status for OFW for the empirical data in the QCA. Having both the problem stream and the politics stream ripe for coupling is sufficient for explaining agenda change in almost all of the cases. This is a powerful conclusion: If most policy makers in a national renewable energy policy sub-domain agree that OFW is a solution to a particular policy problem they've identified, and either the programme for government or the balance of influence between industry groups is not opposed to OFW, then OFW will make it on to the political agenda of multiple institutions. In such instances, policy entrepreneurship (for particular technology-specific policy elements), extant policy solutions, and indeed policy windows (as operationalised by this study) are not necessary to explain agenda status for OFW.

Alternatively, having both the problem stream and policy stream ripe, or having the problem stream ripe with entrepreneurial effort on multiple policy elements may also be sufficient to put OFW on the political agenda. That is, if most of the policy community agrees that OFW is a solution to a particular policy problem, and either there are extant policy solutions for at least two of the three OFW policy elements, or alternatively, policy entrepreneurship for technology-specific policy measures, then OFW will make it on to the political agenda.

In each of the alternatives above, most of the MSF conditions are redundant for a parsimonious explanation of sufficiency. Therefore, whilst the empirical evidence supports the MSF hypothesis that a conjunction of *all* the MSF conditions are sufficient for agenda change, the consideration of counterfactuals consistent with the empirical findings uncovers simpler relationships of sufficiency. Simpler configurations of the MSF conditions can have similar explanatory power to the general hypothesis.

Using QCA to test the general MSF hypothesis offers a promising route to theoretical progress. The set theoretic basis for such analysis fits both the fundamentally interpretative nature of the MSF theory and the complexity of the subject matter it attempts to explain. This consists in identifying directional conditions that influence agenda setting and policy decision making in particular policy domains or for particular policy issues, linking them to higher-order or more abstract MSF concepts, and demonstrating alternative complex configurations of such conditions that hold over many cases that may span different jurisdictions or even policy domains. Although this approach has been used to test other theories in the domain of political science, in the rare cases where it has been applied to MSF, it has been in a partial manner and not testing the general hypothesis, nor to questions of the energy transition. Hopefully this study demonstrates its fruitfulness.

This approach to characterising and distinguishing MSF from other theories of the policy process also runs contrary to a recent strand in the literature which attempts to distinguish MSF's explanatory power through individual concepts. For instance, several papers have recently sought to develop the concept of 'coupling' as the central explanatory notion of MSF, or even the central causal mechanism of MSF (Herweg, Huß and Zohlnhöfer, 2015; Dolan and Blum, 2023). Herweg et al go as far as claiming that coupling is the "decisive concept that lifts MSF from describing to explaining agenda and policy change" (Herweg, Huß and Zohlnhöfer, 2015). However, and unsurprisingly, there does not seem to be a single definition of the coupling metaphor that is both sufficiently clear and generalizable.

Contrary to the above developments, this study demonstrates that it is MSF's claim about the structure of complexity that can provide interesting and surprising explanations. There are certain configurations of conditions that make agenda change and policy decisions more probable, and certain configurations of conditions that make it less probable. These conditions can be classified into the general structural elements of the MSF and complexity can be tested at this level of abstraction.[90] It is the hypotheses on the logical form of these configurations that distinguishes MSF most notably from other theories of the policy process and not the content of individual metaphors or elements in the theory (which may well have cognate concepts in other theories). There are still almost no empirical studies elaborating and testing such MSF-inspired configurations to know whether this approach will produce robust, coherent and general explanations.

Finally, the QCA also discovers surprising results because it considers cases of agenda change and non-agenda change in a consistent manner. For instance, in this study it demonstrated that a policy window in the politics stream holds a necessary relationship to most cases where OFW is on the agenda and most cases where it is off the agenda. The conceptual relationship is therefore trivial. Over a twenty year period, OFW moved on and off political agendas regardless of sustained high levels of public support for more ambitious government action on climate change or several changes in government. This type of finding confirms the importance of Zohlnhöfer et al.'s recent call to use negative cases to clarify the relationship between policy windows, entrepreneurial activity and agenda change (Zohlnhöfer, Herweg and Zahariadis, 2022) . This study (thanks

[90] The analysis of SUIN conditions posed an unresolved conundrum, both for SUIN conditions associated with agenda and no agenda status. The analysis highlighted two necessary disjunctions for agenda status and no agenda status respectively (refer to Chapter 5.3.2 and 5.3.5). However, it is unclear that these disjunctions represent theoretically meaningful concepts. The analysis does demonstrate that the empirical data happen to hold certain unexpected set theoretic relations to the outcomes. Furthermore, the general interpretation of SUIN conditions are that they are functional equivalents for a deeper unifying concept [114]. MSF theoretical literature does not provide higher-order concepts for these kinds of disjunctions. On the contrary, MSF theory explicitly distinguishes the three streams, ripeness of the streams and policy windows as analytically separate, if related, concepts. If the disjunctions found in the SUIN analysis are functional equivalents of a higher-level concept, this could fundamentally undermine the coherence of the MSF hypothesis. The result, in and of itself, does not give any confidence that there is in fact such a concept. However, the existence of such SUIN conditions at the level of the MSF concepts in the dataset, may provide reason for further analysis of the fundamental sets in different configurations. More generally, it highlights the capability of QCA analysis to uncover unintuitive and non-obvious relationships in qualitative data, even between higher-level theoretic constructs.

to the QCA) demonstrates that the risk of trivial inferences are present in any study that does not also consider negative cases. Indeed, the strong implication is that the common inferences that almost all empirical MSF literature draws between policy windows and agenda change, in failing to consider negative cases, entail the risk of triviality.

6.3. The value of using process tracing and QCA

There are a few ways to articulate the complementarity of the two methods and the value-add for this study of using both. In the most general terms, the process tracing enabled strong within-case inferences on the presence of mechanisms within particular cases, whilst fsQCA enabled hypothesis testing and cross-case inferences (Beach and Pedersen, 2013; Oana, Schneider and Thomann, 2021).

For this study an ‘explaining outcome’ variant of process tracing was used as there was no well-established correlation between a cause (or causes) and the outcome of interest, nor was the MSF hypothesis well-developed as a mechanistic conjecture. This enabled a case-centric approach that could provide a minimally sufficient explanation for the outcome of interest. Following this, an additional classificatory step then sought to interpret the discovered causal mechanisms in terms of more generic MSF concepts in order to see if this delivered more generic conjectures in MSF terms.

The use of this variant of process tracing largely served to buck the more general trend in MSF-inspired empirical studies to use cases as an ancillary mode of theoretical demonstration. Instead, process tracing enabled this study to undertake something more akin to a comparative history as the contrasting of contexts, to borrow Skocpol and Somers’ terminology (Skocpol and Somers, 1980). This enabled the study to remain sceptical of MSF’s proposed macro-level explanatory generalizations (in stark contrast to most empirical studies that merely seek to demonstrate it), whilst bringing out the unique features of each case. The value of this is two-fold. For people with an interest in the energy transition and OFW as an object of political contention (but no particular interest in MSF) it delivers domain-specific results. For people with an interest in generic theories of the policy process and/or MSF (but no interest in the energy transition or OFW), it enables detailed empirical cases that call some of the fundamental MSF assumptions or frequently made generalisations into question in the reflective equilibrium between theory and data.

The above contrasts with the fsQCA where each of the MSF concepts was 'baked in' to the structure of the analysis. The QCA enabled the testing of the general MSF hypothesis as a conjecture about a complex configuration of conditions associated with OFW's agenda status and its lack of agenda status. Given the structure of the general MSF hypothesis (refer to Table 3, p. 48), there are 240 possible combinations of the constitutive sets consistent with the outcome.[91] Simply put, no narrative structure could hope to carry this complexity covering a twenty year period. A rigorous testing of the MSF hypothesis requires formal set-theoretic analysis of qualitative data using a software application. The novelty of this study is that it sliced qualitative data covering 20.5 years into 43 time slices each representing a 6-month micro-case. This enabled cross-case inferences between those blocks of time where OFW was not on the agenda, and those where it was. It also provided some surprising results regarding the triviality of certain conceptual relations and parsimonious explanations when considering counterfactuals consistent with the empirical data. None of these results would be evident with other forms of qualitative analysis.

Another way of characterising the complementarity of the two methods is that process tracing enabled the discovery of causal mechanisms associated with periods of *agenda change* and the scope conditions within which the causal mechanisms functioned, whereas the QCA enabled the discovery of complex configurations of conditions temporally associated with the *agenda status* of OFW. The process tracing provides explanations of moments of change, whereas the QCA provides confidence that certain hypothesised relations of sufficiency or necessity hold consistently over time.

6.4. New hypotheses for testing

The evidence from the process tracing cases enables the formulation of hypotheses not limited by the interpretative limits of MSF and which may serve future research in this area.

[91] This considers the possible combinations of conditions as per Table 1, p. 46, which renders the following calculation of possible combinations: 5C1 x 2C1 = 5x4x3x2x2 = 240

From Case 1 we can abduct the following hypothesis for OFW moving on to a political agenda. OFW is likely to enter the political agenda when:

1. A small minority of political candidates believe that a government can and ought to prioritise policy to support OFW as a solution to long-term decarbonisation and to realise the opportunity of electricity export (especially when the domestic market is small), *and*
2. These candidates are elected to the legislature and secure at least one position in the government (cabinet) as minister of energy, *and*
3. There is an existing consensus in government to accelerate the growth in renewable sources of power production in general.

From Case 1, we can also derive several hypotheses for the adoption of policy elements aimed at supporting OFW.

Development and adoption of a technology-specific price support instrument for OFW are more likely to fail when:

1. There is not a technology specific grid connection policy that provides certainty on the timing of grid connections for OFW projects, and
2. The government is unwilling or unable to provide the electricity regulator with a formal direction for issuing a technology-specific grid connection policy consistent with the regulator's statutory duties and market conditions, or
3. The government expects that the public will not accept the additional cost to consumers or tax payers due to the price support instrument (i.e. there is a significant political risk to adopting an OFW price support instrument), or
4. Policy and/or political entrepreneurs expect that OFW will not be necessary to achieve a decadal renewable energy target

Policy development and adoption of a technology-specific grid connection policy for OFW is more likely to fail when:

1. There is a backlog of grid connection applications from other commercial renewable plant with a legitimate expectation of regulatory treatment under extant connection policy, and

2. Providing OFW with grid access is expected to displace other commercial renewable generation capacity, and
3. There is no legally defensible justification for the regulator to provide OFW with preferential grid connection treatment over other renewables.

Developing and adopting new marine planning legislation to support OFW is more likely to fail if:

1. The government opts for a holistic ‘plan-led’ approach to marine spatial planning legislation that integrates all maritime activities into a single comprehensive legislation, or
2. The marine planning mandate resides in a different department from the energy policy mandate, or
3. OFW’s expected route to market closes, i.e. no price support instrument expected, during marine planning proposal development.

The findings from Case 2, can be re-described as a general hypothesis. OFW is likely to fall off the political agenda when:

1. A sufficiently large crisis overtakes a government, and
2. Demand for power is expected to fall, and
3. The policy community agree that the additional cost for technology-specific price support is unjustifiable.

From Case 3, we can abduct the following hypothesis for OFW moving on to the political agenda. OFW is more likely to move on to the political agenda when:

1. Civil servants in the department of energy are required to propose a plan to meet a legally binding national emissions reduction target, and
2. Civil servants do not judge cheaper decarbonisation policy alternatives to renewable generation as technically feasible or socially acceptable, and
3. Transmission grid planners in the TSO believe that they will be unable to develop the required onshore grid to meet the decadal renewables target exclusively with (cheaper) onshore renewable alternatives, and
4. Economic advisors to the civil service project that integrating OFW into a supply mix will only be moderately more expensive than other renewable generation alternatives over the planning period, and

5. A jurisdiction has a mature onshore wind energy industry able to pivot to offshore.

Given the temporal coincidence of target setting and agenda status for OFW in Case 3, the preceding hypothesis may also serve as a hypothesis for technology-specific target setting.

From Case 3, we can also abduct an hypothesis for the adoption of technology-specific grid connection policy for OFW. A regulator is more likely to issue a technology-specific grid connection policy for OFW when:

1. It processes grid connection applications for renewables on a rolling basis or in frequent batches, and
2. Government has adopted a robust target for OFW capacity over a decadal planning horizon.

Given the lack of detailed and comparative empirical research on this issue, the preceding hypotheses put out several options for further testing in other jurisdictions.

6.5. Caveats, limitations

This study has empirical and interpretative limitations.

Firstly, qualitative data is fundamental to both the process tracing and the QCA. Empirically, the study relies on triangulating data from a limited set of source materials. Although the extensive range of sources is a great strength of the study, it is clearly not exhaustive. For instance, there are points where inferences on the activities and beliefs of individuals need to be made. Some inferences are made with more confidence than others based on the available data. It may be that further key informant interviews or Freedom Of Information requests may reveal a slightly different unfolding of events at particular points in time, or slightly different beliefs and interests to have been at play. There is room for the usual revision and contestation over historical facts and inferences. However, given the lack of robust attention the subject has received, not merely in Ireland but for other jurisdictions, it should serve as a robust base to open discussion rather than provide definitive, explanatory closure.

Secondly, the fsQCA develops one of several possible ways to operationalise generic MSF constructs. One may either take the QCA result of this study as disconfirming the theory, or disconfirming the particular operationalisation of the theoretical concepts. It is possible that a different operationalisation of the MSF may lead to different results for the hypothesis testing. This plays out in how fundamental constituent sets are defined (and the data used to calibrate them given a particular definition); how sets are interpreted as belonging to particular higher-order MSF concepts; and how the constituent sets are weighted when several combine to determine a higher-order set score. For example, this study operationalises the MSF concept of 'public mood' as the level of public support for climate change mitigation and renewable energy targets and draws on an extensive history of national opinion poll results (refer to Appendix B). Although there are no better alternatives for this study, it is none the less a simplification of a rich concept which may be operationalised differently in other contexts. This study then interprets public mood as one set that determines the opening of policy windows in the politics stream. Again, there are good reasons for this (provided in the appendices), but alternatively this could be interpreted as a factor that determines politics stream readiness alongside interest group positions and government ideology. Finally, this study weights Focusing events, feedback on policy implementation failures, and deterioration of indicators equally in determining the status of policy windows in the problem stream. Alternative weightings are possible and may be consistent with empirical findings from the process tracing.

Indeed, one of the perennial challenges with MSF is the prevalence of ambiguity. At least the process of operationalising MSF for a QCA requires a level of transparency in concept definition and calibration which are often lacking in MSF empirical studies using less rigorous qualitative methods. Appendices I – O provide additional critical reflections on the challenges of interpretation and ambiguity. Additionally, the QCA dataset generated for this study (refer to Table 8) and R code written (refer to the supplementary files) may serve to easily compare some alternative interpretations of MSF in as far as these terminate in alternative combinations of the underlying sets that constitute the higher-level MSF concepts.

Finally, the process of calibrating the qualitative data into QCA set scores could have ideally made use of at least one more independent coder. This would enable the calculation of intercoder reliability, or at least non-quantified intercoder consistency. Unfortunately it was not in the scope of this study to support multiple coders of the QCA dataset. In lieu of this, extensive appendices are provided for maximal transparency.

7. Conclusion

At the time of writing this conclusion in September 2023, it is evident that offshore wind energy is a key component to a net-zero power system, not just for the island of Ireland, but for many jurisdictions globally. A closer study of why and how various actors in and around government have gone about selecting it as an object of political effort is long overdue. To this end, this study made empirical, methodological and theoretical contributions (refer to Table 21).

Table 21: Summary of knowledge contributions of study

Knowledge contribution	Summary points
1. Methodological	*1.1. Use of two integrated approaches (process tracing based on extensive primary and secondary data, and QCA based on temporal micro-cases) to test MSF as a causal hypothesis.* *1.2. Operationalizing MSF as falsifiable hypothesis for OFW in parliamentary democracy with liberalized power sector (Table 7, p. 94)*
2. Theoretical	*2.1. Reorienting MSF to technology as object of political attention (as opposed to policy)* *2.2. New frameworks of the policy process aimed at power generation technology deployment (Figure 34, p. 265), and grid connection policy cycle (Figure 35, p.271)* *2.3. New hypotheses for testing (Chapter 6.4, p. 282)*
3. Empirical	*3.1. Rich case narrative of OFW in the Republic of Ireland (Chapter 4 and accompanying appendices)* *3.2. Causal mechanisms (Figure 7, p. 125; Figure 8, p. 148; Figure 22, p. 215) and scope conditions (Table 20, p. 257) that move OFW on and off agendas. Mechanisms generalizable to cases with matching scope conditions.*

Firstly, this study generated a dense historical narrative of the first two decades of offshore wind energy in the Republic of Ireland, spanning the period 1999 - 2020. The narrative paid particular attention to the efforts of individuals to bring the technology on to political agendas (or move it off agendas) and develop and adopt policies aimed at its commercial deployment (or thwart efforts to this end). Furthermore it traced the interaction of such individual efforts within istitutions and policy domains. The implicated institutions included governments, state departments and agencies, the transmission system operator, regulator, and specialist research institutes. The policy domains included climate change and renewable energy target setting, energy generation price support instruments, marine planning legislation, and grid connection policies. Due to the word limit imposed on the doctoral monograph, significant components of the narrative is presented as appendices in this document.

Secondly, this study discovered three causal mechanisms (refer to Figure 7, p. 125; Figure 8, p. 148; Figure 22, p. 215) that move OFW onto or off of political agendas at different points in time, along with nine contextual conditions that influenced the functioning of these mechanisms (refer to Table 20, p. 257). The status of most contextual conditions may remain relatively stable for many years, potentially decades, but sporadically undergo shifts in uncoordinated ways. These conditions inform the battle of ideas between people in and around governments seeking to legitimate political intervention to support particular renewable generation technologies at particular points in time. Ultimately, the causal mechanisms that explain agenda change vis-à-vis OFW are diverse, even within a single jurisdiction, and combine structural, material, and ideational components with personal agency.

In the introduction and literature review I argued that existing academic literature does not adequately capture the aforementioned. It demonstrated that in some cases actors advocated for OFW as a solution to national decarbonisation efforts (Kern *et al.*, 2014; Banet, 2018; Motta, 2021; Do *et al.*, 2022; MacKinnon *et al.*, 2022), national energy insecurity (Kamp, 2006; Kern *et al.*, 2014), and/or regional (sub-national) economic development or re-industrialisation (Kamp, 2006; Fornahl *et al.*, 2012; Dawley, 2014; MacKinnon *et al.*, 2019) (Westgard-Cruice and Aoyama, 2021) (Normann, 2015)(MacKinnon *et al.*, 2022), or in response to increasing social opposition to deploying onshore wind energy (and related transmission infrastructure) in a couple of other cases (Hays, 2005; Ernst & Young, 2015) (Kern *et al.*, 2014). The aforementioned literature also give some, albeit limited, indication of why these were dominant legitimating arguments in favour of technology-specific policy support in particular cases at particular points in time. However, the aforementioned literature is geographically sparse, and/or limited in temporal and policy scope.

This study demonstrates that in order to adequately grasp how offshore wind energy function as a political object, it is necessary to track the process of how a diverse cast of actors spread across many institutions move from a large and evolving portfolio of possible policy responses to climate change, energy insecurity and/or social opposition to technology deployment to a preoccupation with supporting the deployment of particular technologies in the context of a liberalised electricity market and geographic particularities. The key point is to consider how people in and around governments move from technology-neutral support measures to technology-specific policies; that is, from favouring low-carbon and/or indigenous energy sources as a general class to being more specific and prescriptive in the technological winners that public policies, legislation and regulation picks. This study advances the general argument that least-cost target attainment (from an economic perspective) and the operation of a safe and secure electricity system (from an engineering perspective) may ultimately determine when governments and state agencies pivot from technology-neutral to technology-specific policies to support OFW (or other technologies) in many cases. A configuration of nine scope conditions inform the battle of ideas that policy and political entrepreneurs use to legitimate policy-specific support. These consist of the existence/absence of national industry to benefit from OFW-related manufacturing and construction; availability of other indigenous generation sources (renewable and fossil) and the cost-differential with OFW; the size of the power system and its interconnection with neighbouring systems; the level and trajectory of greenhouse gas emissions and public support for mitigation; grid limitations to the penetration of variable renewables and decadal expectations of synchronous-non-synchronous penetration potential; the location of supply and demand centres and the available alternatives for grid expansion and reinforcement; power and energy systems modelling tools and modellers for long-term scenario planning; energy or emissions targets. The configuration and status of these scope conditions inform the battle of ideas in policy and political networks and in turn the causal mechanisms that bring OFW on to agendas or push it off agendas.

In particular, the shifting relations between institutions and personal agency in the selection of energy technologies for political agendas centred on two questions that people in and around governments were collectively preoccupied with: 1) Does technology X form part of a 'least-cost' generation mix to meet projected demand in a decade's time whilst fulfilling a renewable energy or emissions reduction target? 2) Could improvements in the transmission grid and grid resilience plausibly accommodate commercial deployment of technology X in a decade's time? If specialists in the system operator, regulator or other specialist research consultancies (including universities) do not answer both of these questions in the affirmative, it is unlikely that they would consider a power generation technology as a solution to policy problems of energy security, liberalisation, or decarbonisation. They will dissuade any elected official or civil servant who disagrees.

Since the early 2000s, the increasing sophistication of various power and energy system models, and the proliferation of different networks of modellers, to assess bigger sets of technologies and optimize technology mixes to meet specified emissions targets at least cost and subject to grid-related constraints ultimately became the locus of problem framing and technology legitimation. The agency of political entrepreneurs (i.e. elected officials) and civil servants predominantly lie in the choice to commission analysis from one groups of experts over another. Civil servants also exercise agency in mediating the interests of (and associated solutions proposed by) the TSO, regulator, industry and government in the process of establishing the implication of scenario modelling projects for energy policy agendas at a given time. However, neither civil servants nor elected officials could pick technology winners without these being *de facto* vetted by the outputs of a long-term, scenario modelling project that considered a wide portfolio of technologies. These new norms came with its own incumbents or gatekeepers, whether the TSO, particular universities, or private sector consultancies who both deliver the visions of plausible energy futures along with credibility to civil servants and elected officials who employ their analysis. This has supplanted the monopoly on knowledge historically held within the vertically integrated public utility, although the constituent parts that developed out of its unbundling, still hold an immense influence.

Thirdly, this study did not find strong support for a general hypothesis on agenda change as advanced by the Multiple Streams Framework (Herweg, Zahariadis and Zohlnhöfer, 2017). Findings suggest that the coincidence of a policy window opening, the three streams being ready for coupling and a policy entrepreneur coupling the stream in favour of OFW, is not *necessary* for OFW to enjoy political agenda status. Indeed, none of the respective elements in the general MSF hypothesis are necessary and non-trivial. Whilst the coincidence of all the MSF conditions is *sufficient* to explain OFW's agenda status, this study also identifies simpler combinations of conditions consistent with all the examined cases and counterfactuals. These findings offer an infirming case for the general hypothesis, especially as interpreted by Herweg and Zohlnhöfer.

These findings should be of interest to researchers utilising MSF, not just in the domain of energy or climate change politics, but in other policy domains as well. This study advanced an argument for interpreting the MSF as a falsifiable hypothesis about the structure of complexity. That is, a hypothesis that there are certain complex configurations of conditions that cause agenda change. This appears to be the most promising route to advance theorizing in the tradition of MSF to both a) capture what distinguishes MSF from other theories of the policy process, and b) to aid the building of a coherent and comparative body of knowledge of interest to academics and policy makers. This is of particular importance given the noted lack of rigour in operationalising MSF for empirical work and the resulting incoherence of resulting body of knowledge (Jones *et al.*, 2016). As Jones et al observe following a review of hundreds of papers using the framework, it is evident that many researchers simply do not mean the same thing when they employ the concepts of MSF, if it is indeed clear what they mean at all. The current norm is to use MSF as a loose collection of vague metaphors in empirical research, and to indulge in the further proliferation of inexact metaphors in theoretical work (with Herweg and Zohlnhöfer's work a noteworthy exception).

Contrary to the above developments, I argue that there is nothing that distinguishes individual metaphors in the MSF such as 'policy windows', ‘coupling’, or ‘spill overs’ from other theories that have cognate concepts worded differently. Rather, it is Kingdon’s claim about the structure of causal complexity, how the different elements of his framework come together, that distinguishes MSF from other theories of the policy process and provides a provocative, interesting and falsifiable claim. There are certain configurations of conditions that make agenda change and policy decisions more probable, and certain configurations of conditions that make it less probable. These conditions can be classified into the general structural elements of the MSF and complexity can be tested at this level of abstraction. Whilst careful operationalisation of the structural elements can make the MSF falsifiable, the structural elements remain metaphorical. That is, their meaning may be operationalised to mean very different, mutually exclusive or contradictory things in different empirical studies. It has been forty years since Kingdon first published ‘Agendas, Alternatives and Public Policy’, which has remained an enduring and insightful account of political agenda-setting in federal US politics. However, those who seek to continue developing this approach (whilst claiming a deeper theoretical insight on the policy process) ought to engage directly with the thorough critiques of the body of empirical and theoretical literature that has drawn on his original insights.

To demonstrate such a response, this study presented a sophisticated example of how MSF concept could be operationalised with sufficient clarity to undertake a formal set-theoretic analysis, using fsQCA to test the general MSF hypothesis. The set theoretic basis for such analysis fits both the fundamentally interpretative nature of the MSF theory and the complexity of the subject matter it attempts to explain. This consists in identifying directional conditions that influence agenda setting in particular policy domains or for particular policy issues, linking them to more abstract MSF concepts, and demonstrating alternative complex configurations of such conditions that hold over many cases that may span different jurisdictions or even policy domains. Given the number of conditions and their possible configurations, such an analysis requires a software solution to perform the set theory analysis. Although this approach has been used to test other theories in the domain of political science, it had not yet been used to test the general MSF hypothesis. This study provides the first demonstration of the fruitfulness of this approach.

Fourthly, a rigorous understanding of the case, including the discovery of causal mechanisms and complex configurations of conditions associated with OFW's agenda status, requires a mixed methods approach that includes process tracing and QCA. This study demonstrated the value of combining these methods. As noted at the outset, this study was not conceived as a rigid proof/disprove of MSF, but rather emerged from a historical contingency. Understanding the Irish energy context in 2020 and the possible trajectories of offshore wind energy in contributing to the decarbonisation of its power sector (and potentially the wider European region's electricity supply) was the first impulse. This drew me first to process tracing as a case-based method for knowledge acquisition, and secondly drew me to MSF for my initial approximate orientation, enabling me to formulate questions and gather data on a complex case. This much is evident in the historical narrative. Indeed, MSF served this purpose very well – i.e. as an orienting heuristic. However, with deeper knowledge of the case came further critical reflection on the framework, and the need to push it towards greater conceptual clarity or precision in order to discover knowledge of a more generalizable and comparative nature. Hence it was quite late in the research process that the testing of the general MSF hypothesis came about. QCA requires extensive and transparent operationalisation of MSF concepts and a proportional consideration of cases of *no* agenda change. Both are necessary if we are to address criticisms that MSF has spawned an incoherent research agenda and that it is too imprecise to be proven wrong (Sabatier, 2007; Jones *et al.*, 2016). The combination of these methods promises improvements in robust empirical work, hypothesis testing, and the building of a more coherent and comparative body of knowledge on the topic. However, care should be taken when combining process tracing and QCA given their divergent causal ontologies (Beach, 2018).

Finally, this study serves as a rich case for practitioners working on policy innovation aimed at commercial deployment of OFW. Ireland has been a laggard in Europe, but it may still be an early-*ish* mover in the global context. It shares many characteristics (or 'scope conditions' as per the process tracing) with potential future adopters of the technology that the first movers, like the UK and Denmark, do not. This study therefore may serve a pedagogic function for actors in and around governments which have not yet embarked on the process of incentivising, legislating, and regulating the industry. The demand to draw recommendations for policy makers from this study is therefore to be expected. However, the results of the study and the reactions to the first peer reviewed paper published from it suggests that this would be misplaced. There is no one generic ‘policy maker’ who may benefit from generic recommendations. Instead there are many different actors with a wide array of reasons for and against supporting the deployment of this technology in particular jurisdictions at particular points in time. These include elected officials, civil servants in departments of energy, marine, planning and the treasury, specialists in system operators and regulators, industry interests, environmental and grassroots opposition groups. Rather, as Peattie and Flyvbjerg argue, rich case studies tend to lose their value for practitioners when they are summarised in high-level generalizations and recommendations that serve to close down discussion (Flyvbjerg, 2006).

In line with Flyvbjerg’s recommendations, the first peer reviewed article from this study included a rich narrative and left scope for readers of different backgrounds to make different interpretations and draw diverse conclusions (Jean Pierre Roux *et al.*, 2022). Empirically, it covered the terrain of Case 1 and Case 2 (Chapter 4.1and 4.3), but teased out discussion points not included in this thesis. Reactions to the first article demonstrated the value of this strategy. A senior Irish civil servant and an ex-CEO of the Irish TSO responded through private communications with their respective perspectives, largely aligning with the article’s main conclusions but adding important nuances. Conversely, Fintan O’Toole (prize winning Irish journalist) drew heavily on the article for his recent column in the Irish Times (O’Toole, 2023). Making extensive and almost exclusive use of the article’s rich narrative for his column did not deter him from drawing conclusions not shared by the author.

I intend to publish several further peer-reviewed articles from this thesis. This study (including the extensive appendices) will therefore continue to serve as the empirical and methodological foundation from which further articles will tease out discussions and themes not covered in this document. As with the first article, subsequent articles will serve to progress more detailed discussions with academic and non-academic audiences.

8. References

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Appendix A – schematic for case classification

Case(s) from the Republic of Ireland may be classified as a sample from the population of European states with an OFW resource. For this population, the literature review provided evidence of the scope conditions that could affect the functioning of causal mechanisms for any sample of cases in the region. Table 22 offers a provisional schematic of such scope conditions. This will need a much wider review of literature to refine the classification of countries for each conditions and for different blocks of time, as classification is also time dependent when considering the deployment of OWF over multiple decades.

Table 22: Schematic of countries and the status of scope conditions that influence the agenda status of OFW

	UK	Norway	France	Denmark	Germany	Belgium	Netherlands	Ireland
Industrial history (wind, O&G, marine-industry)	X	Y	X	Y	Y	X	Y	X
Liberalised power sector	Y	Y	Y	Y	Y	Y	Y	Y
Large OFW resource	Y	Y	Y	Y	Y	Y	Y	Y
Energy insecure	X	X	Y	Y	Y	Y	Y	Y
Public support for climate action	Y	Y	Y	Y	Y	Y	Y	Y
Parliamentary democracy	Y	Y	Y	Y	Y	Y	Y	Y
Large power demand	Y	X	Y	X	Y	X	X	X
Significant power trade / interconnection with neighbours	Y	Y	Y	Y	Y	Y	Y	X
North Sea	Y	Y	Y	Y	Y	Y	Y	X

Ireland shares most, but not all of the enabling scope conditions. From the late 1990s, some Irish industrialists and politicians called for the Irish government to emulate and surpass the first movers (Denmark and the United Kingdom). It shared some characteristics with smaller European states like Denmark, Belgium, and Norway: the size of its economy and population, level of economic development, size of the national power market, and a large offshore wind resource. It shared at least one relevant geographic and political characteristic with its neighbour, the UK: the Irish Sea, where large commercial offshore wind farms were operational in UK waters, although it had a peripheral geography to the cluster of North Sea states. In common with all EU states, it is a democracy with a liberalised energy sector. Of course, there were also key differences. It lacked the historic industries of some first movers like Denmark. It lacked the extensive shallow waters that congregates on the UK side of the Irish Sea and across the North Sea. Its economy and power sector lacked the scale of the UK as well as a proactive, profit seeking landlord in the form of the Crown Estate. Although it had some limited interconnection with its closest neighbour (the UK), it was relatively isolated and further interconnection and trade would be much more costly than between European states on the continent.

Appendix B – definition and calibration of sets for QCA

This appendix includes detailed justifications for the definition and calibration of sets used in the QCA

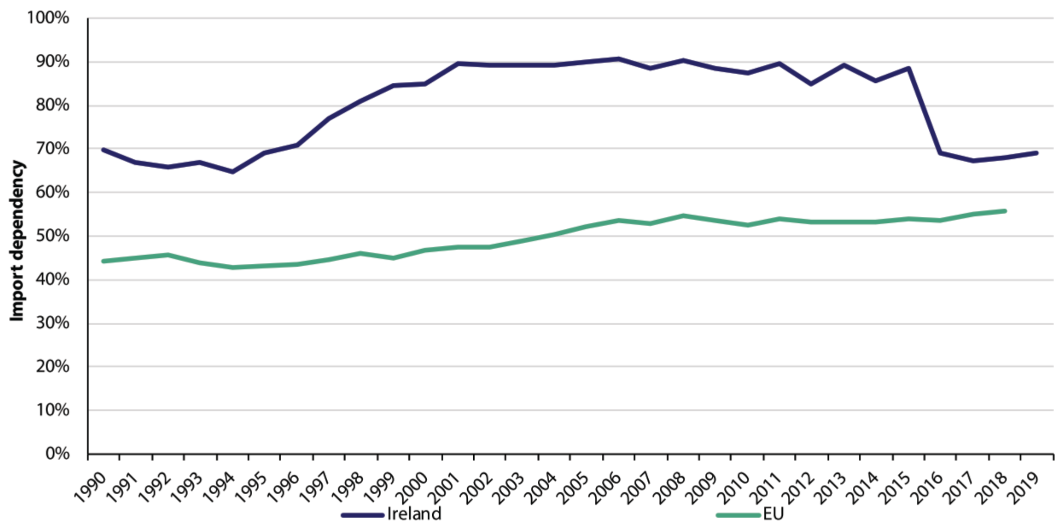
1. Deteriorating indicators (INDI)

MSF literature notes that the deterioration of key indicators often serve to draw policy makers' attention to a particular issue, opening a policy window and enabling problem brokers to frame particular conditions as problems needing political intervention. For this study I identify energy dependency, greenhouse gas emissions and renewable energy targets as three relevant indicators that Irish policy makers have tracked in the Republic of Ireland (and in many other jurisdictions) for the duration of my case research, and that (often taken together) provide information inputs to the debate around public policy support for renewables (in general).

In the QCA, the set 'INDI' represents the higher-order MSF concept of deteriorating indicators. I calibrate the INDI set for each case by averaging the scores of the three constituent fundamental sets, ENIMP, CO2 and RET, as explained below.

a. Indicator: energy dependency (ENIMP)

Figure 3: Import dependency of Ireland and the EU 1990-2019



Source: SEAI & Eurostat

Ireland is a relatively energy insecure country, with import dependency ranging from around 65% to 90% from 1990 onwards. Its energy dependency has been significantly higher than the EU average (Byrne Ó Cléirigh, 2020). It is evident from a cursory knowledge of the Irish context, that concerns over energy insecurity often feature in political debate and has constituted an important driver for policies to support the development of indigenous sources of energy.

These include offshore gas reserves, peat, and renewables; most notably wind energy since the 1990s (Gaffney, Deane and Gallachóir, 2017). There is therefore some reason to think that it may also be implicated in reasoning to support OFW. Crudely put, a sharp rise in import dependence and/or a high level of import dependence may serve to open a policy window in the problem stream, *ceteris paribus*. It provides one more indicator that may draw the attention of policy makers and assist problem brokers in framing problems that foreground the need to develop indigenous energy resources. On the other hand, a steadily declining import dependence or a low level of import dependence may make it harder for problem brokers to justify significant effort on behalf of policy makers, and cost on behalf of taxpayers or energy consumers, to support indigenous sources of energy. Import dependency is well-tracked indicator for many countries and so may also serve in comparative analysis.

I therefore define this set for the QCA as “high energy import dependence”. I use the available historical data on Irish import dependency, within-case data, to set meaningful anchors on this set.

Set definition: High energy import dependence	
Anchors	Concept
1	import dependence >= 90%
0.67	import dependence 60-89%
0.33	import dependence 40-59%
0	import dependence <=40

b. Indicator: greenhouse gas emissions (CO2)

Cutting greenhouse gas emissions has been another important driver for policy action to develop renewables in Ireland. A distinguishing factor of the relationship between national emissions and political action has been the target-oriented nature of activity. This started with commitments by countries under the Kyoto Protocol, which in turn for EU member states transferred into national targets under the effort sharing regime. This target setting has roughly run on a decadal scale, first with targets for 2020 and then 2030, whilst simultaneously formulating longer-term commitments for net zero. I therefore take the urgency or importance of this indicator for national political action as potentially calibrated to the extent that emissions reductions at a particular point in time are not tracking the trajectory needed to meet the relevant decadal target. For instance, during most of the 2000s, Ireland would have been focused on its target for 2012 under the Kyoto Protocol and EU effort sharing policy. There would have been a shift in focus as expectations (and related work) were calibrated to the 2020 target throughout the early 2010s. With the signing of the Paris Accord and subsequent policy shifts the focus rested on determining and then meeting the 2030 target.

Again, a cursory knowledge of the Irish context, and climate politics more generally, suggest that the greater the mismatch between current emission levels (and projected trajectories) and the long-term target, the more this indicator serves as an input to problem framing and the opening of a policy window for renewables, *ceteris paribus*. With the establishment of state capacity during the 2000s to measure emissions, it has also become an indicator tracked on an annual basis for an extended period, albeit with a reporting lag. Qualitative data gathered for the case study also complement the EPA's GHG inventories to indicate the reporting lag and the timing of the awareness of policy makers of the indicator.

Set definition: CO2e emissions far above allocation/target	
Anchors	Concept
1	National GHG emissions far above target trajectory
0.67	emissions significantly, but not far, above target trajectory
0.33	emissions tracking (or almost) target trajectory
0	emissions below target trajectory

c. Indicator: renewable energy target (RET)

Analogous to greenhouse gas emissions, renewable energy policy making in Ireland has also had a target-oriented history, at least since the late 1990s. A cursory knowledge of the Irish context suggests that the greater the mismatch between current installation of renewables (either as MW or %) or the informed expectation of installation rates, and the long-term renewable energy target, the more this indicator serves as an input to problem framing and the opening of a policy window for renewables, *ceteris paribus*. However, unlike greenhouse gas emissions, reporting on progress to renewable energy targets are less formalised and more a matter of expert judgement within the policy community concerned with the matter. Judgement of the case set membership scores therefore requires careful triangulation of policy documents, Oireacthas records and key informant interviews.

Set definition: Renewables below target trajectory	
Anchors	Concept
1	% or MW renewables far below target trajectory
0.67	% or MW renewable significantly below target trajectory
0.33	% or MW renewables tracking (or almost) target trajectory
0	% or MW renewables exceed target trajectory

2. Feedback on policy implementation (FB)

MSF literature also notes that feedback on the implementation of policies, particularly implementation failures, often serve to draw policy makers' attention to a particular issue, opening a policy window and enabling problem brokers to frame particular conditions as problems needing political intervention. For this QCA, I selected feedback on grid connection policy, marine planning legislation, and renewable energy price support instruments as three key policy areas where implementation success or failure may serve to close or open a policy window for OFW.

It is a reasonable assumption that policy windows for these respective policies do not coincide. Drivers and timing of failures for the respective policy elements are diverse and may not coincide. This is self-evident in the problem stream, where separate indicators and policy-specific feedback and expirations are unlikely to coincide for the different policies in the set. In my operationalisation therefore, I include a separate policy window condition for each of the three policy types. On the contrary, when a policy window opens in the politics stream (i.e. when a general election occurs or the national mood shifts, it is very unlikely that such events are concerned with the details of the respective policies in the set. Rather, a cursory glance at election manifestos and public consultations on particular policies suggest that government commitments (prior to and following general elections) and public mood (when concerned with energy at all) is more generally concerned with support for particular technologies *tout court*, e.g. more generally stated support/opposition for coal, peat, wave, or offshore wind generation, as oppose to the technical details of a connection policy, or price support instrument. Therefore, I operationalise a policy window in the politics stream as a single variable for windows of opportunity for promoting a particular technology or renewable energy technologies in general.

In the QCA, the set 'FB' represents the higher-order MSF concept of policy feedback. I calibrate the FB set for each case by averaging the scores of the three constituent fundamental sets, FB_GRID, FB_MAR and FB_PRICE, as explained below.

a. Feedback on grid connection policy (FB_GRID)

Defining feedback on grid connection policy implementation poses an interesting challenge for the MSF. Should it be focused on grid connection policy for renewables in general, or the accommodation of offshore wind in particular? Every time a grid connection policy is up for renewal or reform, it opens a formal opportunity for stakeholders to provide feedback and attempt to sway the regulator's decision. Offshore wind developers, alongside onshore wind, solar and gas plant developers, all have a window of opportunity to advocate for preferential terms for their technology. If this is taken as the focus of the condition, then the set is simply defined as: Regulator hosts consultation on grid connection policy. It can then also be calibrated as a set with binary values. The set has a value of 1 when the regulator opens public consultation on a draft connection policy and 0 once the regulator issues its decision. The 'directionality' of the set is then simply whether formal feedback on connection policy is possible. In the Irish case, this mostly overlaps with a cycle of grid connection policy making; connection policies have terms that trigger the need for renewal – e.g. Irish connection policies usually process connection applications in batches set by MW caps for various technologies. In exceptional circumstances the regulator may consult when there has been a significant policy failure, or 'Focusing event' in MSF parlance. Defining the set as such also has a logical analogy to definition of a policy window in the politics stream, where a general election is by definition a policy window. Similarly, the regulator's statutory consultations on draft connection policies are, by definition a policy window. The drawback of this definition of the set is that it does not focus on the *nature* of the feedback provided during consultation. MSF theory on this point is usually concerned with the nature of feedback on policy implementation – e.g. feedback on an extant policy's failure to achieve certain objectives. Accordingly, the set can be defined more narrowly as feedback that grid connection policy is not accommodating OFW. A set value of 1 will then represent (verified) feedback that offshore wind projects are unable to receive grid connection offers and 0 would represent feedback that offshore wind projects are barred from receiving grid connection offers. If the set is defined this way, it then becomes a complicated matter of degree to judge whether the technical terms of connection offers (under particular policies) are sufficiently favourable to enable connection. *De jure,* projects may be able to submit connection application and receive offers, but *de facto,* the terms of the process and the offers make connection unfeasible. This has often been the case in Ireland. A fuzzy set with anchors at 0.33 and 0.67 can be defined around the feasibility of connection then, with consultation submissions and key informant interviews triangulating the researcher's judgement on this. A second challenge with this definition of the set is that it presumes failure in terms of a particular objective. Should the policy failure be judged against the objectives held by the government or regulator at the time, or should it be the objective of connecting OFW? As the history of connection policy in Ireland makes clear, government and regulatory objectives shift over time. If their shifting objectives are built into concept definition, there is no consistent way of calibrating the set over a long period of time (or between different jurisdictions with different objectives). This complicates comparison and interpretation of results immensely. On the other hand, if the government and/or regulator had no interest in facilitating the connection of offshore wind over a particular period, then defining this as the objective risks making the set conceptually trivial, albeit a clear and consistent definition. Defining the set as such also changes its causal and conceptual relation to other conditions in MSF. For instance, set membership may simply amount to the status of grid connection policy at a particular point in time vis-à-vis OFW – i.e. the regulator's stance. For instance, between 2011 and 2019 it was simply not possible for offshore wind projects to receive a grid connection offer. In this instance, the condition resembles the state of the policy stream over this period, where there was no policy solution for connecting OFW – see discussion on Condition B5.2.

In conclusion, I've laid out several options for defining this set. In this study, I opt to define it as a formal opportunity to provide feedback to the regulator on grid connection policy. In other words, the cycle of statutory public consultation the regulator conducts when renewal of an extant grid connection policy is required. I also remain open to evidence from other case study sources, including key informant interviews and Oireachtas transcripts where there is clear evidence that the regulator considered feedback from government or the system operator outside of the statutory public consultations.

b. Feedback on marine legislation (FB_MAR)

The focus of this indicator is ultimately on the ability of developers of OFW to gain the requisite licencing to survey the marine area during project development, to obtain planning approval to construct an offshore wind farm, and obtain a lease agreement to occupy the seabed. Feedback on legislation may be provided informally (or off the record) and formally during public hearings and consultation on legislative reform. The sources of feedback are project developers and many other stakeholders with an interest in the matter, including ENGOs, community members and statutory consultees. These debates may often be technical, normative and wide ranging. However, for set definition, it can be reduced to whether extant legislation enables the construction and operation of offshore windfarms. If, at a point in time, project developers or other stakeholder provide feedback that there is not a fit-for-purpose legal framework to obtain the necessary licences/consents then set membership has a value of 1. Feedback that an extant legislative framework is sufficient to obtain the necessary licences/consents is calibrated to value of 0. Analogous to grid connection policy, the extent to which extant legislation is fit for purpose may be a matter of degree. Within the restrictions of set theoretic analysis it may be possible to define a more nuanced, fuzzy set to represent the extent of functioning legislation. However, the informational requirement to implement this across many, potentially diverse cases, is immense. For this reason, I define the set as a binary. If there is proof that a government or state agency actually issued licences/consents then it was possible to obtain these, and strictly the necessary legislative framework is assumed to be in place. If it is de jure or de facto impossible to obtain the necessary licences/consents, then there is likely to be consensus on the point between project developers and the feedback on this will be explicit. Such instances clearly offer a window of opportunity (in the problem stream) for policy entrepreneurs.

c. Feedback on price support instrument (FB_PRICE)

Defining this set faces similar challenges to A2.1 (feedback on grid connection policy). Formal opportunities to provide a price support instrument may coincide with the expiration of an extant instrument or with a government agenda to develop an instrument in the absence of any preceding. Feedback may also be informal or provided on a running basis. Should the set be defined in terms of the possibility to provide feedback or on the nature of the feedback? In the case of Ireland, the department of energy has held the responsibility for developing price support instruments and government (cabinet) with approving these for implementation. Furthermore, because there is no Irish legislation that clearly prescribes how a government should go about this, unlike the legislation that puts substantive and procedural restrictions on the regulator’s function vis-à-vis grid connection policy, feedback tends to be more fluid. This is further driven by the fact that a price support instrument has been the central lever an Irish government has had in a liberalised market to drive target attainment. Feedback on instrument implementation is therefore often done in terms of how well it is facilitating progress on meeting a renewable energy target. This may be monitored on an on-going basis informally by civil servants and policy makers in and around government. The above argument supports definition of a set in terms of the *nature* of the feedback provided on a price support instrument. Again, defining it in terms of feedback that an instrument is failing to support the development of OFW risks conceptual triviality if this is not already an objective of a government. Conversely, feedback that an instrument is failing to meet a renewable energy target may open a policy window that serves OFW or other technologies.

Consequently, I define this set as feedback that a price support instrument is failing to support renewable energy target attainment. I calibrate it as 1 when the failure is sufficiently large to warrant urgent action, 0.67 when the failure is sufficiently significant to warrant some concern (but not large), 0.33 when the instrument is largely succeeding in its objective; and 0 when feedback is that its implementation is on track for target attainment.

3. Focusing events (EVENT)

In defining this set, it is necessary to provide a clear ‘directionality’ a priori that restricts it to those events relevant to the case and hypothesis. I therefore define this set as a Focusing event that strengthens the case for OFW deployment. This definition requires significant interpretation of Focusing events. If there is evidence that a particular event (or series of events), for instance a controversy surrounding energy or climate change related issues, enabled certain problem brokers or policy entrepreneurs to make strong arguments in support of prioritising the deployment of OFW, then that would calibrate to full set membership of 1. If a Focusing event somewhat strengthened the case for OFW, then a calibrated anchor of 0.67. If there is either no Focusing event that was related to OFW deployment, or an event that undermined the case for OFW, such cases has no set membership – i.e. calibrated to 0.

4. Policy window in the problem stream (WIND_PR)

In this QCA the concept of a policy window in the problem stream is defined as the average score across EVENT, FB, and INDI. Where this averaging results in ambiguous scores (very close to or on 0.5) I revisit the qualitative data, mainly from the process tracing case narratives, to recalibrate case scores for WIND_PR. This can be viewed in Appendix N.

5. Change in government (CHG_GOV)

I define this set a priori as any semester where there is a general election, or a change of minister for a department implicated in energy or marine planning policy. Table 23 lists the dates for these changes in the period 1999 – 2020. Given the temporal resolution of the QCA cases, either a change in government or change in relevant minister logs set membership for a single 6-month period that it falls in. In the odd instance where general elections and government formation may span the June-July divide, I log it to the case that it largely falls in. It just so happens that all Irish elections and government formations largely fall in the first semester of the calendar year over this period. The overall Irish election campaign period that precedes the polling day is also short. In a rare instance, like the 2016 general election, it may take longer for a coalition government to form after the first meeting of the new legislature. But even in such a case it took about three months for a new government to form. I therefore assume that the period from the formation of the agendas in the party manifestos (prior) to the general election campaign until the confirmation of the official new government agenda in the Programme for Government is always less than six months.

Table 23: Dates of general elections and relevant ministerial changes 1999 - 2020

Change in government / relevant minister	Dates	Assigned case
General election	17 May 2002	2002S1
Ministerial change: department of Communications Marine and Natural Resources	29 September 2004	2004S2
General election	24 May 2007	2007S1
General election	25 February 2011	2011S1
Ministerial change: department for the Environment, Community and Local Government	11 July 2014	2014S2
Ministerial change: department of Communications Energy and Natural Resources	11 July 2014	2014S2
General election	26 February 2016	2016S1
Ministerial change: department of Housing, Planning, Community and Local Government	14 June 2017	2017S1
Ministerial change: department of Communications Climate Action and Environment	11 October 2018	2018S2
General election	8 February 2020	2020S1

I assume that a change a general election offers a greater scope for political agenda change than a single ministerial change (at the helm of a relevant department) during the term of an existing government. This is especially the case as it is evident that many ‘cabinet reshuffles’ or individual ministerial changes are due to matter completely unrelated to the agenda of the government for a particular department. Therefore, although a ministerial change within a government's term may still offer an opportunity of agenda change for the affected ministry, it may be far more limited or dependent on the individual characteristics and interests of the minister. I therefore calibrate such minor governmental changes as 0.67 for the set.

Consequently, I define this set as a change in government or relevant minister. I calibrate it as 1 in the case of general elections and 0.67 in instances of ministerial changes within a government. If neither of these occur in a case, the score is 0.

6. National mood (MOOD)

In MSF literature, the conceptualisation and measurement of a 'national mood' on a particular issue is often noted as one of the more challenging points of operationalising the framework (Zohlnhöfer, Herweg and Zahariadis, 2022). On some issues opinion polls serve as the best proxy that is now often employed in empirical work [Ref (Cook and Rinfret 2013; Dolan 2019: 13; Sanjurjo 2020a; Tiernan and Burke 2002)]. Zohlnhöfer et al argues that it is not the public mood that matters, but how policy makers perceive it on a particular issue (Zohlnhöfer, Herweg and Zahariadis, 2022). However this may conflate conditions for a policy window opening with conditions for the politics stream to be ripe, which also includes a condition that policy makers perceive the public as supportive on a particular issue (see subsequent discussion in this Appendix on condition B3.1.

Given the reliance on opinion poll data, it may be difficult to pinpoint the exact moment that public mood shifted. In rare occasions, data from other sources such as the Oireachtas record and key informant interview can be triangulated. However, it is more consistent to take the status/level of public support on climate change as opening a policy window, rather than change in it. As long as public support for climate change remain very high, it may contribute to keeping a policy window open.

For the QCA it is possible to run two alternatives. Once the dataset has been calibrated, it is very easy to run two configurations, one where the MOOD contributes to POL_STR and one where it contributes to WIND_POL. For this thesis I opted for adding it to WIND_POL but for a subsequent article I analyse both alternatives.

In the instance of OFW, it is not apparent that there has been a public mood on this particular technology, or if there has been, that it is in any way a widely shared policy priority for citizens. However, public support for climate action and the adoption of renewable energy more generally may be the most obvious issue where there is both a long history of measuring the public mood and a relation to OFW. Supporting the deployment of OFW is one way for policy makers to indicate to the public that they are taking action to mitigate emissions. In MSF theory a policy window may open in the politics stream when there is a *change* in public mood on a particular issue. However, in this instance it seems insufficient to define the set in terms of a change in public mood. Rather, I propose defining the set as *high public support for climate action*, and calibrate it according to the *level* of public attitudes. Any moment when a strong majority of the public is supportive of climate action, a policy window in the politics stream may be counted as more open than close. When there is a very large majority of the public supportive or strongly supportive of climate action, then there is certainly an opportunity to push for the prioritisation of OFW, alongside other mitigation measures. As long as public support for climate action remains consistently high, a policy window in the politics stream remains open. This also allows the set to be calibrated largely a priori where opinion poll data exists, though in some instances this can be triangulated with referrals to the public mood by key informants and the Oireachtas record.

I use the Special Eurobarometer surveys on climate change to reconstruct the Irish public mood from 2008 to 2020 (Eurobarometer, 2008, 2009; *Special Eurobarometer 372 Climate change*, 2011; European Commission, 2014, 2015, 2017, 2019). These surveys provide a frequent record on Irish public opinion on climate change from 2008 to present, as well as public opinion on specific European and national policies, such as renewable energy and CO2 reduction targets (Figure 36). Given that the Eurobarometer is well established and that it asks specific questions on European (and sometimes Irish) policy, I also assume that the relevant politicians have paid attention to its findings; i.e. that their perception of public support for climate action align with the Eurobarometer survey results.

A strong majority of the Irish public considered climate change to be a very serious problem (70%) and one of the most serious problems facing the world (63%) in 2008 (the first Eurobarometer survey on climate change). This level of concern decreases in 2009 and remains between 40 – 50% until around 2015. Between 2009 and 2015, the survey results do not provide figures for the % of the Irish public who consider climate change a 'very serious' problem. However, the average score of the seriousness of the problem appears to track the aforementioned roughly. It drops from almost 8 (out of ten) to 6.5 in 2013 and returns to almost 8 by 2019.

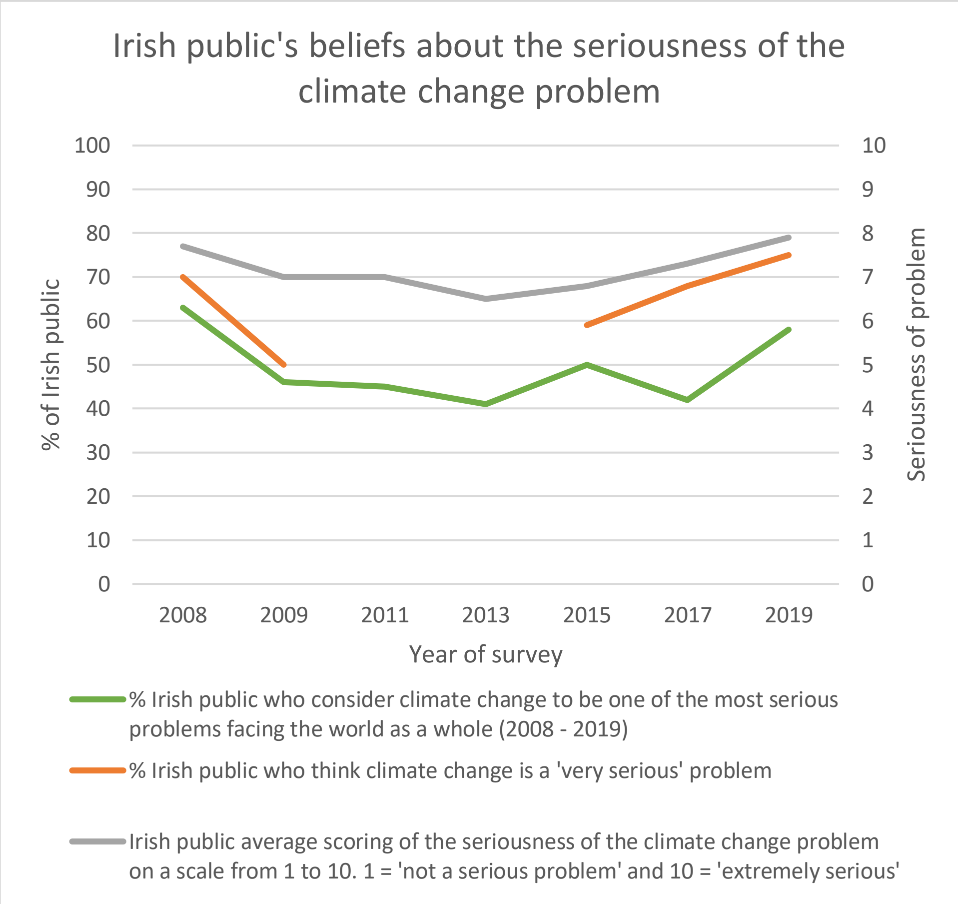
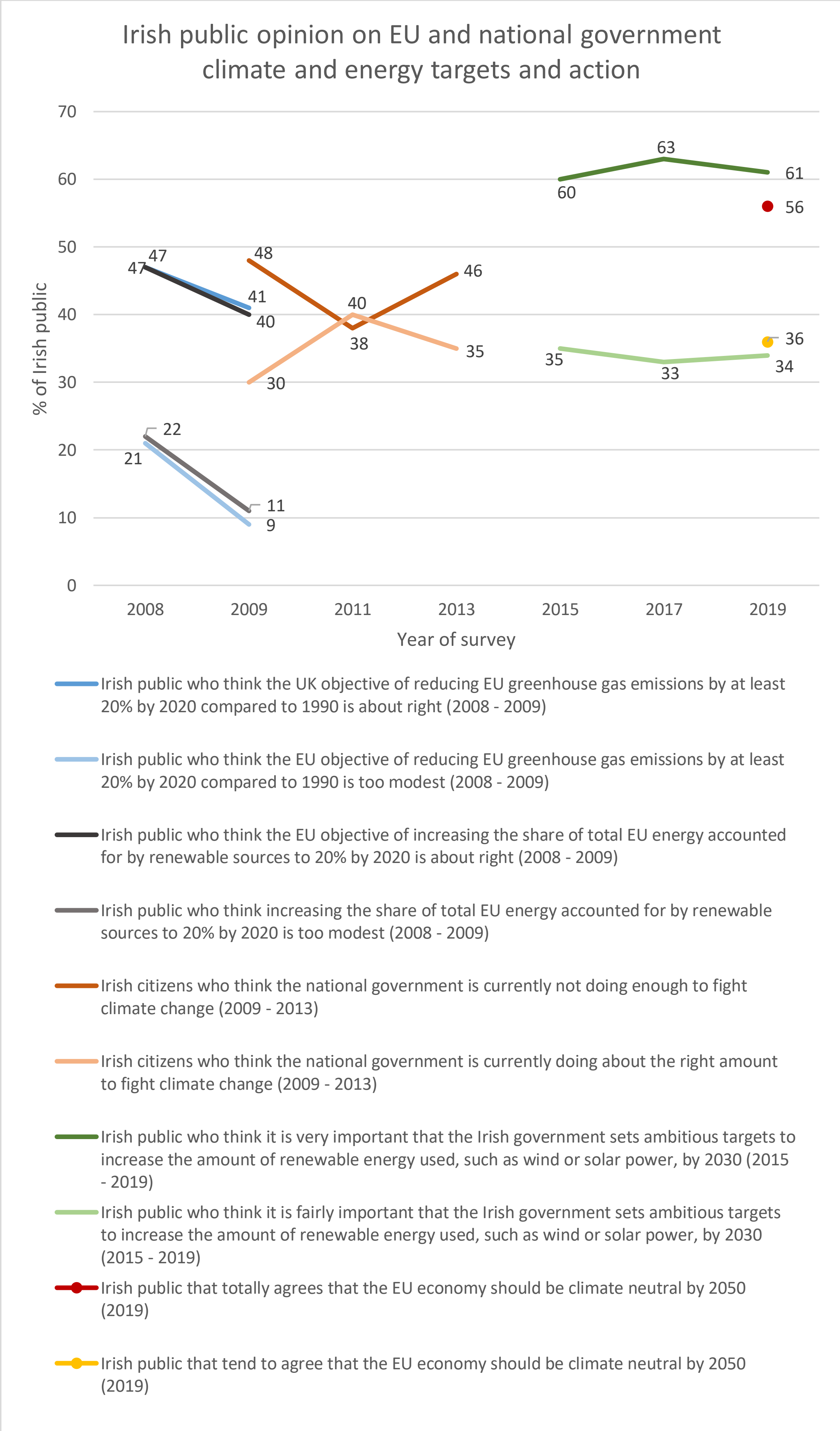


Figure 36: Reconstruction of Irish public opinion on climate change. Data from Eurobarometer (2008, 2009, 2011, 2013, 2015, 2017, 2019)



Irish public opinion on EU and national government climate and energy targets and action
70
60
50
40
30
20
10
0
% of Irish public
2008
2009
2011
2013
2015
2017
2019
Year of survey
47
47
41
40
48
38
46
40
30
35
60
63
61
56
35
33
34
36
22
21
11
9
Irish public who think the UK objective of reducing EU greenhouse gas emissions by at least 20% by 2020 compared to 1990 is about right (2008 - 2009)
Irish public who think the EU objective of reducing EU greenhouse gas emissions by at least 20% by 2020 compared to 1990 is too modest (2008 - 2009)
Irish public who think the EU objective of increasing the share of total EU energy accounted for by renewable sources to 20% by 2020 is about right (2008 - 2009)
Irish public who think increasing the share of total EU energy accounted for by renewable sources to 20% by 2020 is too modest (2008 - 2009)
Irish citizens who think the national government is currently not doing enough to fight climate change (2009 - 2013)
Irish citizens who think the national government is currently doing about the right amount to fight climate change (2009 - 2013)
Irish public who think it is very important that the Irish government sets ambitious targets to increase the amount of renewable energy used, such as wind or solar power, by 2030 (2015 - 2019)
Irish public who think it is fairly important that the Irish government sets ambitious targets to increase the amount of renewable energy used, such as wind or solar power, by 2030 (2015 - 2019)
Irish public that totally agrees that the EU economy should be climate neutral by 2050 (2019)
Irish public that tend to agree that the EU economy should be climate neutral by 2050 (2019)

Irish public opinion on particular policies add richer information on the shifting public mood over a decade. In 2008 only 21% of the public thought that the EU 2020 CO2 reduction target of 20% was not ambitious enough, dropping to 9% by 2009. A similarly low and dropping proportion of the public through the 2020 renewable energy target of 20% was too modest. At the time, the largest proportion, 40-47% thought the targets 'were about right'. Between 2009 and 2013, the proportion of the public who thought the government was not doing enough to fight climate change moved between 38 and 48%, and between 30 to 40% of the public thought the government was doing enough. However, between 2015 and 2019 over 90% of the public consistently agreed that it was either important or very important for the government to set 'ambitious targets' to increase the amount of renewables by 2030. By 2019, over 90% agreed (somewhat or totally) that the EU economy should be climate neutral by 2050. I interpret these statistics as an increasing proportion of the public supporting increasingly ambitious policies over this period. Key informant interviews and the Oireachtas record also confirm a perception amongst Irish policy makers of a step-change increase in the importance of the issue for the Irish public and the demand for ambitious policy action from 2015 onwards (Civil servant 09pmi, 2021b; Roux, 2021n; Civil servant 15pmi, 2022).

I could not find any Irish opinion poll data on climate change prior to 2008. This presents a challenge for the QCA cases between 1999 and 2008. The first Eurobarometer data point for 2008 suggests that public support for climate action was higher before 2008 than after, which may also partially explain the unprecedented success of the Irish Green Party in the 2007 general election running on an explicit manifesto of more ambitious action to curb national greenhouse gas emissions and support renewable energy sources. However, it is unlikely that the supportive majority or the ambition of public expectation matched that of the post-2015 period. In lieu of Irish opinion polls, I draw on several international reviews of public opinion on climate change over this period, including one systematic review (Nisbet and Myers, 2007; Capstick *et al.*, 2015). The general conclusions are that public concern about climate change and support for climate mitigation policies grew during the early 2000 up to around 2007. A poll of ten European countries carried out in 2005 and 2007 showed a sharp rise in the percentage of respondents, from 36% to 55%, who considered it ‘very likely’ they would be personally affected by climate change. Key informant interviews with Irish policy makers also suggest that governments prior to 2007 may not have perceived such high public support for more action on climate change, but that it grew during the early to mid 2000s.

Drawing all of the above, I score all cases from 1999S1 – 2020S1 as per Table 8 (p. 220). The biggest uncertainty with this scoring is at which point cases between 1999S1 and 2008S1 should switch from 0.33 to 0.67, as this difference in kind in the fuzzy set may have a significant influence on the results for these cases.

7. Problem stream ripeness (PRO_STR)

In defining and calibrating this set, I continue from the theoretical discussion in Chapter 2.3.6. I define the set as follows: Most of the relevant policy community agrees that OFW is necessary to solve particular policy problems. Convergence of the policy community on a particular problem framing is a matter of degree. I therefore calibrate this set as a fuzzy set. A case has full set membership if most of the key actors in the policy community converges on the above. A case is more in than out (0.67) if representatives from two key institutions in the policy stream agree on the above. These may be any combination of two key actors, such as the system operator and an influential research organisation, or civil servants in the department of energy and an influential research organisation. I define a case of more out than in (0.33) if only one key actor adopts a particular policy problem framing that points to OFW as a necessary solution. If there is no evidence of any of the key actors framing problems around OFW during a period, the case is totally out (0).

I outline these actors in Chapter 2.1, but also remain open to the findings of the qualitative case narrative as the in-depth qualitative research may reveal other key actors or fine-grained but relevant divergences on problem (and solution) framing. Triangulating key informant interviews, Oireachtas records and commissioned reports are key to building the qualitative evidence base to calibrate the cases. I therefore include the analysis of this in the results chapter.

8. Politics stream ripeness (POL_STR)

a. Programme for Government (GOV_PRG)

MSF literature claims that the ideological affiliation of political parties provides a rough idea of the extent to which certain policy proposals will appeal to a government. However, given that policy makers' preferences are unclear and that a policy proposal can be framed in multiple ways to appeal to different ideological positions, ideology is only a rough indicator of whether the politics stream is ripe for agenda change (Zohlnhöfer, Herweg and Zahariadis, 2022). In the Republic of Ireland and on the topic of OFW the issue is further complicated by three facts. Firstly, the many political parties that compete in the political system often don't have widely differing ideological stances on many policy issues. Ireland is very different from say a polarized, two-party system like the United States of America. Secondly, even if parties have some ideological differences, they have to compromise these in the formation of coalition governments, which is the norm in Ireland. Thirdly, there has been a something of a long-standing consensus between the main parties that climate change is a significant global risk and that it is necessary that government should facilitate indigenous and/or renewable sources of generation (refer to the Oireachtas memos available in the supplementary files folder).

I therefore adapt this condition to focus directly on the extent to which the agreed Programme for Government (PfG) that each newly formed government issues for its term in office, is supportive of commercial OFW deployment. The PfG is the clearest indication of the stance of the coalition government that may carry through the term of government. I triangulate this with party manifestos (prior to the general election) and the Oireachtas record where the stance of individual parties and politicians within the coalition is relevant to understanding stream ripeness. A focus on PfGs enables a clear calibration prior to deep qualitative investigation in some cases, but in other cases, triangulating the PfG with other sources are key to have high confidence in the calibration. I therefore deal with the calibration in the Results chapter.

Set definition: Programme for Government commits to supporting OFW deployment	
Anchors	Concept
1	PfG explicitly includes support for OFW
0.67	PfG does not explicitly include support, but general energy policy priorities of government aligned with potential support
0.33	PfG does not explicitly include support, and general energy policy priorities of government do not aligned with potential support
0	PfG specifically precludes OFW

b. Government perception of public mood as supportive of action on issue

One of the key challenges this study highlights is the ambiguity in higher level MSF concepts that may overlap at the operational level. The need to clarify this concept for a directional QCA set further underscores the ambiguity in MSF theory. In MSF conceptual literature, there is a distinction between a change in national mood that opens a policy window, and a supportive national mood on an issue that renders the politics stream ripe. In practice, this distinction appears spurious. For instance, as long as there is high public support for ambitious climate action, it may contribute to opening a policy window for entrepreneurs eager to promote renewable energy. Such a high level of support may be relatively constant over a period of years and hence contribute to a policy window on related action remaining open. A supportive public on climate change provides one more reason for policy makers to prioritize renewables, *ceteris paribus*. The state of public support, not a shift, is what is relevant to a policy window opening and staying open. Public mood shifts across the supportive/opposing threshold is of course relevant to the moment of policy window opening/closure. If a change in mood on a particular issue is what determines set membership then only the moment of change, regardless of the direction, is what matters. Consequently, a policy window may be closed in the politics window, despite a sustained high level of support from the public on a particular issue. This seems absurd.

If the above argument holds, then the distinction between the function of public mood for policy window and stream ripeness disappears. Utilising both amounts to a conceptual equivocation that we would seek to avoid in hypothesis testing. If the hypothesis is to be coherent, there must be a very clear distinction between what we measure for stream ripeness, policy windows, and entrepreneurial coupling.

One option then for hypothesis testing is simply to drop public mood from the policy window or stream ripeness category. Another option is to make a clearer distinction between different objects of public mood and how policy makers take this into account. For instance, a general high level of support for climate action may open a policy window for support of renewable energy. However, policy makers or elected officials may perceive/assume that the public would not be supportive of a policy that significantly increases the cost of energy to mitigation emissions, thus rendering the politics stream un-ripe for agenda change. However, such a distinction risks double counting public mood across the QCA sets (and qualitative explanations using MSF). The government PfG, or policy makers working out 'value acceptable' policy solutions (i.e. policy stream ripeness), may have already taken into account (or assumed) that the public is not supportive of policies that significantly increase the cost of energy to mitigate emissions (or increase energy security).

Double counting as noted above may undermine progress on developing and testing a theory that robustly incorporates causal complexity.

A further complication in classifying the function of public mood on climate change in the MSF hypothesis applied to OFW, relates to the potentially different effect of public mood on agenda setting compared to decision making. A high level of public support for climate action may open a policy window for a wide range of very different policy proposals, such as supporting OFW. However, policy makers (in the policy stream) and elected officials (in the politics stream) form far more complex views on anticipated public support for particular policy alternatives as they move through the decision making process to whittle down and refine acceptable solutions for supporting OFW.

Given the above, this study therefore eliminates a supportive public mood on climate change as a condition for politics stream ripeness and retains it as a condition contributing to policy window opening. At the same time, I note that it may be fruitful for research to test QCA results from multiple different designs, consistent with MSF, to tease out the robustness of the theory.

c. Balance of influence of interest groups (INGRP)

This study triangulates the position of relevant interest groups vis-à-vis OFW based on Oireachtas records (public hearing with groups in parliamentary working groups), key informant interviews, and reports commissioned by interest groups. I consider the balance of interest group position on policy makers by paying attention to the resources and intensity of key groups (Sanjurjo, 2020). Groups with many members and more resources to spend on campaigning tend to be more influential with government. Groups that also campaign intensively and in a sustained manner (rather than sporadically) also tend to occupy positions of greater influence with government. The Irish case is relatively simple over the period in question, because there had largely been only two industry interest groups that sustained a key interest in this issue, the Irish Wind Energy Association (IWEA) and National Offshore Wind association of Ireland (NOW Ireland). At different points in time However, other interest groups may also have sporadically sought to influence government on this matter. In defining this set and the calibration of cases for it, it is therefore necessary to consider the balance of support/opposition between groups, and their influence on policy makers. Key informant interviews are essential to provide information on the relative influence of different groups on government and other state institutions, but tracing public hearings and consultations on particular policies with government decisions also provide useful information in this regard. I therefore leave the calibration of cases to the Results chapter.

In defining the set in terms of the balance of interest group influence on government, I opt for a binary set – either interest groups, on balance, influence government in favour of OFW, or they don’t:

Set definition: Balance of influence from interest groups on government in OFW's favour	
Anchors	Concept
1	Balance of influence from interest groups on government in OFW's favour
0	Balance of influence from interest groups on government NOT in OFW's favour

9. Policy stream ripeness (POLY_STR)

For this concept I retain the noted distinction between a price support instrument, network connection policy, and marine planning legislation (See Chapter 2.1). As the process tracing revealed, different institutions but overlapping policy networks may be responsible for developing these three policy elements and solutions for these may not be coordinated. I therefore include a separate set for each policy element in the QCA. I average these for a single calibration of policy stream ripeness.

However, as argued in Chapter 3.3.3, there are ambiguities in operationalising MSF theory to define policy stream ripeness. The process tracing confirms that the policy community may often only work out all the design terms of any of the aforementioned policies once OFW is already on the agenda. Employing the strict definition proposed by MSF literature would therefore render policy stream ripeness irrelevant to agenda setting, and trivially necessary for decision-making. While this raises an issue for MSF theory, there may still be empirically productive distinctions to be made on this.

I therefore adopt a different set definition for stream readiness. The policy stream is ripe for OFW when there is a viable:

- price support instrument for onshore wind and solar available
- grid connection policy for onshore wind and solar available
- draft marine planning legislation (ready for the Oireachtas legislative process)

For price support and grid connection, the exact terms for accommodating OFW within these policy elements do not yet have to be agreed on, as long as most of the general constellation of terms that would constitute a solution are agreed on. However, for marine planning legislation, there needs to be a draft bill ready to enter the Oireachtas legislative process.

POLY_STR: There are viable policy solutions for OFW across three policy elements. POLY_STR = AVE (SOL_PRICE, SOL_GRID, SOL_MAR)	
Set definition: SOL_PRICE - There is a viable price support instrument for onshore wind and solar	
Anchors	Concept
1	Viable price support instrument for wind/solar available
0	Viable price support instrument for wind/solar NOT available
Set definition: SOL_GRID – there is a viable grid connection policy for wind/solar	
Anchors	Concept
1	Viable grid connection policy for wind/solar available
0	Viable grid connection policy for wind/solar NOT available
Set definition: SOL_MAR – there is a draft marine planning legislation bill that accommodates OFW ready for the legislative process	
Anchors	Concept
1	Viable marine planning legislation is available
0	Viable marine planning legislation is NOT available

10. A policy entrepreneur promotes the agenda change (ENTRE)

I incorporate three findings from the qualitative case study in the definition of this MSF condition for the QCA. Firstly, in addition to the three policy elements of interest, there is the additional substantive policy position of having an OFW target. This is usually in response to framing OFW as a solution to another policy problem. This in and of itself may require substantial entrepreneurial effort. Secondly, institutions can limit the influence of an entrepreneur and ultimately responsibility for the three policy elements most often fall to different institutions. Therefore, we may define entrepreneurship as a matter of degree in terms of the extent to which one or more entrepreneurs are willing and able to promote OFW as the solution to policy problems and promote OFW-specific terms for the three different policy elements across the implicated institutions. I therefore distinguish four crisp sets under this MSF condition and average over them to arrive at a calibration of the extent to which policy entrepreneurs promote OFW for each case.

<table>
<tr><td colspan="2">Set definition: Policy maker promotes OFW as solution to a policy problem</td></tr>
<tr><td>Anchors</td><td>Concept</td></tr>
<tr><td>1</td><td>Policy maker promotes OFW as solution to a policy problem</td></tr>
<tr><td>0</td><td>Policy maker does NOT promote OFW as solution to a policy problem</td></tr>
<tr><td colspan="2">Set definition: Policy maker promotes OFW-specific price support instrument</td></tr>
<tr><td>Anchors</td><td>Concept</td></tr>
<tr><td>1</td><td>Policy maker promotes OFW-specific price support instrument</td></tr>
<tr><td>0</td><td>Policy maker does NOT promote OFW-specific price support instrument</td></tr>
<tr><td colspan="2">Set definition: Policy maker promotes OFW-specific grid connection policy</td></tr>
<tr><td>Anchors</td><td>Concept</td></tr>
<tr><td>1</td><td>Policy maker promotes OFW-specific grid connection policy</td></tr>
<tr><td>0</td><td>Policy maker does NOT promote OFW-specific grid connection policy</td></tr>
<tr><td colspan="2">Set definition: Policy maker promotes supportive legal framework for consenting OFW projects</td></tr>
<tr><td>Anchors</td><td>Concept</td></tr>
<tr><td>1</td><td>Policy maker promotes supportive legal framework for OFW</td></tr>
<tr><td>0</td><td>Policy maker does NOT promote supportive legal framework for OFW</td></tr>
</table>

11. OFW is on the agenda (AG_CHG)

Calibrating this set build on the discussion in 2.3 on defining what it means for OFW to be ‘on the agenda’. A key point is that there are several institutional agendas. OFW may be on any combination of them for different reasons and at different times. Yet, the more institutional agendas it is on, the more it is on ‘the agenda’ *tout court*. The qualitative case research reveal that the relevant institutions grew from four in 1999 to six by 2007 with the intervention of the regulator in grid connection policy and the splitting of the marine planning and energy mandates between two departments. The simplest way to account for the concept of ‘spillovers’ (see Chapter 2.3.5) and OFW being on ‘the agenda’ as a matter of degree is through a fuzzy set.

Set definition: OFW is on the agenda	
Anchors	Concept
1	OFW is on the agenda of three or more of the relevant institutions
0.67	OFW is on the agenda of two relevant institutions
0.33	OFW is on the agenda of one relevant institution
0	OFW is not on the agenda of any of the relevant institutions

Appendix C – Ireland's first marine consenting policy for offshore wind power

In 1999, Minister Frank Fahey, leading the Department of Marine and Natural Resources decided against the need for a legislative overhaul of the Foreshore Act of 1933 to provide a framework for consenting OFW. Instead he opted for a departmental guidance note that would set out the terms for licencing and leasing for prospective developers (Department of Marine and Natural Resources, 2001). In February 2000, Fahey's department issued a consultation document to stakeholders entitled 'Offshore Electricity Generating Stations – Note for Intending Developers', on the approach to be taken to licencing and leasing. The department circulated the consultation to over 150 parties with an interest in wind energy, electricity generation, or the maritime environment, and received over 30 submissions (Roux, 2021a). His department made it available to the public on application.

With this brief consultation and the development of the guidance note, Fahey (and by implication the government), considered the legislative problem solved:

> *"I opened this matter to public consultation to give the general public and industry interests an opportunity to contribute to the debate. I am satisfied that sufficient procedures are in place to deal with applications. Because the technology is new we have opened the debate to public consultation. There is no pressing demand for legislation or new regulations but I will keep an open mind on the matter."* (Roux, 2021a)

The 58-page guidance note sets out detailed terms for the application and issuance of licences and leases their transfers and/or sales, conditions for retaining and revocation of licences and leases along with requirements for environmental and visual impact assessments. A few of the terms are worth noting. Concerning foreshore licences, the Department of Marine and Natural Resources would issue these for four years with a nominal charge of €20 and a deposit of €100,000. The deposit was refundable subject to the licence being 'worked satisfactorily', reporting requirements fulfilled by the holder, and a lease application made within 12 months of licence expiration if the site proved suitable for development. Further to the deposit, licence applicants were not required to submit any further financial information on their legal and financial standing.

The department could issue multiple licences over the same area with the first applicant having prior rights to development. The second or subsequent applicants for a particular area, if unwilling to commit to the terms of the licence, could register an “expression of interest” which would entitle them to reactivate their application in the event of a subsequent party applying for the area or the first applicant surrendering or losing his license rights.

Concerning foreshore leases, the maximum period of a lease would ‘ordinarily’ be 60 years and the Minister could choose between commercial rents based on the nominal output of a turbine (€3,800 p.a. on a rating of 1 MW), or a percentage of gross revenue (2-2.5%). Applicants for leases were required to have held a Foreshore Licence for the site in good standing, and hold a licence from the regulator to construct and operate a generating station (or a contractual agreement with bodies holding such licence), and planning permission for onshore works. Applicants were required to provide a business plan covering construction and the first five years of operation, including sources of capital, and proof of good standing with the Revenue Commissioners. The Minister would permit sale of leases if the CER (or other appropriate authority) were willing to transfer the appropriate authorisations or licences. Concerning ‘environmental’ issues, offshore generating stations would not be allowed within 5 km of the coast unless applicants could justify, subject to visual impact assessments and additional consultation, that construction would not ‘interfere unduly’ with the visual amenity of the landscape and seascape. An Environmental Impact Statement would be required and a template of requirements for this provided by the department. Proposed or designated Special Protection Areas (SPA), Special Areas of Conservation (SAC) or Natural Heritage Areas (NHA) were not explicitly precluded but any ‘significant impact on the integrity’ of such areas would not be allowed.

The guidance note specified 22 agencies that applicants were either recommended to consult or from whom various permissions were required. [92]

[92] Dúchas (National Heritage Service of the Department of Arts, Heritage, Gaeltacht and the Islands), included the National Parks and Wildlife Division and National Monuments and Historic Properties Division; CER; Local Government; Bord Gáis; Eircom, E-Sat Telecom, Ocean and other licensed telecommunications operators and the Office of the Director of Telecommunications Regulation; the Commissioners of Irish Lights; Irish Aviation Authority; CHC Ireland (formerly Bond Helicopters); the Harbour Master or appropriate authority in ports

Importantly, the notice confirmed that the Licensee who first applied for a Foreshore Licence over a specific area would have a legitimate expectation to first claim on a Foreshore Lease over the area subject to terms and conditions.[93] The notice explains that "Legitimate Expectation" assured intending developers that the state would not engage in "gazumping", but that the legitimate expectation did not

> *"put a contractual obligation on the Minister to issue a Foreshore Lease for the development of an offshore electricity generating station to any applicant or in respect of any particular location. The Minister reserves the right to refuse to consider any application for a Foreshore Lease where he is not satisfied that the applicant has the necessary financial and/or technical expertise available to him to allow the construction and operation of an offshore generating station to proceed in an orderly and businesslike manner."* (Department of Marine and Natural Resources, 2001)

Given that the consultation document was published in February 2000, it is probable that most of the ideas underlying it was developed over the course of 1999 when the first lease application offered a precedent to learn from. It is therefore almost certain that Airtricity's application for a lease for its Arklow Bank project served as the test case that largely informed the policy.

Once the department published the guidance note, applications for leases could resumed. However, the application for a lease was still far from straightforward and required significant efforts from both applicants and one particular civil servant in the DMNR who was the focal point for interfacing with applicants and preparing the application for departmental consideration. It is instructive to consider a response from an individual acquainted with the process:

> *"We were the first [to apply for a lease for an offshore wind farm]. There was no example of it being done before… so [the department] kind of modified or looked at what had been done for oil and gas and then said, right, how does this apply? And we just worked on it together, back and forth a few times, with different*

near to the site; environmental NGOs, local tourism and fishing interests, including BirdWatch Ireland, the Royal Society for the Protection of Birds, An Taisce (The National Trust for Ireland), Coastwatch Europe, Irish Wildlife Trust, Irish Women's Environmental Network, Joint Links Oil and Gas Environmental Consortium, Voice of Irish Concern for the Environment, Irish Offshore Coalition.

[93] The Foreshore Licence had to have been worked in accordance with all terms and conditions; a valid lease application submitted to the Minister within 12 months of the expiry of the licence; an application made to CER for licences; and planning permission obtained. If the intention of a developer was to sell the electricity generated outside the Republic of Ireland, clear evidence of contractual commitments to purchase the electricity generated would be required.

legal [advisors]. And we kind of agreed what could be done in the context of what we were able to commit to, what we couldn't commit to. But really… This is really done because somebody in the Department of Marine thought offshore wind was something that we should be doing in Ireland. And he made sure that he worked on it to get it delivered. That's really how it happened." (Wind energy project developer 08idi, 2020)

Appendix D – Arklow Bank and the first grid connection for OFW

At the time, the system operators had a 'transitional' connection policy; to transition both to a liberalised market and greater connection of renewables, largely onshore wind power, from third party developers. Grid connection policy in Ireland was evolving in the context of unbundling the vertically integrated state-owned monopoly, ESB, whilst liberalising the generation and supply markets as per the 1999 Act. ESB National Grid (ESB NG), a wholly owned subsidiary of ESB, became the Transmission System Operator (TSO), whilst ESB Networks (ESBN), also a wholly owned subsidiary of ESB, became the Distribution System Operator (DSO). Together I refer to these as the 'system operators'. Initially all connection applications to the system operators, both for conventional and renewable plant, was processed through the same Connection Offer Policy. The system operators operated a '70 business-day Offer Process'. Either the DSO or TSO would process each application individually and sequentially and make an offer to an applicant within 70 working days. When processed individually, it was not possible to assess the interaction of grid connections that may eventually come to share distribution or transmission network infrastructure. The acceptance of some offers therefore frequently required the reprocessing of other offers already made, but not accepted, where applications compete for the same or similar available network capacity. This worked well enough for a few large conventional plant connections and a relatively small number of renewable connections.

Airtricity submitted its connection application for Arklow Bank under this transitional regime. At that point, the policy was that the TSO/DSO would bring the network connection up to the 'gate' of the plant, but the allocation of the associated costs, particularly for an unprecedented scale of offshore wind farm, was a discretionary negotiation. In Phase 1 Airtricity had initially planned to develop 120MW (of the permitted 520 MW on the lease). This required a high voltage connection to the transmission system, issued by ESB NG. Whilst it was possible for Aitricity to obtain a connection offer for an offshore wind farm in a relatively short time (between three and four months), the costs proved exorbitant. As a key informant privy to the process put it:

> *"I just literally applied to ESB NG for a grid connection and met them, told them what we were trying to do. They laughed at us and we*

> *continued to tell them "No we're serious." … eventually they gave us a connection agreement. I remember getting it through the post and it was going to be €1.5 million or something per annum on maintenance of the line. … I went to my boss and said, "What are we going to do with this?" I remember thinking it was ridiculous, but Airtricity was never a company to say 'no' or 'It can't be done'."* (Wind energy project developer 08idi, 2020)

Airtricity raised the issue with deputies in the Oireachtas (Roux, 2021c). From June 2001 to March 2002, several opposition party deputies asked the Minister for Public Enterprise whether the government would support the connection of Arklow Bank or if ESB would carry the cost for the connection.[94] O'Rourke's deputy, Minister of State, Mark Jacobs, responded that grid connection decisions were the preserve of the regulator and system operators. He also highlighted the technical challenges with connecting large-scale offshore wind (no doubt communicated to him by the system operators), particularly the limitations on the transmission grid to absorb more wind at such a scale.

In the meantime, Airtricity had progressed the Arklow development through creative means, adapting its original proposal:

> *"So I was down in Arklow one of the days, down at the harbour, and running by the harbour I saw the medium voltage lines. Now, the transmission, the high voltage stuff, was running a couple of miles from the harbor. This one was running right along the harbor. And I just remember looking and going, I wonder if there's any capacity on those lines. So I went in and spoke to the head of ESB Networks, the medium voltage guys. He said, "That's amazing. I love the idea. I'm going to do everything I can to help make this happen." So got the exact opposite response, and I said to him, how much capacity is on the lines in Arklow? And he said, I think it's around 25 megawatts. … and I said, "Right, I'm going to send in a grid connection for twenty five megawatts in Arklow." And he said, "fine". And I sent in the grid connection with 25 megawatts and it was approved."* (Wind energy project developer 08idi, 2020)

94 Jack Wall (Labour), June 2001; Ulike Burke (Fine Gael), January 2002; Liz McManus (Labour - Wicklow), March 2002

Appendix E – Priorities of the renewable energy policy community, 2000-2002

This appendix elaborates on Chapter 4.1.3 and should be read alongside it.

The policy community identified uncertainty about the future of the electricity market as the main barrier for onshore wind. It recommended improvements to the Alternative Energy Requirement (AER) market mechanism to support large-scale onshore wind projects to address this barrier. The AER was a series of auctions the government had launched in the late nineties as the main price support instrument for wind power. The first three rounds of auctions (AER I, II, III) had been poorly designed (Gallachóir, Bazilian and McKeogh, 2005). The auction winners were purely based on price and didn't require planning permission, resulting in a mismatch between wind projects with price support from the scheme but without planning permission, and vice versa. The uncertain schedule of the auctions also introduced uncertainty into the wind market. This uncertainty resulted in under-developed planning applications swamping planning authorities and grid connection applications swamping the ESB's departments. The RESG strongly recommended that the government send a clear signal to the market that it was committed to target attainment on deploying onshore wind energy (Renewable Energy Strategy Group, 2000). In practice, this amounted to calibrating the terms, scale and timing of the price support mechanism to target attainment. The RESG recommended that the AER-V, over a 24-month window period, provide a 15-year Power Purchase Agreement (PPA) for all wind projects with planning permission and the necessary CER licences and authorisations up to attaining the 500 MW wind capacity target.

Concerning the electricity network, the RESG highlighted two barriers to connection of wind power. Firstly, there was a serious shortage of capacity on the grid for individual, spatially disbursed connections. The group recommended strategic network upgrades in locations where wind farms were expected or where there were projects with planning permission, along with a mechanism to recover the costs for such upgrades from all connections. Secondly, it pointed out the unknown impacts of more wind power on system security. The group recommended further research to understand the system security implications of a growing proportion of wind penetration on the system. Most urgently, the 500 MW target required a proportional growth from 1% (in 2000) to 7% by the end of 2005, but research was needed on the impact of reaching the 2010 deployment target.

Appendix F – Grid connection policy, 2003-2006

This appendix expands on Chapter 4.1.6 and should be read as providing the evidence for the conclusions of this section.

The electricity network challenges highlighted by the RESG's first report would soon crystalise the position of the fledgling regulator and the ESB vis-à-vis each other and the issue of grid connection policy. The 1999 Act gave the CER power to authorise access to the transmission or distribution system for holders of electricity generation licences and other eligible customers, but did not imply a particular grid connection policy. The 1999 Act also created clear procedural and substantive norms for the regulator. Consultations and responses were published publicly and the regulator had to justify decision publicly and in terms of the act. Only the Minister responsible for energy could give the regulator a written Direction on particular matters, but the Act heavily circumscribed the matters on which such a Direction could be given and procedural constraints for giving such directions. All of the aforementioned made it difficult for advocates, whether elected officials, the system operators or industries to bend the regulator to their peculiar interests.

As noted in the previous section, the Transitional Connection Policy operated by ESB from 1999 onwards severely limited the first offshore wind connection (due to the costing model), but it enabled relatively speedy processing of connection applications for wind energy plant in general, as long as there were relatively few applications. This was about to change in 2003, and would entail knock-on effects for the forthcoming offshore wind grid connection applications.

Under the Transitional Connection Policy the ESB subsidiaries processed applications for conventional and renewable plant through a '70 business-day Offer Process'. Applications were processed individually and sequentially. When processed individually, it was not possible to assess the interaction of grid connections that may come to share distribution or transmission network infrastructure. The acceptance of some offers therefore frequently required the reworking / reprocessing of other offers already made, but not accepted, where applications compete for the same or similar available network capacity. This worked fine for a system based on a few large conventional plant connections and a relatively small number of renewable connections.

During the early 2000s, ESB NG failed to allocate sufficient resources to assess the impacts of higher penetration of wind farms on the grid (Gallachóir, Bazilian and McKeogh, 2005). Wind developers also did not submit adequate data on turbine performance (‘dynamic models’) to enable the TSO to carry out dynamic simulations. During 2003 grid connection applications from wind farms grew considerably. This prompted the TSO to seek a moratorium on issuing further wind connection offers from the regulator (ESB National Grid, 2003). On 3 December 2003, the CER announced a moratorium on new wind connection offers, on the request of the TSO (Reeves, 2003). The moratorium coupled with expectations of the connection policy that would follow triggered an acceleration in connection applications, and a massive backlog in processing applications. By July 2004 there was a build-up of 1,640 MW of generation connection applications. By December, when the CER issued its decision on a new policy to process wind applications, the build-up had grown to 1,640 applications being checked or being processed, totalling 2,494 MW (Commission for Electricity Regulation, 2004; ESB National Grid, 2004a).

ESB was primarily concerned with the system impacts whilst it fell to CER to facilitate timely consultation and a decision on a non-discriminatory connection policy.

One of the key functions of CER, granted by the 1999 Electricity Act, was to authorise access to the transmission or distribution system. In dispensing this function it was constrained by procedural and substantive rules and principles set out in the act. The Act forbids the CER from discriminating unfairly between applicants for licences and authorisations. In addition, the 1999 Act tasks the CER with balancing several objectives (Oireachtas, 1999, p. 11):

- *(a) to promote competition in the generation and supply of electricity in accordance with this Act;*
- *(b) to secure that all reasonable demands by final customers of electricity for electricity are satisfied;*
- *(c) to secure that licence holders are capable of financing the undertaking of the activities which they are licensed to undertake;*
- *(d) to promote safety and efficiency on the part of electricity undertakings;*
- *(e) to promote the continuity, security and quality of supplies of electricity; and*
- *(f) to promote the use of renewable, sustainable or alternative forms of energy.*

The increase in grid connection applications along with the uncertainty of impact on system resilience would pit the above-mentioned principles against each other. By August 2004, the ESB NG proposed the concept of a Group Processing Approach (GPA) to the renewables industry (ESB National Grid, 2004a). The proposal was to process all renewable grid connection applications completed by a specified date in a group, called a ‘Gate’. ESB NG would divide applications within the Gate into groups and subgroups, based on geographic location and level of grid interaction. ESB NG would then study these respective clusters of geographically proximate projects to determine the optimal transmission network reinforcements required for each group. ESBN and ESB NG would then identify the shallow (direct) connection method and associated deep reinforcements for each individual application within a group/subgroup. Depending on the optimal connection, either ESBN (in the case of connections to the distribution network) or ESB NG (in the case of connections to the transmission network) would issue a connection offer to individual applicants within a group/subgroup. Individual application connection charges would be proportional to the cost of connecting the group.

This approach promised several benefits. By removing interacting and reworking aspects associated with single sequential application processing, connection offers would be made more quickly on average. It would remove the ‘race to sign’ a connection offer (once made), and introduce more financial certainty for developers. It would also decrease overall connection infrastructure, which in turn would reduce planning permission requirements, impact on landowners, network development costs, environmental impacts, and ultimately minimising network charges. However, opting for a GPA opened several new implementation issues for consideration, some of which would be assessed directly against the CER’s overarching statutory objectives. These included selecting the size of the Gate and criteria for inclusion in the gate, criteria for making exceptions to the GPA, and deciding the order in which to process group and subgroup clusters and timing of individual connection offers.

Stakeholders raised several issues in the consultation process.[95] One proposal was for a comprehensive review of connection policy that would integrate it with

[95] ESB industry workshop, 20 August 2004; CER stakeholder forum, 1 November 2004

long-term strategic grid development. This would require the system operators to plan and develop the system in anticipation of, and with the objective to, maximise the connection of renewables over the long-term. Against this the regulator argued that dealing with the short-term challenge of the ‘huge application backlog’ was paramount:

> *“The task now facing the System Operators and the Commission was, and is, essentially an administrative one: how to deal with this unprecedented volume of applications in a manner which is efficient, equitable and generally in accordance with the Electricity Regulation Act 1999.”* (Commission for Electricity Regulation, 2004, p. 2)

Grid connection policy would remain separate from longer-term grid development planning which would be dealt with under the CER and system operators’ cyclical reviews of network investment. Essentially the system operators would continue chasing the market, regardless of longer-term inefficiencies in this approach.

On 23 December 2004, just over a year since the announcement of the moratorium, CER published its connection policy decision for Gate 1 of the new GPA (Commission for Electricity Regulation, 2004). It favoured balancing short-term efficiency in dealing with the crises brought on by the moratorium with a measure of fairness to applicants, whilst deferring some decisions to a second gate. It decided that all grid applications deemed completed at the start of the moratorium, would be processes together under Gate 1. This amounted to 33 projects, totalling 330 MW, with offers issued by April 2005. In addition, ESB NG argued that renewable grid connection offers should still be conditional on the outcome of its dynamic simulation of the impact of wind farms on the electricity system. It retained the right to constrain output from wind farms as and when needed. Having dealt with a relatively small group of applications that had been in the queue longest, it would move on to a second gate, deciding on how to deal with applications received subsequent to moratorium commencement. At the time of making the GPA proposal, the system operators and the CER only intended for the GPA to be a policy solution to clear the backlog, and suggested re-introducing an ‘enduring policy’ subsequently (ESB National Grid, 2004a).

Alongside the new GPA for renewables, the regulator maintained the historic single application rules for conventional plant. By 2005, However, the regulator gave direction on how it would deal with interactions between conventional and renewable plant. The TSO was required to consult with the CER in any instance where an application from a conventional plant had the potential to affect the offers issued, or already issued, to renewable generators under the GPA. The CER reserved the right to issue specific directions to system operators on how to deal with contingencies on the grounds of wider public interest and security of supply. A test case emerged in June 2005. The TSO referred an application for a Combined Cycle Gas Turbine plant at Aghada, County Cork, that ESB would construct. The regulator decided that the connection application should not be given priority over renewable applications because “there was not sufficient evidence that such priority was warranted on grounds of the wider public interest.” CER judged that the plant was not necessary in the short to medium term to meet system adequacy requirements[96], and that it ran contrary to promoting competition given the renewable projects already in the connection queue, and ESB’s existing position in the generation market. CER found that it would be prima facie unfair to existing renewable generation applicants for the plant connection to be prioritised run against the regulator’s responsibility to promote renewables.

CER’s decision in favour of a GPA essentially created a single queue for all wind projects based on the completion date of their connection application. This set a powerful precedent and raised the expectation in the market that future gates would be determined in the same or similar ways. Given that there were very low barriers to submitting grid connection applications, these continued to grow rapidly. All renewable applications, onshore and offshore wind, would be considered based on the date of their complete applications, and batches of applications would be processed together. Given the head start onshore wind had in Ireland, large offshore projects had to line up behind many smaller onshore projects. The regulator did not opt for opening a separate queue for offshore wind.

By November 2005 the system operators had made offers to all applicants under Gate 1. The take-up of Gate 1 connection offers stood at 87% (323 MW of 370 MW) (Commission for Electricity Regulation, 2006). However, a significant number of offers had resulted in disputes being brought to the CER.

[96] It used ESB National Grid’s “Generation Adequacy Report 2005-2011” to reach this judgement.

These disputes centred mainly on connection methodologies, forecast timeframes and individual connection costings (Commission for Electricity Regulation, 2005).[97]

In November 2005, the regulator published its proposal for Gate 2 for public consultation. This was the first time grid connection policy considered its obligation to promote renewables in terms of a long-term target, though this consideration did not prove definitive in calibrating the Gate 2 batch size. This essentially amounted to ensuring sufficient connection of renewables to meet the 2010 RES-E target of 13.2% (Directive 2001/77/EC). The DCMNR's Renewable Energy Development Group had estimated that meeting this target would require 1,432 MW of installed renewable capacity by 2009 (Department of Communication Marine and Natural Resources, 2004). By November 2005, if all outstanding live connection offers were to be accepted, the cumulative renewables on the Irish grid would be around 1,567 MW. 809 MW of wind had been connected, there were signed connection offers for 517 MW and live offers (from Gate 1) of 278 MW. Assuming all Gate 1 offers were taken, the cumulative renewable generation on the system would be 1,604 MW. Issuing further renewable connection offers was therefore not necessary to meet the 2010 target.

However, at this point, the connection application queue had grown to 2,841 MW. Based on the system operators' performance of Gate 1 processing, the CER proposed a cap of 500 MW for Gate 2 could be processed in a similar amount of time. Although more wind connections were not needed to reach the 2010 target, the CER argued that a 500 MW Gate 2 held several advantages. It would limit the risk of connection offers that wouldn't be taken up; ensure optimal system planning; provide credibility to the financial community; and provide information on the potential level of constraints that this new amount of wind may face in certain circumstances.

Under this broad target several conflicting grid connection policy options formed the objects of public consultation for setting the criteria for Gate 2 (Commission for Electricity Regulation, 2005). Many stakeholders urged the CER to move

[97] Whilst processing applications under Gate 1, the CER issued a more general set of rules regarding connection charges, connection methods, contestability and payment schedules.

away from application completion date as the sole criterion for inclusion in the gate. One proposal was to prioritise applicants who already had a PPA through the AER auction scheme, this would remedy one of the failures in the scheme. The regulator rejected this because it would discriminate against those applicants financing their project through merchant contracts. Another proposal was to prioritise financially viable applicants. This would filter out speculators and allocate the scarce network capacity to those most likely to deploy projects. The regulator argued that it would be inappropriate for it to assess the financial status of applicants and would result in many disputes and delays. Another proposal was to prioritise applicants based on the expiration date of their planning consent. This would remedy the often-encountered situation where projects' planning permission expired before it could secure a grid connection. However, the CER found that this would discriminate against applicants who chose to structure projects differently. The CER also decided against prioritising the most 'system ready' projects; those projects that apply to nodes of the network with available capacity. This could promote earlier consumption of renewables, but the Forecast Statement 2005-11 found that new generation anywhere would trigger deep reinforcement. The CER also decided against requiring a high application bond. This would filter out speculative applications, but also drive out smaller developers without 'deep pockets'. Another proposal which enjoyed more consideration was a hybrid gate, with part of the gate capacity allocated on application date and part on grid system optimisation. This would decreases cost to customers and lead to more efficient network development in the selected clusters, but would require a 'significant degree of subjective decision making' by System Operators, open to dispute (Commission for Electricity Regulation, 2005).

Ultimately, the regulator decided on connection criteria that would strike a balance between fairness to applicants in the queue and system stability. The CER considered fairness in terms of non-discrimination between applicants, continuing with the precedent set in Gate 1. It considered system stability in terms of prioritising those projects that required the least system reinforcements and could be connected to the system most efficiently. The resultant 'queue and system approach' extended grid connection offers to the first 500 MW in the application queue ordered by application completion date, and set out criteria for offers of a further 800 MW to renewable applications which met particular system optimisation criteria. Applicants who made neither the 500 MW queue cut-off nor 800 MW system optimisation criteria remained in the queue free of charge. No offshore projects made either group, although the system optimisation reservation may have delayed consideration of offshore projects already in the queue.

During Gate 2, the single processing regime continued to apply to conventional plant applications (Commission for Electricity Regulation, 2006). The rationale for this was fulfilling its statutory function of ensuring security of supply and the promotion of competition in generation and supply markets. A balance was to be struck between ensuring energy security and not causing unfair delay in processing renewable connections due to capacity reservations for conventional generation. The regulator therefore reserved more than 800 MW for conventional generation connection alongside Gate 2 assessment of renewable applications. Grid connection offers under the renewables group processing approach in the region was premised on grid offers being issued for the reserved amount of conventional power.

The CER published its decision on the Gate 2 policy in June 2006. It would ensure that the system operators issue more than sufficient grid connection offers to reach the 2010 target. Offshore wind projects would have to continue lining up in the same queue as onshore projects and be subject to the same connection cost calculation formula in spite of their much larger scale.

Appendix G – Grid connection policy, 2007 – 2010

This appendix expands on Chapter 4.3.3 and should be read as providing the evidence for the conclusions of this section.

A combination of the growing backlog of connection applications and the government's 2007 White Paper triggered the regulator to initiate public consultation on a new Gate 3 wind energy connection policy in 2007 (Commission for Electricity Regulation, 2007). At the outset of the consultation, there was 8,500 MW of renewables in the grid connection queue, 2,800 MW of which would be given grid connections by the end of Gate 2. This amount already exceeded the estimated 4,400 MW of installed renewables requirement to meet the 33% RES-E 2020 target, set in the White Paper.

Prior to the consultation on Gate 3, the System Operators had started developing a more comprehensive approach to long-term grid development over a circa 20-year horizon. They developed a new network model that incorporated current and likely future generation sites; likely interconnection; the introduction of the All-Island Market; likely closures; government renewable targets; growth in demand; and technological developments. It would be able to identify a list of transmission deep reinforcements required to meet different future scenarios in a technically and economic efficient manner (Commission for Electricity Regulation, 2007). It proposed this to the regulator as a way to set some of the criteria for processing the group of applications under Gate 3. There was therefore a move from Gate 1 (respond to backlog crises without discriminating against market participants), to Gate 2 (meet RES-E 2010 target whilst maintaining a consistent approach to the backlog), to Gate 3 (align grid connection policy with optimal long-term development of the grid and maintain defensible approach to the application backlog). The GDS model raised the question of why a cap on the gate was needed at all. Because the model could extend the planning horizon out to 20 years, the entire queue of renewables could, in theory, be assessed together alongside likely conventional plant, and an optimal order and schedule of connections calculated for a much larger set of plant over a much longer time horizon. The GDS system relegated the queue-based approach to a secondary consideration for the date of connection offer within the gate. It only considered date order of connection applications in instances where the required MW for projects in an area exceeded the firm capacity at a network node in a given year.

It took a year for the regulator to complete its consultation, finalise its decision and direct the System Operators to implement Gate 3 (Commission for Electricity Regulation, 2008). Continuing from previous gates, the regulator sought to balance several, sometimes conflicting objectives in settling on grid connection policy criteria (Commission for Electricity Regulation, 2007):

- *Being fair to individual generator applicants;*
- *Setting simple and transparent criteria*
- *Offering practical and timely instructions for the system operators to implement;*
- *Maintaining "the philosophy of group processing", by enabling the most efficient and optimal network development;*
- *Enabling the growth of renewable generation in Ireland and achievement of the Government's renewable targets; and,*
- *Ensuring that security of Ireland's electricity supply is maintained,*
- *Promoting plant that increase competition and/or bring wider system benefits.*

Similar to previous gates, two central policy questions for consultation were how to set a cap on Gate 3, and criteria for access to the gate, and prioritisation within the gate.

The regulator put forward three broad options for this:

1. Issue connection offers by deemed completion date of connection application
2. Issue some connection offers by date, and some by criteria that would optimise grid development (the hybrid used for Gate 2)
3. Issue connection offers in accordance with the new Grid Development Strategy proposed by the System Operators.

Following grid connection consultation and publication of the All-Island Grid Study, the commission proposed a cap to Gate 3, for the sake of practicality and simplicity, and fairness to earlier applicants. 3,000 MW of applications, based on application date order, would be pre-selected for Gate 3 and entered into the GDS model. This pre-selection cap was significantly larger than the 1,600 MW cap the regulator had proposed, at the outset of the consultation, to meet the 2020 RES-E target. Given the certainty the more comprehensive approach gave to a larger set of developers, a clear majority supported it (Commission for Electricity Regulation, 2008).

Then, in October 2008, Ryan announced that the government would increase its 2020 RES-E commitment from 33% to 40%. The regulator responded to this increased target with a second, shorter round of consultation. By December 2008 it issued its decision to continue issuing Gate 3 connection offers using the GDS system and increased the Gate 3 pre-selection cap to 3,900 MW of renewables project applications in the queue, to ensure meeting the new 2020 RES-E target and sustaining it with a reasonable degree of certainty. It was technically feasible to calibrate the connection policy cap to the estimated capacity required by the 2020 target largely because Eirgrid had developed more sophisticated systems to process grid connection applications and align it with a grid development planning horizon out to 2025 (Eirgrid, no date). This interesting sequence of events, demonstrated how, by 2008, the regulator proved very responsive to decadal governmental target setting in executing its mandate. One way of demonstrating the effect of long-term targets is by looking at how other policy measures, such as connection policy, are calibrated to achieving the target (and recalibrated when the target changes).

The increased Gate cap included three of the five offshore wind projects under development in Ireland, totalling 800 MW in capacity, in the pre-selection for the gate. However, NOW Ireland continued to make its argument that offshore wind should not be processed under the gate system “due to its capacity, large scale and the challenging nature of offshore construction.” (NOW Ireland, 2008) The CER did not create a dedicated route for offshore wind connection in spite of NOW Ireland’s appeal. However, the GPA along with Gate 1 and 2 policies had by then set a strong precedent that non-discrimination entailed considering applications in accepted submission date order. The offshore wind projects qualified for pre-selection into the gate simply because of their place in the application queue, though the larger Gate cap may have brought forward their processing. The connection policy required Eirgrid to model the optimal connection order for the Gate, and issue a schedule of connection offers accordingly, a significant task that would take more than a year to complete (Eirgrid, 2013).

The big shift in Gate 3 was that Eirgrid had taken a more proactive stance to align long-term grid planning with the market-driven approach to siting wind plant. Gate 1 and 2 had placed it in a completely reactive position to the queue based approach. Now it was developing a grid development plan to 2025, in line with climate change objectives (for 2020) that enabled wider optimisation of the grid whilst broadly letting the market determine where wind power generation would occur.

When the regulator eventually announced the final schedule for firm grid connection offers under Gate 3, opposition deputies from Fine Gael and Labour were quick to criticize the new connection policy. Steven Coveney and Leo Varadkar, criticized the regulator that the lack of strategic criteria in Gate 3 would entail additional costs to consumers for grid development and upgrades. Coveney and McManus noted that the policy had enabled a speculative, secondary market in grid connection offers, discouraging genuine investors. Coveney questioned the lack of a proactive spatial planning strategy that would determines grid connection policy for more strategic and efficient grid development. The response from the regulator to these general criticisms is also informative for understand the lack of favourable treatment for offshore wind. The Chair of CER, Michael Tutty, at a Oireachtas hearing:

> *"Our feeling was that if we had to decide on [connection applications] on the basis of doing an analysis of each project and on which was best from an overall economic point of view, we would spend much time in the High Court defending ourselves against [developers] which complained that we did not calculate their one correctly."*

Tutty further argued that developers already select the best sites on a combination of quality of wind, grid connection costs, and land availability and that a centrally driven zoning exercise would generate more public opposition. The Gate system then issues offers in spatial clusters within market-driven groups.

Appendix H – Grid connection policy, 2014-2020

ECP-1 prioritised 400 MW for providers of DS3 system services to reduce the curtailment of renewables, wholesale energy prices and a reduction in constraint payments. The CRU decided that receipt of valid planning permission would be required for a connection offer under ECP-1 System and that the connection contracts would have longstop dates to 2 years (i.e. they had to be able to energise in two years) to filter out speculative or less-developed projects.

For offshore wind projects CRU had initially proposed that either a foreshore licence or lease would be required as the functional equivalent of planning permission for onshore projects [179]. However, following consultation, the final decision required offshore applicants to have a foreshore lease [180]. This ruled out all but two projects, Codling and Arklow (which had obtained their leases in the early 2000s).

In November 2017, CRU published a draft decision on an Enduring Connection Policy 1 (ECP-1) for consultation. By this point, the SOs had received approximately 36,000 MW of connection applications. More than five times the all-island system requirements at the time (Commission for Electricity Regulation, 2017a). With ECP-1 the CRU set out a proposal to deal with the existing volume of applications in a way that would "promotes a more optimal use of the existing network taking into account the current system needs, national policy and the consumer interest. In particular, ECP-1 aims to ensure that the projects which receive connection offers are the ones that are most likely to be built." (Commission for Electricity Regulation, 2017a, p. 1). It highlighted the main, urgent challenge as the current approach to accepting and processing applications for connection which enabled the massive rise in grid connection applications. The same group processing rationale, which had guided Gate 3 (rationalised as being optimal for network planning, cost minimization, and hence consumer savings), would now be practically unfeasible, given the sheer volume of applications that could be considered in a gate. Two further policy decisions that had the unintended consequence of contributing to a speculative boom in grid connection applications. The capacity relocation rules, introduced to offer Gate 3 projects flexibility if they had difficulties in progressing at a given location, triggered a secondary capacity market that fuelled speculative connection requests and planning applications. The non-GPA route to connection, which was intended to support a non-existent solar PV industry in 2009, triggered over 600 grid connection applications for over 6,000 MW by 2017 (Commission for Electricity Regulation, 2017a) of solar PV. Processing these applications subject to set timelines on a rolling basis was diverting significant SO resources to (potentially speculative) solar PV, whilst wind had no route to connection following Gate 3, raising the ire of wind developers (IWEA, 2017). These and other issues had been raised through the Generator Connections Liaison Group for some time.

For ECP-1, CER shifted the balance of its obligations towards correcting the unintended effects of previous policies in the fairest way possible in order to prioritise ‘shovel ready’ projects that could, in the first instance, provide system services.

The CRU set the 1000 MW cap according to an estimate by the SOs of what they could realistically connect within the allotted time. Respondents to consultation called for a larger batch, but CRU (advised by the SOs) argued that this could cause delays. Its priority was to create more market certainty through smaller batches at regular intervals (2018, 2020, 2021, 2022). 1000 MW was judged as sufficiently ‘significant’ to enable a broad range of shovel ready projects without delay. The CRU also promised an incentive mechanism to ensure that the system operators were accountable for the efficient and timely processing of the 2018 batch such that the subsequent batch for new connection applications could commence no later than the CRU’s target date of 2020.

Importantly ECP-1 prioritised 400 MW for providers of DS3 system services within the 1000 MW cap. The priority at this point was to secure the operation of the network as quickly as possible for higher levels of non-synchronous plant (mainly wind). This would reduce the curtailment of renewables and lead to lower wholesale energy prices and a reduction in constraint payments (funded by consumers). Having issued sufficient RE connection offers in Gate 3 to meet the RES-E 2020 target, the focus was now on managing the cost-implications of this. This involved investment in existing generation capacity and new more flexible technologies, including storage. The CRU argued that the 400 MW prioritisation was a necessary precursor to ensure RE in the ECP-1 batch do not face constraints, and that future ECP batches can roll out in a timeline manner.

The CRU decided that receipt of valid planning permission by the date of its ECP-1 connection decision was the most effective means to filter out speculative projects and best indicator for 'build-ready' projects with which to continue. More controversially, it also decided to allocate scarce network capacity according to project planning permission expiration date. In this sense the CRU was still carrying forward a proxy for prioritising those developers that had been in the queue the longest as a means to treat generators fairly. It argued that those applicants whose planning permission expired sooner had often been in the queue for longer, and would not be able to apply for the next connection batch, whereas those with longer remaining planning permission interval could apply for the next connection processing batch. At the same time it exempted DS3 providers from requiring planning permission, arguing that this may cause delays that result in insufficient system services in time. For offshore wind projects CRU had initially proposed that either a foreshore licence or lease would be required as the functional equivalent of planning permission for onshore projects (Commission for Regulation of Utilities, 2017b). However, following consultation, the final decision required a foreshore lease (Commission for Regulation of Utilities, 2018a).

Whilst ECP-1 did not provide technology-specific preferential treatment for OFW, it did signal an important shift in the regulator's approach to connection policy that would ultimately serve OFW. As Dr Paul McGowan, chairperson of the Commission for Regulation of Utilities (CRU) responded to elected officials during an Oireachtas committee hearing:

> *"Our approach to connections has changed and we have introduced a regular batch system, the purpose of which is to bring forward many of the projects that fit with the renewable energy support scheme the Government is initiating. ... [W]e will follow whatever is in the RESS system and try to facilitate that. It is a matter then for the Minister and the Department as to how that is designed. ... If offshore generation is part of that system, we will look at its efficient integration."*

Appendix I – QCA set calibration, 1999-2002

In this section, I use the qualitative data that informed the preceding narrative to calibrate most of the set scores for the QCA analysis. I work through each of the sets from Table 7 in order. Table 8 (p. 220) presents the QCA calibration for cases in the period 1999S1 – 2001S2. Appendix A also provides detailed justifications for set definition and anchors along with additional data for calibration for some sets.

1. Did a policy window open?

ENIMP: From 1999S1 – 2001S2 Ireland had a high and increasing energy import dependence of over 90% (Byrne Ó Cléirigh, 2020). Import dependence grew steadily from the mid 1990s as the Kinsale gas field depleted and the Irish economy grew. It peaked in the year 2000 at 90% where it remained for the following decade. I therefore calibrate the cases 1999S1 – 2000S1 as 0.67, and from 2000S2 onwards as 1.

CO2: From 1999S1 – 2001S2 national CO_2 emissions growth was far above the reduction agreed as part of the EU "burden sharing" agreement. I therefore calibrate all cases in this period as 1. Under the Kyoto Protocol, Ireland agreed a national target to limit the increase in greenhouse gas emissions to 13% above 1990 levels in the period 2008 – 2012. However, during this period of analysis, the business as usual scenario for Irish emissions projected growth of more than 35% between 1990 and 2010 (Renewable Energy Strategy Group, 2000).

RET: From 1999S2 – 2001S2 progress on wind energy deployment was expected to fall far short of the MW and % targets set for 2005 and 2010 respectively. I therefore calibrate all cases in this period as 1. It was clear to policy makers that Ireland's progress on deployment of renewables (mainly onshore wind) would fall far short of the new target set in the Green Paper on Sustainable Energy unless significant policy actions was taken (Department of Public Enterprise, 1999; Renewable Energy Strategy Group, 2000). The Green Paper significantly increased national ambition on renewable energy, setting a 500 MW target for 2005. At the same time, policy makers already anticipated that Ireland might have to comply with a target of 13.2% of total electricity from renewable sources by 2010, given the European Commission White Paper and proposal for a Directive on the promotion of renewable energy (European Commission, 1997; Renewable Energy Strategy Group, 2000). These new targets put progress on wind energy deployment into a new perspective. Given the continued challenges with policy coordination to support the deployment of wind throughout this period (Gallachóir, Bazilian and McKeogh, 2005), it is very likely that the expectation of policy makers throughout this period was that progress on renewable deployment was falling far short of what was needed to attain the targets.

INDI: By definition, INDI averages the set scores for ENIMP, CO2 and RET, representing the MSF concept of deteriorating indicators that serve to open policy windows. The data presented in the narrative provide strong proof that over this period the three indicators drew the attention of politicians and policy makers, albeit variably. For politicians in particular energy security and competition became key priorities for the government, whilst emissions reductions had started featuring in the framing of government energy-related objectives. Whilst renewable energy, largely onshore wind energy, was still considered a minor 'side issue' for the government, policies passed in the late 1990s did gather a new policy community which became very attentive to renewable energy target attainment, either in MW terms, or in proportion (%) to the overall electricity mix. The Green Paper oriented the government's policy towards target attainment for renewables and raised the question of how best to set and attain a decadal target by 2010. The target served to introduce and recalibrate a renewable energy indicator to which the line department with the energy mandate and the associated policy community paid attention. Taking the three indicators together, the qualitative data provides support for the claim that the deterioration of these indicators served to draw the attention of people in and around government and support problem framing in favour of policy action on renewables.

FB_GRID: As discussed in Appendix A, the definition and calibration of a set for feedback on grid connection policy is complex. For subsequent episodes of the Irish case, I stick narrowly to the definition proposed in Appendix A, namely that cases score a 1 if the regulator hosts public consultation on new connection policy, and otherwise a 0. However, for the period 1999 – 2002, the process tracing suggests some exceptions. The Electricity Regulation Act established the regulator in 1999, and it took a significant amount of time for it to build the capacity to exercise the regulatory duties the Act gave it (Electricity Regulator 06eri, 2020; Electricity Regulator 21eri, 2021). The 1999 Act gave the regulator power to authorise access to the transmission or distribution system for holders of electricity generation licences and other eligible customers, but did not imply a particular grid connection policy. However, it would not be until the wind connection moratorium in 2003/04 that the regulator intervened with structured consultation cycles (refer to Chapter 4.1.6, p. 117). Prior to this, ESB still implemented its Transitional Connection Policy for wind energy. The grid policy cycle had not yet crystalized around the regulator. Hence, when ESB's terms for a transmission connection offer for the Arklow Bank project threatened to severely limit the first project (due to the costing model), Airtricity turned directly to elected officials to escalate the issue in the Oireachtas, ultimately necessitating a response from the Minister of Public Enterprise. I therefore score sets 2001S1 – 2001S2 as 1. However, the government did clearly respect the independence of the fledgling regulator on this matter, confirming that any questions on the connection of Arklow Bank is a matter of connection policy that falls to the regulator and system operator.

FB_MAR: It was the first applications for licences and leases in 1999 that triggered feedback on the shortcomings of the Foreshore Act for the purposes of consenting offshore wind farms. These shortcomings became a topic of parliamentary discussion, as well as direct discussions between a few developers and civil servants in the Department for Marine and Natural Resources over the course of 1999. I therefore score the cases 1999S1 – 1999S2 as 1. Following a brief moratorium on the issuing of leases, the department issued a detailed guidance note in 200S1, supplementary to the Act, on how licencing and leasing for marine power generation would progress under the existing act. This resolved key issues sufficiently that licencing and leasing commenced for the remainder of this period without further formal consultations.

FB_PRICE: This study defines this set as feedback that a price support instrument is failing to support renewable energy target attainment. The work and recommendations of the Renewable Energy Strategy Group in 2000S1 provide the best source of evidence on feedback on the AER scheme over this period (Renewable Energy Strategy Group, 2000). It noted that the AER would fail to enable meeting the 2005 target, unless some changes were made to its terms. However, until 2001S2, the feedback was rather that subsequent rounds of the AER should be improved, rather than abandoned and replaced with a wholly different instrument. Accordingly, I calibrate the cases over this period at 0.67; feedback that the price support instrument is partially/somewhat failing at supporting target attainment.

FB: By definition, FB averages the set scores of FB_GRID, FB_MAR, and FB_Price into the MSF concept of feedback on policy implementation. For the cases 1999S1 – 2000S2 set scores are more out than in, because feedback on the respective policies did not coincide temporally, but rather entered political discourse sequentially as the Arklow Bank project went through its stages of development, and separately the energy policy community provided feedback on the AER scheme. For 2001S1 – 2001S2 feedback for grid policy and price support coincided temporally, rendering the FB set score for these cases more in than out.

EVENT: During this period, there was no Focusing event that significantly strengthened the case for OFW.

WIND_PR: By definition, this set averages scores over INDI, FB, and EVENT to represent the MSF concept of a policy window opening in the problem stream. For the cases 1999S1 – 2000S2 the policy window was more closed than open (WIND_PR < 0.5). For 2001S1 – S2, the policy window switches to ambiguous (WIND_PR = 0.5). This is due to a coincidence of deteriorating indicators and feedback on policy implementation. Notably it was the year that challenges with gaining an affordable grid connection offer for Arklow Bank, lack of an appropriate price support instrument for wind energy more generally, coincided with a drive to meet the 2005 wind energy target. The calibration is broadly consistent with the more detailed qualitative findings, but does omit substantial information. The narrative provides strong support for the fact that the chosen indicators (INDI) for the study is relevant; i.e. they drew the attention of policy makers. The narrative provides strong support for the fact that feedback on policy implementation failures for the chosen policy elements (price support, grid and marine planning) drove policy makers to develop new policies. However, taken together, these did not provide strong reasons for supporting

OFW in particular because they do not account for the reasons *against* technology-specific policy support for the technology. Arguments about the cost differential between available renewable alternatives, most notably an abundant supply of cheaper onshore wind energy resource, and grid constraints to absorb OFW at scale, mediated the problem framing discourse. I elaborate on this in the analysis of PR_STR (the readiness of the problem stream). I therefore recalibrate the ambiguous cases down to 0.33. The justification for this recalibration points to some limitations with MSF to which I return in Chapter 6.5.

CHG_GOV: During this period there was no general election nor relevant change in ministers.

MOOD: Refer to Appendix A for calibration of this condition for all cases.

WIND_POL: By definition this set takes the maximum score from CHG_GOV and MOOD. In other words, if there was either a change in government or high level of public support for climate action, then a policy window would be open in the politics stream. During this period there were neither of these.

2. Were the streams ready for coupling?

PRO_STR: I define this set as most of the policy community agreeing that OFW is necessary to solve particular policy problems. The process tracing highlights that the nascent policy community that started coalescing around renewable energy policy agreed relatively early on in its formative agendas that OFW was not a solution to the problems of national decarbonisation and energy security, at least not over a decadal timeframe. To put it in other words, the lack of OFW was not a problem deserving political attention. Offshore wind project developers attempted to convince politicians that the technology was indeed necessary to solve the longer-term problem of decarbonisation and energy security, and that the prospect of exporting electricity to the UK was also a political opportunity. However, the renewable energy policy community successfully transferred its problem framing to the government at the time (Roux, 2021c). Key informant interviews revealed only one instance in which the department of marine and natural resources adopted a problem framing that prioritised OFW (Wind energy project developer 08idi, 2020; Wind energy project developer 12idi, 2021). This provided reason for departmental efforts to produce guidelines for developers on necessary licencing and leasing to advance the early projects. I therefore calibrate all cases in this period as 0.33 (more out than in – refer to Table 5 for set anchors and definition).

GOV_PRG: OFW entered Irish political discourse for the first time during the term of the Fianna-fail government. It was therefore in neither the election manifesto nor programme for government that informed the government agenda over this period. However, government ideology was aligned with support for the technology in some ways and early on. Most notably, the prospect of building better North-South relations following the Good Friday Agreement, provided a key reason to support the mapping of the OFW resources for the entire island. Furthermore, the government was generally disposed to supporting the deployment of renewables, decreasing energy import dependence and curbing greenhouse gas emissions. Fianna-Fail's position on OFW emerged in this context, but only started crystalizing when Airtricity sought to politicize the issue of grid connection costs. I therefore calibrate cases 1999S1 – 2000S2 as 0.67 (more in than out). However, by 2001S1 it became clear that the government did not think it appropriate that tax payers should foot the bill for the costs of connecting Arklow Bank to the Irish grid. At this point, when costs became clear, the government's stance shifted to not being aligned with supporting OFW deployment. Government was learning. I calibrate 2001S1 – 2001S2 as 0.33 (more out than in).

INGRP: As noted in Appendix A, the two main interest groups in the Irish case are NOW Ireland and IWEA. During the period in question IWEA was already an active campaigner for onshore wind developer interests, but NOW Ireland had not yet been formed. The small number of OFW developers had not yet associated their interests, but Airtricity (as both an onshore and offshore developer) clearly held significant influence with politicians. Although the data did not include explicit reference to the balance of influence between onshore and offshore developers over this period, it is a sound inference to draw that onshore wind developers, through IWEA, held much more influence than Airtricity's OFW advocacy, which was more narrowly tied to progressing the Arklow Bank project. It is also apparent from data over this period that the government already understood the zero-sum game between connecting one or two very large offshore wind projects to the grid, compared to many smaller onshore projects (Roux, 2021c). Grid capacity was a scarce resource and Irish demand was relatively small, compared to the scale of the proposed Arklow connection. When confronted with the costs of Arklow Bank, the government favoured onshore wind interests. I score all sets over this period accordingly.

POL_STR: By definition, POL_STR is the average of GOV_PRG and INGRP representing the MSF concept of politics stream ripeness. For the entire period in question, POL_STR is more out than in, because of the balance of interest group influence and the lack of explicit government support for OFW.

SOL_PRICE: Over this period, a viable price support instrument for renewables was available. The AER had supported two onshore wind energy auctions. Significant challenges hampered the successful implementation of the AER and its coordination with planning consent and grid connection policy. However, the policy community still thought it was the best available alternative and sought to extend it with improved terms in order to meet the 2005 target. The AER thus served as a policy solution which could be utilised by the government to support OFW, if it was so inclined. This is confirmed by a subsequent decision in 2002 to do just that (refer to Chapter **Error! Reference source not found.**, p. **Error! Bookmark not defined.**) (Sustainable Energy Ireland, 2002). I calibrate cases over this period accordingly.

SOL_GRID: Over this period, a grid connection policy for wind was also available. ESB operated a '70 business day connection offer' policy for all wind developers and Airtricity obtained two connection offers for Arklow Bank; one on the transmission grid and one on the distribution grid. As the process tracing makes clear, it was the terms of the transmission grid connection offer (the cost model) which rendered it unviable for Airtricity. However, this is not necessarily a case of grid connection policy failure. The problem Airtricity faced is that it did not have a route to market for a commercial scale offshore wind project, given the lack of price support instrument. I calibrate the cases over this period 1999S1 – 2001S2 accordingly.

SOL_MAR: From 1999S1 – 1999S2, a viable marine planning legislation was not available to progress OFW development to construction and operation. However, in 2000S1 the Department of Marine and Natural Resources issued its guidance note to offshore energy generators which served to progress project development through the entire project cycle. This guidance was passed as supplementary to the Foreshore Act, unilaterally developed by the department in consultation with stakeholders, and agreed by the government, without any legislative reform. I calibrate the cases over this period accordingly.

POLY_STR: By definition, POLY_STR is the average of SOL_PRICE, SOL_GRID and SOL_MAR, representing the MSF concept of policy stream ripeness. For all cases 1999S1 – 2001S2, the policy stream was riper than not (0.67 to 1). This is because, taken individually, there were policy solutions for grid connection, price support, and (from 2000S1) marine planning.

3. Did a policy entrepreneur promote agenda change?

ENTRE: I address policy entrepreneurship across all the noted policy areas together. Calibration of this set is sensitive to the classification of Airtricity's advocacy activities over this period. MSF theory classifies interest groups as acting in the politics stream and policy entrepreneurship occuring largely in the policy stream. The general claim in the literature is that interest groups can, by influencing government, keep certain things off the agenda, but they can not set the agenda (Herweg, Zahariadis and Zohlnhöfer, 2017). However, the process tracing problematizes this distinction. In Ireland, civil servants in line departments undertook some of the policy making over this period, informed by experts and in close contact with government. Airtricity definitely sought to influence all or most of the relevant actors in and around government in advocating for certain policies. The data clearly show how they attempted to put certain policy reforms on various agendas (legislative and departmental), and achieved mix success. At a departmental level, they succeeded in driving reform of marine planning policy up the agenda and contributed to a new policy that served to advance licencing and leasing activities. However, they failed to influence the government and regulator on a technology-specific grid connection policy. The process tracing highlights the activities of the renewable energy policy community over this period. An embryonic community was forming around the DMNR, consisting of a few experts from the ESRI, SEI and a couple of universities. However, much expertise on the power sector still resided in the incumbent public utility, ESB, whilst advocates from Airtricity were able to drive key clauses in the Electricity Regulation Act. From the data, it is unclear whether Airtricity had substantive policy proposals for grid development and connection policy for OFW or merely appealing the unfavourable terms of the connection offer for Arklow Bank. Regardless, the key informant interview data lend support for interpreting them as policy entrepreneurs attempting 'partial couplings' to move OFW up the political agenda. That they largely failed should not detract from this interpretation. I therefore interpret Airtricity's activities as policy entrepreneurship for an overall problem framing in favour of prioritising OFW, and on particular matters of grid connection policy and marine planning policy (until the latter was changed in 2000S1). Furthermore, the efforts of a dedicated senior civil servant, a Principle Officer in the DMNR, were necessary to drive offshore wind up the departmental agenda, develop a policy for marine licencing and leasing, and have it passed by a supportive minister and cabinet. This individual ensured that applications for licences and leases were processed in a timely manner. This was because the Minister for Marine and Natural Resources had discretion in deciding licences and leases under the Foreshore Act and faced little opposition in taking a unilateral decision on the matter. Key informant interviews reveal that Airtricity sought to avoid the AER price support instrument as a route to market for its onshore wind projects. It is reasonable to assume that whilst the full costs of Arklow was not yet apparent, they also aimed to use their merchant model to deliver this. However, as new costs like grid connection became clear, it is reasonable to infer that they switched to lobbying for a technology-specific AER (Sustainable Energy Ireland, 2002). However, evidence for this only appears in 2002 onwards. I calibrate all the cases over this period as 0.75.

4. Did any agendas change?

AG_CHG: Over this period, four institutions were implicated in OFW policy; the newly established regulator, the system operators (in the process of being unbundled), the DMNR, and the cabinet. I only find evidence that OFW entered the agenda of the DMNR in a significant way. This consistent in at least one civil servant, along with the minister, taking interest in the challenges that the early OFW developers were facing in obtaining licences and leases, whilst securing the interests of the state as the owner of the seabed. Between 1999S2 – 2000S1 the department drafted a new guidance note for offshore wind project developers to supplement the Foreshore Act and made the strategic decision to avoid undertaking costly legislative reform of the Act; contrary to what some opposition parties were calling for. Subsequent to the issuance of the guidance note, there is also circumstantial evidence that the department took somewhat of an interest in the issue of a technology-specific price support instrument for OFW (Sustainable Energy Ireland, 2002). However, the more important contextual point is that renewable energy was still very much a ‘side-issue’ within the larger constellation of energy policy, with most of government policy effort focused on conventional fossil fuel sources of power . Regardless of whether OFW was a ‘side issue’ it was sufficiently elevated for the department to undertake some effort in policy reforms (Civil servant 09pmi, 2021a; Civil servant 15pmi, 2021; Civil servant 29pmi, 2021). I did not find evidence that OFW was on the agenda of any of the other institutions.

5. Did policies change?

POL_CHG: The only policy that changed during this period to support OFW, was the issuance of the guidance note for offshore wind developers in 2000S1 (Department of Marine and Natural Resources, 2001).

6. Critical reflection on calibration

It is worth reflecting critically on the underlying logic of averaging feedback on the individual policy instruments (FB = AVE(FB_PRICE, FB_MAR, FB_GRID) as a means to estimate whether feedback on extant policies served to open a policy window for offshore wind. The qualitative data for this period emphasises the coordination challenge created by the uncoordinated terms of the AER scheme, planning approval for onshore wind and grid connection policy. A key priority for the nascent renewable energy policy community was to bring these instruments into alignment (coordinate them) so that onshore wind could be deployed faster. It is not clear that a temporal coincidence of formal feedback opportunities would necessary open a policy window wider for OFW. Although these consultations provided opportunities for OFW interests to advocate for their interests, the reasons against supporting OFW at this point in time were such that more opportunities to participate in formal consultations would not translate in a policy window being open wider for OFW.

When considering a policy window in the problem stream (WIND_PR), the narrative provides strong support for the fact that feedback on policy implementation failures for the chosen policy elements (price support, grid and marine planning) drove policy makers to develop new policies. However, taken together, these did not provide strong reasons for supporting OFW in particular because they do not account for the reasons policy makers had *against* technology-specific policy support for the technology. Arguments about the cost differential between available renewable alternatives, most notably an abundant supply of cheaper onshore wind energy resource, and grid constraints to absorb OFW at scale, mediated the problem framing discourse. There are two possible solutions to this for future studies. The first is to define different sets to constitute the concept of a policy window which departs from MSF's restrictions. The second is to weight the constituent sets differently in aggregating them to the higher level concept.

There is an additional challenge to the definition and calibration of sets aimed at capturing the concept of a policy window. When considering the judgements of different actors I find contested views on whether a policy window opened for OFW during this period. From the point of view of policy makers within the emergent renewable energy policy community in Ireland, a policy window for OFW certainly did not open (Policy researcher 01pri, 2020; Civil servant 09pmi, 2021a; Civil servant 15pmi, 2021; Policy researcher 27pri, 2021). OFW was not a solution to any of the policy problems they faced. They had little to no reason to frame the lack of OFW as a policy problem that needed urgent attention. The emergence of new energy and electricity indicators, over this period, to which the energy policy community started paying increasing attention is noteworthy. Although climate change targets (reduction in CO_2e emissions) may have been an important driver in renewable energy targets, it was the latter (increase in MW from renewable sources) that emerged as the indicator to which an emergent policy community aimed. The percentage of renewables in the electricity mix was increasing over this period but onshore wind was still a relatively small 'side-issue' in energy policy, with gas policy and energy security of paramount importance. What was most important is that policy makers started judging the increase in renewables against medium-term targets. It was not good enough that onshore wind's contribution to the electricity mix was increasing, policy instruments had to be calibrated to ensure it would meet a target; first the 500 MW target set for 2005, then the 13.2% target set for 2010.

For them, the deteriorating indicators and policy feedback were sufficient to open a policy window for *onshore* wind energy, but insufficient to open a policy window for OFW. This was because of the cost differential between onshore and offshore wind, the abundance of the onshore resource, grid constraints, and the norm of target attainment at least cost to consumers that constrained policy alternatives.

However, a small group of offshore project developers did not need such reasons for action, or endorse such reasons against action. For them a policy window was open, or alternatively they were driven to act regardless of the existence of a policy window. For them deterioration of indicators, feedback on failed policy, focussing events or changes in government were also insufficient for opening a policy window, but for different reasons. Instead, it was the conjunction of the liberalisation of the Irish electricity market, the scale of an exploitable resource on the shallow sandbanks off the Irish east coast, and the anticipation that climate change policy would drive stricter future emissions targets which informed the thinking of the early visionary and speculative project developers. The founding members of Airtricity were the first to judge that the Irish marine environment opened the potential for constructing wind farms at an immense scale and that liberalisation of the electricity market could enable an ambitious business model that could potentially make this expensive technology commercially viable. It was particularly the clauses in the Electricity Regulation Act 1999 that gave the suppliers of renewable energy a head start in accessing the entire Irish market, which opened the policy window for OFW. It was only Airtricity with the most ambitious business model that linked the preferential access to the entire Irish market and potential export to the UK market with a massive offshore wind farm project. A couple of other speculators took notice and attempted to follow Airtricity. It was this conjunction of conditions that created the spillover from the 1999 Electricity Act to advocacy for technology-specific policy support for OFW in Ireland. From here, over a period of three years, Airtricity took each extant policy challenge in turn to drive technology-specific policy support for offshore wind with mixed success. First, it was the shortcomings of the Foreshore Act that needed to be circumnavigated (if not directly addressed) to obtain a lease agreement. Then it was the unaffordable grid connection costs that had to be appealed, followed shortly by appeal for a technology-specific price support instrument. On the marine planning policy front they were successful in driving policy change, but failed to convince the government and policy makers to support their grid connection and price support appeals, for the reasons noted.

Evidence for these two radically different framings of a policy window, based on the interests and motivating reasons of actors, serves to underscore the challenge of operationalising the concept for the purposes of hypothesis testing. Alternatively, one can argue that Airtricity advocated for policy support for OFW regardless of the reasons against it. As it stands, the first episode of the case study provides evidence that the more objective definitions underpinning the operationalisation of the concept of policy windows within the QCA, provides a relatively robust first approximation of some of the relevant reasons at play in problem framing. I return to this point, following the QCA analysis in Chapter 5.11.

Calibrating the policy stream as proposed for this study is a decent approximation of the underlying MSF concept, but omits substantial qualitative data. The process tracing makes clear that one of the central policy problems that emerged in the early 2000s was the lack of policy coordination between planning approval, grid connection offers and price support across institutional 'silos'. The different policy areas implicated in OFW as a policy issue implies multiple policy streams. Right from the start of OFW's emergence as a political issue, it appears that three largely separate policy streams existed, differentiated largely by institutional mandates and the challenges raised by wind energy. However, explaining the influence of institutions in such situations is not merely a challenge for this QCA, but for MSF theory more generally. Whilst the detailed case narrative can bring out these complexities, MSF may not offer a coherent or detailed explanation of such issues. I therefore maintain a narrow interpretation of policy stream readiness for the QCA.

Appendix J – QCA set calibration, 2002-2007

In this section, I use the qualitative data that informed the preceding narrative to calibrate most of the set scores for the QCA analysis. I work through each of the sets from Table 7 in order. Table 8 (p. 220) presents the QCA calibration for cases in the period 2002S1 – 2006S2. Appendix B also provides detailed justifications for set definition and anchors along with additional data for calibration for some sets.

1. Did a policy window open?

ENIMP: From 2002S1 – 2006S2 Ireland's energy import dependence remained around 90% (Byrne Ó Cléirigh, 2020). I calibrate all cases over this period accordingly. By 2004, completing the Corrib project, most notably the controversial onshore pipeline was a top priority for the government and occupied most of the time of the Minister for Marine and Natural Resources (Civil servant 09pmi, 2021a; Civil servant 15pmi, 2021). However, the pipeline would prove to be a massive controversy and caught up in local opposition throughout this period (Keohane and Kuhling, 2010; Slevin, 2019). It is beyond the scope of this study to reconstruct in detail the changing expectations of when the Corrib gas field would come online and by how much it would decrease energy import dependence. However, the mere fact that import dependence remained at an unprecedented level throughout this period meant that the indicator served as an influential input to problem framing.

CO2: Ireland's CO_2 emissions plateaued in 2005 and declined slightly by 2007 (Duffy *et al.*, 2015). However, annual measurements only began in 2005, and reporting of national inventories usually have a two-year lag. I therefore infer that the expectation remained high throughout this period that the trajectory of CO_2 emissions remained far above what was required to meet Ireland's commitment under the Kyoto Protocol. I calibrate all cases for this period accordingly.

RET: Over this period the calibration of cases shift as the renewable energy policy community shifted its focus from achieving the 2005 target to the 2010 target. With the recommendation of the RESG in hand by 2000S2, policy makers set out implementing some of the most urgent measures needed to achieve the 2005 target, such as additional AER rounds for onshore wind.

However, delays in implementation meant that by April 2005 only 362 MW of the 450 MW wind energy target was installed (Gallachóir, Bazilian and McKeogh, 2005). However, more importantly for calibrating cases for this set is when the focus of the policy community shifted to meeting the 2010 target. What the process tracing shows is that the window for opportunity really opened whenever the policy community recalibrated its focus to a new target, which was a step-change increase on the previous. This occurred in 2004S2 (Department of Communication Marine and Natural Resources, 2004). It was the shift to focusing on the policy challenge of attaining the new, more ambitious 2010 target that opened the window to consider a new price support instrument (to replace the AER), the grid connection backlog, and grid development. I therefore calibrate cases over this period as follows: there was roughly two years from 2002S1 to 2003S2 where the government was implementing the recommendations from the RESG and where the expectation may have been that Ireland would fall somewhat, but not far short of reaching the 2005 target. Then in 2004S2, the policy community recalibrated its objectives to the 2010 target, emphasising that Ireland would fall far short from meeting the 13.2% renewables target unless a significant new raft of policy measures were implemented. It took roughly two years for the regulator to make its decision for the Gate 2 connection policy and for government to announce the first REFIT (European Commission, 2007). By this point then Ireland had a grid connection policy and price support instrument implemented for it to meet the 2010 target. The process tracing presents strong support that by 2006S2 the policy community expected that renewable deployment would start tracking towards target attainment. I calibrate the cases over this period accordingly.

INDI: By definition, INDI averages the set scores for ENIMP, CO2 and RET, representing the MSF concept of deteriorating indicators that serve to open policy windows. The data presented in the narrative provide strong proof that the three indicators continued to draw the attention of politicians and policy makers over this period, albeit variably. Over this period, energy security, competition, and emissions reductions crystalised as three elements, or as one key informant described it “three legs of a stool” that informed all government discussion on energy policy (Civil servant 29pmi, 2021).

FB_GRID: During this period, the regulator hosted two consultations on grid connection policy for wind energy plant. The first coincided with the moratorium it placed on processing new wind grid connection applications, following feedback from the system operator on the risks of connecting further new wind plant to the system at an increasing rate. This resulted in the Group Processing Approach and Gate 1 policy for processing wind grid connection applications. The second feedback period coincided with the completion of Gate 1 and resulted in the Gate 2 policy. Both of these window offered OFW developers an opportunity to provide formal feedback on the failing of connection policy to support OFW. The new procedural norms set by the regulator along with the terms of the BPA established a powerful cyclical precedent to the renewal of grid connection policy for wind energy and the concomitant windows of agenda setting and decision-making.

FB_MAR: Over this entire period it was possible for developers to obtain foreshore licences and leases under the Foreshore Act and in line with the guidance note published by the DMNR in 2000. Developers did complain that obtaining leases were extremely complicated (Roux, 2021d). However, it was not impossible, and at least one developer concluded a lease agreement with the state and another was progressing towards a concluded lease agreement. Accordingly I calibrate all cases over this period as 0.

FB_PRICE: This period commenced in 2002S1 with concerns that the AER was failing somewhat in facilitating the wind energy needed to meet the 2005 target, and with recommendations to improve its terms for subsequent auction rounds (refer to previous episode). However, delays in implementing the AER and continued failure meant that by 2004S1 it was agreed that the instrument had largely fail at facilitating the intended capacity of deployment for the 2005 target and would definitely fail at serving the 2010 target. The status of this feedback remained salient until the government announced a new REFIT scheme in 2006S1. At this point, there was a break in the policy implementation feedback cycle as stakeholders adjusted to the new instrument and awaited feedback that would emerge once implementation was well underway.

FB: By definition, FB averages the set scores of FB_GRID, FB_MAR, and FB_Price into the MSF concept of feedback on policy implementation. For cases over this period, FB alternates between contributing towards open and closed windows (i.e. it alternates between FB > 0.5 and FB < 0.5 at short intervals). This is due to the fine-grained temporal scope of cases and the aggregative logic of the constituent sets; i.e. the coincidence of feedback on three different policy measures at short time intervals. However, when considered alongside INDI and the higher-order abstraction of policy windows in the problem stream (WIND_PR), the case narrative offers a more stable general account of how indicators and policy feedback interact to open (or close) policy windows. I address this in detail under the WIND_PR analysis below. In short, there is no strong reason to adjust the automatic case calibrations for FB over this period, but the case provides some reasons for adjusting the WIND_PR calibrations.

EVENT: During this period, there was no Focusing event that strengthened the case for OFW. The qualitative data show that two noteworthy Focusing events did occur, but neither instance was to the benefit of OFW. Firstly, the Corrib gas pipeline controversy was significantly delaying the completion of the single most important energy infrastructure project in Ireland at the time. This threatened to extend Ireland's high rate of energy import dependence for many years. However, as for calibrating QCA sets, ENIMP already includes this effect in the QCA. Secondly, the moratorium on wind grid connections was another significant Focusing event. However, this did not turn out to directly benefit OFW. Prior to the moratorium and the consequent introduction of the GPA, an OFW developer managed to obtain two connection offers within 70 business days (refer to previous episode). The GPA and subsequent Gate 1 and Gate 2 policies forced OFW developers to queue behind hundreds of onshore wind grid connection applications, many of them speculative. Given the directionality of this set definition in the QCA, the moratorium therefore also does not count as a Focusing event that served the interests of OFW.

WIND_PR: By definition, this set averages scores over INDI, FB, and EVENT to represent the MSF concept of a policy window opening in the problem stream. For the cases 2002S1 – 2003S1 the policy window was more closed than open (WIND_PR < 0.5). For three years, between 2003S2 – 2006S1, the calibration alternates between 0.44 and 0.56, around the point of maximum ambiguity. These shift technically mean that a window opened and closed repeatedly if slightly. A return to a richer understanding of the case data underlying INDI and

FB calibration (and their constituent sets) are necessary to adjust for this statistical ambiguity. One of the key points that stand out from the process tracing is that, although all three indicators became well established over this period in the framing of renewable energy policy problems, some were more influential in driving the priorities of policy makers. Renewable energy policy makers, and the government, did not weight the importance of these indicators equally (as this study's QCA does). Most important was the shift in policy makers' focus in 2004 to reaching the 2010 renewable energy target. This calibrated renewable energy policymaking efforts much more than emissions trajectory or energy import dependence. As long as policy makers estimated that Ireland would fall far short of the target and didn't have a worked out solution for getting back on track, the policy window remained open. With regards to feedback, an analogous dynamic is at play: feedback on the failures of grid connection policy, particular those provided during the moratorium on new wind grid connections and informing the GPA, was much more important in opening a policy window than feedback on the challenges with extant marine planning legislation. The data provides strong evidence that the coincidence of the grid connection moratorium and failure of the AER scheme opened a significant window for renewable energy policy. It was not until development of the REFIT was completed and the decision on Gate 2 was made that the reasons for frenzied policy activity decreased. I therefore recalibrate the ambiguous sets from 2003S2 – 2005S2 as 0.67. I recalibrate 2006S1 to 0.33 as the policy window largely closed with the completion of the REFIT development and consultation on Gate 2.

GOV_CHG: This period commences with the 2002 general election and includes a ministerial change for the Department of the Marine and Natural Resources in 2004S2. I calibrate the cases over this period accordingly.

MOOD: Refer to Appendix A for calibration of this condition for all cases.

WIND_POL: By definition, this set takes the maximum score from CHG_GOV and MOOD. In other words, if there was either a change in government or high level of public support for climate action, then a policy window would be open in the politics stream. A policy window opened in the politics stream with the general election in 2002S1 and the ministerial change at the department of marine and natural resources in 2004S2. From 2005S1 onwards the window remained open as public support for climate action shifted from a minority of the Irish public to a small majority of the Irish public. However, as noted in Appendix A, detailed tracking of Irish opinion on this topic only commenced in 2008. Although there is circumstantial evidence that Irish support for climate action gradually increased during the early to mid 2000s, it is not clear when exactly support shifted from a minority to a majority of the public. Refer to Appendix A for a further discussion on this.

2. Were the streams ready for coupling?

PRO_STR: During this period, no one in the renewable energy policy community thought that OFW was necessary to solve a particular political problem. I calibrate the cases over this period accordingly.

GOV_PRG: The PfG for the coalition government included an explicit commitment to "increase the opportunities for offshore wind and wave energy generation" (Fianna Fail and Progressive Democrats, 2002). Applying the set concept narrowly thus requires a calibration of 1 for all cases in this period. However, the qualitative data reveals a more nuanced picture of the government's ideology or position on this that requires reinterpretation of the PfG commitment. By the end of 2002, the government had opted against a price support instrument for commercial scale OFW, and instead opted for supporting one to two small demonstration projects (Sustainable Energy Ireland, 2002). In terms of set calibration, this may be interpreted in two ways. The fact that government deemed it appropriate to support demonstration scale projects in order to support the longer-term scaling to a commercial scale industry, may be interpreted as supportive. However, this is not what OFW developers were advocating for at the time. The views of industry actors were that they were ready for commercial scale deployment. Analogous to the earlier decision on grid connection costs, the qualitative research finds a shifting pragmatic political position as politicians learned more about the issue (through the policy community). The Fianna-Fail-led government position also crystalized around the idea of target attainment at least cost and the overarching concern to shield the taxpayer from more expensive renewable alternatives. Therefore, although the PfG included a general and explicit commitment to support OFW in 2002S1, by 2002S2 the policy community advised the government against support commercial scale OFW deployment through a price support instrument. The government position to support demonstration scale projects only was still indicative of some support. Furthermore, opposition parties also used opportunities in the legislature to criticize slower than expected progress on the deployment of renewables, creating further pressure to prioritise policy making on the subject. I therefore calibrate cases 2002S1 and 2002S2 narrowly as 1 (explicit mention of support for OFW in PfG), cases 2003S1 – 2004S1 as 0.67 (more supportive than not supportive), and cases from 2004S2 onwards as 0.33.

INGRP: During this period, the balance of influence from interest groups remained with IWEA, lobbying for the interests of many onshore wind developers. Lack of representation led a few OFW developers to form their own advocacy group in 2004, the National Offshore Wind association of Ireland (NOW Ireland) (Industry association advocate 23idi, 2021). However, judging by key policy decisions over this period (such as the regulator's decisions on grid connection policy), NOW Ireland was not yet enjoying much success in influencing national policy. I calibrate the cases over this period accordingly.

POL_STR: By definition, POL_STR is the average of GOV_PRG and INGRP representing the MSF concept of politics stream ripeness. Cases 2002S1 and 2002S2 are ambiguous (POL_STR = 0.5) given the explicit PfG support for OFW but balance of interests groups against OFW support. Revisiting the qualitative data, I recalibrate these down to 0.34. Although the PfG explicitly promised support for OFW, it was vaguely conceived and not central to the overall PfG thrust. For the remainder of the cases in this episode the politics stream is not ripe for coupling, because of the balance of interest group influence and the lack of explicit government support for OFW following the recommendations against an AER for commercial projects.

SOL_PRICE: Auction rounds under the AER scheme continued until the end of 2004. However, by the end of 2003 many politicians and the policy community had agreed that it was not a viable price support instrument to attain the 2010 target, and a new instrument would be required (Department of Communication Marine and Natural Resources, 2004; Civil servant 15pmi, 2021). It took Irish policy makers some time to prioritise work on benchmarking and implementing its own REFIT, completed by 2006S1. Therefore, between 2003S2 and 2005S2 (inclusive) no viable price support instrument alternatives existed. I calibrate the cases over this period accordingly.

SOL_GRID: The system operators' 'transitional connection policy' was still operational when this period started in 2002S1. However, it became apparent by 2003S1 that this could not handle a rapid increase in grid connection applications. There was no workable solution during the subsequent moratorium on wind grid connections. Only in 2005S1, with the implementation of Gate 1 had the regulator and system operators managed to soften up a viable connection policy. This continued for the remainder of this period with Gate 2. I calibrate the cases in this set accordingly. The regulator and system operator were getting a grip on connecting more wind to the Irish system, and at least in terms of policy, Gate 1 and 2 provided a route to connection for OFW.

SOL_MAR: During this entire period, offshore wind developers were able to obtain licences to survey sites and, with some difficulty, leases to occupy sites and planning approval. According to the set definition then, a viable policy alternative existed in strict terms. I calibrate the cases over this period accordingly. However, as is clear from the advocacy of NOW Ireland, the consenting process was uncertain and convoluted and in need of streamlining for it to function optimally.

POLY_STR: By definition, POLY_STR is the average of SOL_PRICE, SOL_GRID and SOL_MAR, representing the MSF concept of policy stream ripeness. This period commences in 2002S1 with a ripe policy stream (POLY_STR = 1) as there were functioning solutions for all three implicated policy elements. However, ripeness decrease from 2002S2 onwards as first the grid connection policy and then the price support instruments failed without any available alternatives. From 2003S2 to 2004S2 the stream is more unripe than ripe. Then from 2005S1, it ripens again gradually as new policy solutions for grid connection and then price support are established.

In using the qualitative data to calibrate the set scores to test the MSF hypothesis, the study has a narrow concern with judging whether the policy community had good enough policy solutions handy if an entrepreneur were to use a policy window to couple the streams to get OFW on to the agenda. However, the qualitative data also provides important information on the nature of the softening up process within the policy stream. Below I take a step back from the QCA to make two further points on the dynamics of the policy stream during this period and why this raises challenges for MSF theorizing.

The agenda window that had opened in 2001 due to industry advocacy and the growing pipeline of offshore projects, prompted the softening up of a technology-specific price support instrument in 2002 and 2003, and eventually an adopted and implemented policy in 2004 with the AER-IV auction. However, by the end of 2002 it was already clear that the government would not offer a price support instrument for commercial scale OFW. The reason for opting against commercial scale technology-specific price support for offshore wind, when an otherwise accepted policy instrument existed has import for how we interpret policy stream readiness. There are arguments for interpreting the policy stream as ripe and not ripe. It was ripe because the AER regime provided an instrument that could easily accommodate an auction for OFW if the government wanted to. A technically feasible and normatively acceptable price support instrument for renewables had been softened up already. That instrument was not normatively acceptable for commercial scale OFW in particular, because of the price differential with onshore, and the anticipated sufficiency in onshore wind projects to meet government targets. However, the problem was not in the feasibility or the norms of the auction instrument per se. The general scheme to use a market-based competitive mechanisms was endorsed by the government and department of finance at least until the end of 2003. One could therefore interpret the policy stream being ready as long as the feasibility and acceptability of the auction scheme persisted. On the other hand, there simply was no normatively acceptable policy alternatives at the time for providing offshore wind with necessary price support to enable commercial deployment, under the auction scheme or otherwise. In the narrow, simplest sense, no technology-specific price support solution existed. Throughout this case study, I opt for the former interpretation because I think it more accurately defines the limits of MSF and highlights the structural driver of the problem which is the price differential with other renewables and the availability of a cheaper renewable alternative.

At this early stage in the establishment of the regulator and the unbundling of the vertically integrated state-owned utility, it is clear that the capabilities to specify what was technically feasible very much rested within two different divisions of ESB (ESB National Grid and ESB Networks). Whilst the 1999 Act had already taken some power away from the incumbent ESB and vested it in the Minister and the CER, it was difficult to contest the expert judgement of the system operators. In setting the size of the Gate and the prioritisation, the system operators had a dominant position in providing the evidence base for what was technically viable. The system operators held a strong position in determining the viable level of wind penetration on the grid overall, the system optimisation criteria, and the required allocation of renewable capacity in terms of these criteria. Industry noted concerns over undue discretion being afforded to the system operators due to this dominant position. To ensure market confidence in the objectivity and fairness of the design and implementation of Gate 2 optimisation criteria, the regulator appointed an independent consultant to oversee and audit the exercise. The shift from merely prioritising projects based on their time in the queue to adding a more subjective system optimisation criteria, favoured clustered onshore wind projects with efficient connections to the existing grid. The queue and optimisation approach therefore didn't discriminate explicitly against offshore. Like all onshore wind, grid connection applications for offshore had to queue. However, it was unlikely that an offshore application would be successful as part of the optimisation criteria given the favouring of onshore clusters. One could argue that at this point the policy community had not yet softened up a technically feasible and value acceptable solution for connecting offshore wind to the grid. However, the Arklow Bank case illustrates that whether this was a policy issue or not is contentious. After all, Arklow Bank did receive a grid connection offer for 120 MW under the Transitional Connection Policy, it just proved unaffordable for Airtricity at the time.

3. Did a policy entrepreneur promote agenda change?

ENTRE: I address policy entrepreneurship across all the noted policy areas together. Calibration of this set is sensitive to how I classify Airtricity and NOW Ireland's advocacy activities over this period. In the previous episode, I did classify Airtricity as a policy entrepreneur, acting in the policy and politics stream advocating for solutions on marine planning, grid connection and price support. However, in deciding against technology-specific grid connection policy and price support instruments the regulator, government and renewable energy policy community had essentially crystalized a stable policy rationale against the essential policy supports for commercial OFW. Whilst NOW Ireland could continue lobbying in the politics stream, there was very little it could do in the policy stream to counter the now established policy community. I therefore don't classify NOW Ireland or Airtricity as policy entrepreneurs from the moment policy problem framing and solution prioritisation stabilized against OFW interests in 2002S2. I calibrate cases over this period accordingly.

The main advocates for OFW, Airtricity and the clutch of developers represented through NOW Ireland, had lost key battles on grid connection and price support policies. The complications with energising Arklow Bank as a demonstration project had also highlighted the challenges with establishing a merchant model for OFW. Following the AER-IV, no key actors in the policy stream took interest in offshore wind power deployment. NOW Ireland and Eirtricity continued its advocacy through this period but didn't appear to have an argument/justification that could convince the government, regulator or system operators to give special treatment to OFW.

4. Did any agendas change?

AG_CHG: During this period five institutions were implicated in OFW policy, with the addition of the regulator's function vis-à-vis grid connection policy. OFW policy development did not feature notably on any of the institutional agendas. I infer that OFW policy did feature sporadically on the departmental agenda for the DCMNR between 2002S2 and 2004S1, as it had to (at least sporadically) progress the design and launch of the AER offshore wind auction. However, key informant interviews confirm that this was not a high priority, compared with the overall thrust of energy policy (focused on gas exploration and exploitation) and renewables (focused on market design and onshore wind deployment).

5. Did any policies change?

POL_CHG: In 2004, the DCMNR hosted the first offshore wind technology-specific auction for 50MW of capacity, and the objective to fund two demonstration projects.

6. Critical reflection on calibration

INDI: The qualitative data also makes clear that whilst the three noted indicators rose in prominence to inform policy action to support onshore wind energy, they were not sufficient in making the case for technology-specific support for OFW yet. For instance, during this period, energy insecurity remained very high, yet energy insecurity did not provide a policy window for OFW either. The focus was on exploring Ireland's own offshore gas reserves and bringing gas from the Corrib gas field onshore. Advocates for offshore wind made the argument that exploiting the offshore wind resource (along with greater interconnection) could serve Ireland's energy security interests in the long-run, but this was insufficient to move policy makers to prioritise it in the short-term, which would've involved Ireland taking a leading role globally in the rollout of offshore wind and greater regional interconnection. Advocates and policy makers also did not link OFW to industrial policy, economic growth and job creation. Government and policy makers framed OFW squarely within the renewable energy policy area, as one, relatively expensive, alternative to meet a renewable electricity target.

EVENT: the process tracing also provide reasons for why the moratorium and subsequent connection policy did not open a window of opportunity for OFW. By the time the moratorium was issued, the policy community had already decided against a price support instrument for offshore wind, so there was no policy driver for a technology specific grid connection policy for offshore wind. The regulator would have needed a very strong policy signal to justify that preferential treatment for OFW was consistent with its fiduciary duties. Instead, the GPA for wind power set a powerful precedent, especially as it prioritised the consideration of all connection applications for wind in date order. The uniquely large scale of commercial offshore wind projects, characteristics of the offshore wind resource (in terms of grid optimisation), or grid development considerations, were not considered appropriate primary criteria for the GPA. This was because giving weight to such criteria would displace many onshore projects and it was in the onshore wind market that the private sector signalled the strongest interest.

WIND_PR: As with the findings from the previous episode, it should be noted that although a policy window was open as per my framework definitions, this did not ultimately provide strong reasons for policy makers to support OFW in particular. This is because the MSF operationalisation does not account for the reasons *against* technology-specific policy support for the technology. The cost differential between available renewable alternatives, most notably an abundant supply of cheaper onshore wind energy resource, and grid constraints to absorb OFW at scale, continued to mediate the problem framing discourse. I elaborate on this in the analysis of PR_STR (the readiness of the problem stream). As noted before, this does not give a reason for the study to amend the QCA calibration or set definitions implicated in WIND_PR, as the consistent operationalisation of MSF to test a clearly defined hypothesis is a key objective of this study. 'Stretching' the concept definition risks unacceptable overlaps or resemblance to the other MSF concepts at play. However, it points to some limitations with MSF to which it is worth returning.

PRO_STR: The process tracing provides strong reasons for why none of the key actors in the policy stream saw OFW as a solution to political challenges. The dominant problem framing of the renewable energy policy community was to attain the 2010 renewable energy target at least cost. Longer-term decarbonisation was not considered an urgent challenge over this period, but by 2006 work had commenced on a White Paper for Energy, the first since 1978, that would set long-term targets for 2020. This problem framing would tether OFW (as a policy concern) to economic growth forecasts, electricity capacity gap projections, and policymakers' expectations of the contribution of other renewables in the future generation mix. The emergent and expected success of onshore wind energy deployment, the estimated costs and uncertainties of supporting commercial scale OFW, and grid-related issues (such as limited capacity to absorb variable load) all affirmed this view.

Appendix K – QCA calibration, 2007-2011

In this section, I use the qualitative data that informed the narrative in Chapter 4.1.7 (p. 123) to calibrate the set scores for the QCA analysis. I work through each of the sets from Table 7 in order. The reader may want to refer back to this table to acquaint themselves with the MSF concept associated with each QCA set. Table 8 (p. 220) presents the QCA calibration for cases in the period 2007S1 – 2010S2.

1. Did a policy window open?

ENIMP: From 2007S1 – 2010S2 Ireland's energy import dependence remained around 90% (Byrne Ó Cléirigh, 2020). Delays at completing the Corrib pipeline continued (Keohane and Kuhling, 2010; Slevin, 2019) and concerns over energy insecurity continued to feature sporadically in political debate.

CO2: By 2007S1 it would have been apparent that Ireland's CO2 emissions had plateaued in 2005 and was potentially declining (Duffy *et al.*, 2015). I infer that this may have shifted expectations that the trajectory of emissions may start converging with Irish commitments under the Kyoto Protocol. As the economic downturn started to manifest, it is also reasonable to assume that policy makers would have expected emissions to drop along with GDP, although the reporting lag would have taken a while to measure the exact scale of the decrease. I therefore infer that expectation on the CO2 emissions trajectory would have shifted further during 2009.

RET: This period commences with an increasing rate of deployment of onshore wind, largely thanks to the new REFIT, and functioning grid connection policies. Policy makers were generally confident that Ireland was increasingly on track to meet its 2010 RES-E target. The 2007 White Paper on Energy first established a new, and much more ambitious target for 2020. However, it is not apparent that the policy community immediately recalibrated its focus to this target. By 2008S2 However, with the increase in the 2020 target to 40% and the consensus that this could be broadly feasible now including the TSO, the policy community had recalibrated its focus on developing the policies necessary to achieve this target. At this point, it was apparent that existing policy measures would fall far short of realising the 2020 target and that significant policy development was required, firstly related to system services, grid development and grid connection and eventually to re-examining the REFIT.

INDI: By definition, INDI averages the set scores for ENIMP, CO2 and RET, for each of the cases over the period 2007S1 – 2010S2. It represents the MSF concept of deteriorating indicators that serve to open policy windows. Similar to the previous episode, the data presented in this episodic narrative provide strong proof that the three indicators continued to draw the attention of politicians and policy makers over this period, albeit variably. The crude averaging of the three indicators is consistent with the qualitative narrative that overall the indicators were favourable to problem framing around OFW over the entire period 2007S1 – 2010S2. However, the qualitative data also presents more nuanced information on how the indicators affected the case for OFW. I reflect critically on this in the subsequent section.

FB_GRID: In 2008, the regulator hosted consultations on the Gate 3 connection policy, offering OFW developers an opportunity to provide feedback on the failing of connection policy to support OFW.

FB_MAR: The legal regime for obtaining licences and leases continued, albeit with some challenges, until 2008S1 when Ryan announced a new OFW REFIT. This signal triggered a rapid increase in interest from market participants with a spike in applications for foreshore licences. The escalation of the matter to cabinet ultimately resulted in a significant shift in government policy in favour of terrestrial planners developing new marine legislation. Until such legislation was enacted, offshore project developers would be unable to obtain leases for wind farms. This made it impossible for developers to obtain a lease and/or planning consent from 2008S2 onwards.

FB_PRICE: This period commenced in 2007S1 with the REFIT underway. Over this period the REFIT had largely succeeded where the AER scheme before it had failed and the thrust of feedback on implementation was largely that it was succeeding in supporting target attainment.

FB: By definition, FB averages the set scores of FB_GRID, FB_MAR, and FB_Price into the MSF concept of feedback on policy implementation. Over this period, FB contributes to closing windows (i.e. FB < 0.5) for all cases except 2008S2. In 2008S2, public consultation on the Gate 3 grid connection policy coincided with the moratorium on issuing new foreshore leases, briefly making FB more amenable to a policy window opening for OFW. The calibration of FB (as the average of feedback on the three underlying policy elements) is consistent with the broader reading of the qualitative narrative. Feedback on the implementation of policies did not serve to open a policy window for OFW. The (onshore) wind REFIT was running much better than the prior AER auction regime and expectations of actors settled that it would suffice for achieving the

2010 target. Following the policy community's shift to 2020 target attainment, the assumption held that an extension of the REFIT would also be the best available price support instrument for achieving that target. Similarly, Gate 3 had settled norms and expectations around the GPA for connecting wind plant to the grid and received the support of the onshore wind energy industry. OFW advocates had very little by way of policy implementation feedback opportunities through which to frame a problem.

EVENT: During this period, there was no Focusing event that strengthened the case for OFW. Two noteworthy Focusing events did occur, but in both instances there didn't appear to be a link to the benefit of OFW. Firstly, the announcement of an offshore wind REFIT triggered an offshore 'wind rush' which resulted in the *de facto* cessation of a marine policy for obtaining leases. This unintentional consequence further weakened the case for OFW. Secondly, the unfolding financial crisis pushed many other issues down the political agenda and drew increasing attention to the price impacts of proposed OFW policies on consumers. This further undermined the case for OFW.

WIND_PR: By definition, this set averages scores over INDI, FB, and EVENT to represent the MSF concept of a policy window opening in the problem stream. For all the cases 2007S1 – 2010S2 the policy window was more closed than open (WIND_PR < 0.5), except for 2008S2 when it briefly became ambiguous (WIND_PR = 0.5). A return to a richer understanding of the case data underlying INDI and FB calibration (and their constituent sets) are necessary to interpret this statistical ambiguity.

Although all three indicators remained relevant to framing renewable energy policy problems between 2007 and 2010, the RET remained the most influential in ordering the priorities of policy makers throughout this period. Similar to the previous period (2002 – 2007), renewable energy policy makers, and the government, did not weight the importance of these indicators equally (as this study's QCA does). Whilst politicians continued general narratives including all indicators, civil servants, the regulator and system operator responded to the RES-E target in particular. When policy makers' shifted their focus in 2008S2 to reaching the 2020 renewable energy target, the terms of several policies were recalibrated to meeting 40% RES-E by 2020. As the process tracing demonstrates, Gate 3 grid connection policy responded directly and explicitly to this, along with grid development and system services policies were all re-aligned to achieving this target.

Concerning feedback, an analogous dynamic is at play: feedback on the failure of the Foreshore Act and supplementary policy guidance for OFW developers to deal with the offshore ‘wind rush’ triggered in 2008S1 was the only feedback directly related to OFW. The announcement of an offshore REFIT by the DCENR in 2008S1 led to a rapid increase in foreshore licence applications, submitted to the DAFF. However, political concerns over a ‘land grab’ by offshore developers and a legal concern over the ‘legitimate expectation’ they may subsequently have to leases briefly escalated the matter on the cabinet agenda.[98] 2008 also saw an extensive consultation on the Gate 3 connection policy and feedback on Gate 2. However, OFW advocates had difficulty utilising this opportunity to make the case for OFW, given the wider context noted.

Taking the above into account, I therefore calibrate WIND_PR for 2008S2 as more closed than open (WIND_PR = 0.33). Overall, the WIND_PR scores for cases over this period confirms a general reading of the narrative that OFW was a solution in search of a policy problem.

CHG_GOV: This period commences with the 2007 general election. Two of the coalition partners made commitments in their manifestos to support offshore wind. The Green Party in particular, had a relatively short manifesto and an explicit commitment to passing an offshore REFIT, successfully negotiating for the ministerial post for the Department of Communications Energy and Natural Resources. The period also includes a cabinet decision in 2008S2 to move the marine planning legislation mandate to the Department of Planning and Local Government opening another policy window in 2009S1 at departmental level. However, it became apparent quite soon, that legislative and bureaucratic delays in splitting the function and moving it to the latter department in fact blocked any attempts at agenda change until the transfer was complete. A task which would take the remainder of the term in government.

[98] Unlike the policy window that opened in 2003, the policy community in 2008 had a solution for price support that was being implemented, and could be extended, with little effort. The REFIT also indirectly solved the coordination challenge between grid connection, planning permission and route to market faced in the early 2000s.

MOOD: Public support for climate action remained relatively high until roughly early 2009 when there was a noted decline. Rrefer to Appendix A 6 for calibration of this condition for all cases.

WIND_POL: By definition, this set takes the maximum score from CHG_GOV and MOOD. In other words, if there were either a change in government or high level of public support for climate action, then a policy window would be open in the politics stream. A policy window opened in the politics stream from 2007S1 – 2009S1, either because of the two noted changes in government or because of public support for climate action.

2. Were the streams ready for coupling?

PRO_STR: There was a brief period after the new government took office when it appeared that more policy makers would adopt a problem framing that OFW was a necessary part of the solution to meeting the 2020 target and longer-term decarbonization. Ryan used his position to drive problem framing in both the DCENR and the Oireachtas, and appeared to have convinced the cabinet of an offshore wind REFIT by early 2008 tethered to a more ambitious 2020 RES-E target that key opposition parties supported. Across political parties there was a stated agreement that OFW was a necessary part of the solution to the long-term challenge of energy security and climate change target attainment for 2020 and an export opportunity (Roux, 2021g, 2021h, 2021i). However, as ESRI's case against REFITs for offshore wind, wave and tidal power started gaining popularity with some parties, Ryan's problem framing lost ground. By 2010, even Ryan conceded that concerns over the cost implications of the proposed REFITs were reasonable. The Regulator maintained that Gate 3 connection offers and terms to OFW projects were sufficient and consistent with 2020 target attainment and Eirgrid of course would extend and reinforce the grid to any project who accepted their connection offers. Ryan's early framing did link OFW to a more ambitious 2020 target and this persisted in the NECP, with a marginal contribution from OFW to the 40% target. However, by 2010S2 some key actors in the policy stream (notably Eirgrid and ESRI) already anticipated that the financial crisis would have an effect on the demand forecast which underpinned many key electricity policy decisions (Roux, 2021i). However, by 2010S2 Ryan and other policy makers were careful to reframe OFW firstly as an opportunity for exporting electricity to the UK (as opposed to meeting a national decadal target). Whilst some politicians agreed on the export opportunity, it was ultimately the TSO that determined the economic case for interconnection. It is therefore reasonable to assume that OFW was effectively decoupled from decadal target attainment problem framing by 2010S2.

For the cases 2007S2 – 2010S1 I therefore calibrate the problem stream to be more ripe than not ripe (PR_STR = 0.67) as over this period there was consistently at least two institutions in the policy community who framed OFW as a necessary part to reaching the 2020 RES-E target. However, it is worth nothing that both these institutions were dominated by politicians and did not include the regulator or the TSO.

GOV_PRG: In 2007, the PfG for the coalition government included an explicit commitment to "examining the possibility of appropriate support measures for offshore wind" (Government of Ireland, 2007a) and, once in government, the Green Party put significant effort into realising its more ambitious election manifesto promise of an offshore wind REFIT, and to "encourage investment" in a European offshore electricity transmission grid (Green Party, 2007). I therefore calibrate cases until 2009S1 as having explicit government support for OFW. However, over the course of 2009, the PfG took a rapid pivot to dealing with the financial crisis (Fianna Fail and Green Party, 2009). OFW, along with many other things were axed from the renewed PfG in 2009S2. From 2009S2 – 2010S2, OFW was not on the PfG.

INGRP: With Ryan's position in government, and the concurrent formation of NOW Ireland in 2007 it appeared that the balance of influence between interest groups would shift in OFW's favour. NOW Ireland formalised the sectorial interests of the OFW project developers as a distinct interest group from onshore wind developers, seeking distinct policies to support offshore wind. The advocacy of NOW Ireland's Chair, Brian Britton, and Airtricity CEO, Eddie O'Connor, gained widespread support across political parties, in government and opposition. Ryan's prioritisation of support for regional interconnection and an offshore REFIT aligned with positions' NOW Ireland had been advocating. However, ultimately none of these policy positions were achieved. Policy influence for NOW Ireland remained illusive, whilst policy makers did accommodate some of the demands of onshore wind developers, for instance on the terms of Gate 3 connection policy. The decision on Gate 3 criteria most clearly demonstrates the balance of power between interest groups. Whilst Gate 3 accommodated some of the demands of onshore developers and garnered IWEA's support for providing sufficient certainty to onshore developers, it was a point of extended contention with NOW Ireland, and several politicians from opposition parties who questioned the date order criterion, but were not in a position to influence it (Roux, 2021h, 2021i). This demonstrates that throughout this period the balance of influence between relevant interest groups still firmly sat with the onshore wind energy industry. I calibrate the sets throughout this period accordingly.

POL_STR: By definition, POL_STR is the average of GOV_PRG and INGRP representing the MSF concept of politics stream ripeness. Cases 2007S2 – 2009S1 are ambiguous (POL_STR = 0.5) given the explicit PfG support for OFW but balance of interests groups against OFW support. Revisiting the qualitative data, I recalibrate these up to 0.67. The explicit noting of OFW in the 2007 PfG had more weight behind it than the previous government's commitment given the Green Party's explicitly manifesto commitment to an OFW REFIT 4.1.7). Although it was only a short item on a long PfG, it is also clear that the Green Party had decided to prioritise it and managed to convince the other coalition partners to follow it proposal for some time. For these ambiguous cases, I therefore weight GOV_PRG heavier than INGRP. However, I note that the ambiguity of politics stream ripeness, i.e. how to weight (even if implicitly) and compare government priorities alongside interest group influence, is a challenge highlighted in MSF literature. For the remainder of the cases in this episode the politics stream is not ripe for coupling, because of the balance of interest group influence and the lack of explicit government support for OFW following the re-issue of a new PfG in 2009S2.

SOL_PRICE: Over this period, a viable price support instrument for renewables was available. Indeed, it was the success of the REFIT for wind, which no-doubt informed the decision to benchmark REFITs for offshore wind, wave and tidal. A civil servant in the DCENR was able to benchmark the new REFITs in a matter of months, but formal state aid approval took longer than expected (Civil servant 15pmi, 2021; Roux, 2021g, 2021h).

SOL_GRID: A viable connection policy was also available throughout this period. Indeed, three offshore wind farms were assessed in the Gate 3 batch and received connection offers. Although Gate 3 did not include any special technology-specific terms for OFW (see next episode for further analysis), OFW projects did eventually get considered under the application date merit order – after many years in the queue.

SOL_MAR: Around 2008S2, the government decided to cease issuing foreshore leases for OFW projects under the Foreshore Act. This ended a period of almost eight years where successive governments made do with the act and supplementary policy guidance. Although terrestrial planners successfully argued for a high-level approach to marine planning legislation, the details of such legislation proved much more complicated than anticipated and progressed slowly. Work on the heads of bill was ongoing when the government's term came to an end. No legislative solution was available to replace the Foreshore Act whilst civil servants in the Department of Environment, Heritage and Local Government were entrusted with drafting an ambitious new piece of legislation that would cover all marine related interests in one act and link it to terrestrial planning.

POLY_STR: By definition, POLY_STR is the average of SOL_PRICE, SOL_GRID and SOL_MAR, representing the MSF concept of policy stream ripeness. Between 2007S1 – 2010S2 the policy stream was ripe as there was always solutions available for at least two of the three policy elements considered.

3. Did a policy entrepreneur promote agenda change?

ENTRE: This period saw the most noteworthy efforts by policy entrepreneurs to both frame OFW as a solution to policy problems and drive progress on technology-specific policies for price support, grid connection and marine planning legislation. For most of the period, there was a cross-party consensus that OFW was an issue that deserved policy attention. As already discussed extensively, Eamon Ryan commissioned the DCENR to benchmark an offshore wind REFIT, participated actively on regional fora to progress interconnection, and created a cross-party Oireachtas Joint Committee on the topic of climate change targets and energy security. By 2008S1, a groups of opposition TDs, working on the Joint Committee, started working on an alternative heads of bill to replace the Foreshore Act, in parallel to civil servants tasked with this (but facing a lack of sufficient institutional capacity). It is noteworthy that all of the entrepreneurial activity came from elected officials during this period, including several TDs from opposition parties. Government appears to have refused their proposal, but my data does not establish the reasons for this. By 2010S2 However, it was clear that OFW had lost its key policy entrepreneurs as realisation of the cost to consumers and the fallout from the financial crisis manifested.

4. Did agendas change?

AG_CHG: OFW was on two distinct institutional agendas for the DCENR and Oireachtas from 2007S2 – 2010S1. This was most noticeable with the DCENR's agenda to develop and implement an OFW REFIT and drive progress on marine planning legislation for offshore renewables, and the Oireacthas Joint Committee's agenda, also partially aimed at developing a legislative proposal for marine planning legislation. OFW briefly made it on to the cabinet agenda 2007S2 – 2008S2 as it had to approve the REFIT announcement and subsequently sought to deal with the offshore 'wind rush' triggered by the REFIT announcement. However, once delegated to the line department for terrestrial planning the cabinet lost interest in the matter. For instance, from 2008S2 onwards Toaiseach Cowen, who was chairing the cabinet sub-committee on climate change and energy security, had no grasp of progress on either the offshore REFIT or the state of proposed marine planning legislation when questioned in the Oireachtas (Roux, 2021h, 2021i). In 2009, the cabinet subcommittee only met twice (Roux, 2021i).

5. Did policies change?

POL_CHG: Despite unprecedented efforts by political and policy entrepreneurs to develop and implement policies in support of OFW deployment, no policies changed to accommodate or favour OFW. The process tracing demonstrates in detail why this was the case (refer to Case 2, Chapter 4.3, p. 128).

6. Critical reflection on calibration

INDI: Although energy security, CO_2 emissions and renewable energy targets were all favourably disposed to making a case for prioritising more indigenous renewable energy as a policy matter of urgency, it was only the decadal energy target that served as a direct logical argument for prioritising OFW. The case that advocates such as Minister Ryan made for OFW were largely predicated on the argument that policy action should prioritise the national energy transition over the long-term and beyond a decadal 2020 target. In tandem, Ryan used the All-island Grid Study to increase the ambition of the RET for 2020, tethering OFW as a necessary technology in the electricity supply mix for reaching the 40% target. However, here he came up against other actors in the policy community, including the regulator and ESRI, who questioned whether OFW would be a necessary part of the 2020 supply mix. Both sides to the dispute agreed on the underlying logic that the case for prioritising policy support for OFW rested on its contribution to the 2020 RET target. Ryan was alone in linking the prioritisation of OFW to a longer-term objective of decarbonisation (the CO2 indicator), and it was not yet clear if OFW would improve energy security, given grid-related constraints and that these debates preceded viable routes to electrify transport and heating.

Finally, it should be noted that the backlog of grid connection applications became a key indicator that prioritised actions from the regulator. A growing backlog became a key driver for the timing of consultation and policy making, and some of the terms of the successive gate policies. Whilst the regulator took policy directions from government's decadal targets, the inability of the regulator and system operator to come up with defensible solutions to constrain a new, often speculative wind generation market, in turn placed constraints on government. My operationalisation of the MSF for the QCA fails to capture the effect of the expanding onshore wind market on OFW via grid connection policy, but a close reading of the qualitative narrative suggests a complex link. The size of the application backlog became the indicator of interest that drew the regulator and TSO's attention and influenced timing of their policy responses. However, it was the regulator norms established in dealing with this backlog that provided another pathway through which OFW's development was stalled.

WIND_PR: In addition, as with the findings from the previous episode, the narrative for the period 2007 – 2011 confirms that the MSF concept of a policy window in the problem stream has difficulty capturing the reasons *against* technology-specific policy support for OFW. The cost differential between available renewable alternatives, most notably an abundant supply of cheaper onshore wind energy resource, and grid constraints to absorb OFW at scale, continued to mediate the problem framing discourse. I elaborate on this in the analysis of PR_STR (the readiness of the problem stream).

POLY_STR: There is some ambiguity in the definition and calibration of SOL_PRICE and SOL_GRID. For SOL_PRICE the ambiguity rests on the concept of an acceptable solution, particularly as it pertains to the €140 MW/h OFW REFIT rate. The ambiguity of SOL_GRID is due to its connection to SOL_PRICE. What counts as a feasible connection policy for OFW depends on its coordination with the price support instrument. This became apparent in 2012 (Refer to Chapter 4.5.4, p. 163).

ENTRE: It is noteworthy that a cross-party consensus on this matter, and proactive effort from several elected officials failed to convert OFW's agenda status into new policies and legislation. In comparison, the TSO prioritised developing the system services policy and grid development plan to accommodate an increased penetration of wind (in general) which would be fundamental to OFW's deployment. The regulator did not see preferential terms for OFW connection as consistent with the norms it had laid down during consecutive Gate policies; no wind project could jump the submission date queue, and no 'VIP queue' would be created for OFW. It is also noteworthy that the regulator did not receive a policy statement from government to justify the aforementioned exceptions.

Appendix L – QCA calibration, 2011-2016

In this section, I use the qualitative data that informed the narrative results in Chapter 4.3, p. 128, to calibrate the set scores for the QCA analysis. I work through each of the sets from Table 7 in order. Table 8 (p. 220) presents the QCA calibration for cases in the period 2011S1 – 2015S2.

1. Did a policy window open?

ENIMP: Energy import dependence remained consistently high during the period as the controversies surrounding the Corrib gas pipeline, and the associated delays, meant that the Corrib gas field did not start producing during this period. However, in 2011 the project received planning approval, and construction on the onshore pipeline (the most controversial aspect of the project) continued amidst direct public action and policing incidents in 2012

(Slevin, 2019). It is reasonable to assume that by 2013S2 policy makers were updating their expectations that Corrib would soon drive down energy important dependence significantly.

CO2: CO_2 emissions continued to reduce over this period because of the decline of economic output following the financial crash (Duffy *et al.*, 2015). Because of the lag in CO_2 emissions reporting, it was not apparent to anyone in the policy community that emissions for 2015 had started rising again (the first time since 2005) until the EPA published the annual national inventory for 2015 in 2017. I calibrate the cases 2011S1 – 2014S2 as 0.33 (that emissions were almost tracking the target trajectory). In October 2014, the European Council reached a decision on the 2030 climate and energy policy framework, which set the overall 2030 emissions reduction target for the region. The 2030 target differed in both scale and form from the 2020 target. It shifted the focus of the Irish climate and energy policy community to the longer-term targets and recalibrated the indicator against which they measured progress. It was also clear to Irish policy makers that the 2030 target would be a stepping stone to a much more ambitious emission reductions target by 2050. I therefore calibrate the cases 2015S1 – 2015S2 as 0.67 (emission significantly above target trajectory).

RET: Throughout this period, installation of onshore wind energy capacity grew consistently. It was not yet clear throughout 2011 that is was on track to meet Ireland's 2020 RES-E target of 40%. However, from 2012 onwards policy makers expected that the build-out of onshore wind was on track to meet the target. Although the EU had set a climate change mitigation target in 2014, this was now in CO2e, and there was no new renewable energy target yet.

INDI: By definition, INDI is the average of ENIMP, CO2 and RET. Taken together, the indicators were still somewhat supportive of problem framing for OFW during 2011 as energy import dependence remained high (with no clear idea of when Corrib would come online) and it was not yet clear that the REFIT extension would drive sufficient deployment to meet the 2020 target. However, INDI became ambiguous for cases from 2012 onwards. Given that INDI contributes alongside FB and EVENT to determining whether a policy window was open in the problem stream, I do not adjust for ambiguity for INDI. Instead, the analysis of WIND_PR below revisits any cases in the period where WIND_PR was ambiguous.

FB_GRID: Feedback on the implementation of Gate 3 grid connection policy (i.e. the sustained high uptake of grid connection offers) indicated that it would suffice to meet the 2020 RES-E target. Although some OFW developers complained about the terms of their connection offers (given the lack of route to market) there were no formal opportunities to provide feedback on a new connection policy during this period. Although the regulator published the draft proposal in 2015, feedback on the ECP-1 policy would only commence in 2016. I calibrate all cases for this period as unfavourable

FB_MAR: The financial crisis and the change in government precipitated the deprioritization of marine planning legislation before civil servants could make significant progress on drafting a successor to the Foreshore Act. Offshore wind project developers could no longer obtain foreshore licences or leases under the extant act. In addition, the EU Directive 2014/89/UK Framework for Maritime Spatial Planning required Ireland to have a MSP by 2021 that met certain substantive and procedural requirements (2014S2). This opened the contrast even further between evolving marine legislative norms that the EU Member States were adopting and the state of Irish marine planning legislation. I calibrate all the cases throughout this period as favourable; i.e. feedback on the extant legislation was that it was clearly not fit for purpose and OFW developers could not obtain the requisite licences and leases to progress work.

FB_PRICE: The renewal of the REFIT for wind until 31 December 2015 (along with the Gate 3 offers) proved successful in bringing sufficient onshore wind energy plant online in accordance with the decadal target set. It was perceived as functioning well enough and no flaws were cause for consideration of changing or abandoning it. Opportunity for formal feedback to inform the terms of a successor price support instrument only opened once the REFIT expired at the end of 2015. I therefore calibrate all cases as unfavourable for OFW.

FB: By definition FB is the average of FB_GRID, FB_MAR, FB_PRICE. The success of the REFIT and the Gate 3 policy, and the associated feedback, meant on the whole, a lack of opportunity for OFW advocates to frame a problem around policy implementation failures.

EVENT: There were no Focusing events in 2011 that strengthened the case for OFW. However, from 2012 onwards a series of public controversies started building, first around grid development work undertaken by Eirgrid under its Grid25 plan, and then due to the rush to develop large onshore wind projects under the Midlands Export Scheme. The Midlands Export Scheme, in particular, constituted a significant renewable-energy related controversy in Ireland, starting roughly 2013S1. There was an associated, if peripheral, argument, expressed by some opposition parties in the Parliament, that wind power should be built offshore, rather than onshore. Social opposition to onshore wind and grid infrastructure was not yet undermining the 2020 RES-E target, but expectations started forming, potentially as early as 2014, that such opposition could undermine the timely construction of sufficient grid infrastructure for any targets beyond 2020. I therefore calibrate EVENT as somewhat strengthening the case for OFW from 2014S1 onwards.

WIND_PR: By definition WIND_PR is the average of INDI, FB and EVENT, and represents the MSF concept of a policy window opening in the problem stream due to a combination of deteriorating indicators, feedback on policy failure and Focusing events. From 2011S1 – 2013S2, the policy window was more closed than open. However, from 2014S1 – 2015S1 it becomes ambiguous, largely due to the increasing controversies noted in EVENT. In order to perform a robust QCA these ambiguous cases need to be recalibrated as either in or out for WIND_PR, which requires a return to the qualitative data to make a broader judgement of the period. The extent of delays in onshore grid development, due to public controversies, had not yet decisively shifted the case away from a primary focus on developing the grid around onshore wind energy resources. The failure of the Foreshore Act and delays in legislating a new bill was widely ignored by almost all parties and policy makers, partially because no OFW developers were driving feedback, given that they had lost their route to the Irish market (thanks to the abandoned REFIT). Arguably the only issue which served to open a policy window over this period was the European Council decision on a binding EU target of 40% reduction in greenhouse gasses by 2030. The target setting process and decision did trigger a step-change recalibration of CO2 and directed the efforts of some actors in the policy stream, most notably the energy systems modellers working on ITM. Whilst this ratcheting up of targets definitely contributed to a policy window for any of a range of solutions (including OFW) to deeper decarbonisation, the process tracing highlights the influence that the least-cost all systems approach to target attainment had on pushing OFW deployment very far into the future and only required for the most ambitious decarbonizing scenarios. I therefore judge a policy window as more closed than open over this period.

Finally, it is worth noting that the problem window for OFW did start to open in 2015S2 with the additional opportunity to develop a new price support instrument to succeed the REFIT.

CHG_GOV: The period starts with the general election of 2011S1. It also contains a further ministerial change for the Department of Energy when Alex White replaced Pat Rabbitte due to a cabinet reshuffle in 2014S2. By definition, these events are policy windows in the politics stream.

MOOD: In 2011 the Irish public's support for more ambitious action on climate action hit a relative low point; a large minority (38%) thought the government should do more to fight climate change, but a similarly large minority (40%) thought the government was doing enough to fight climate change. Support for more ambitious action by the government to fight climate change rose slowly around 2013 and by 2015 it appeared to have crossed threshold again where the majority of the public thought the government needed to put in place more ambitious targets for renewable energy. I score the cases accordingly. For more information, refer to Appendix B.

WIND_POL: WIND_POL is by definition the maximum of CHG_GOV and MOOD and represents the MSF concept of a policy window opening in the politics stream. Except for the two changes in government, there was no window in the politics stream between 2011 and 2014. However, an increase in public support for more ambitious climate action in 2015 opened a window in the politics stream.

2. Were the streams ready for coupling?

PRO_STR: During this entire period, no one in the policy community managed to construct a convincing case that OFW was a necessary solution to a particular policy problem. First, the ESRI successfully argued for the government to scrap the offshore REFIT announced by the previous government. The regulator also refused NOW Ireland's advocacy for more favourable terms for connection offers to OFW projects now missing a route to market. Consequently, much of the momentum built under the previous government ran out almost immediately, as is evidenced by the delays in publishing the Offshore Renewable Development Plan (OREDP), the lack of interest in the findings of the ISLES project, and the stalling of work on new marine planning legislation.

The most consequential development over this period is the rise of the all-systems least cost approach to energy policy making constrained by long-term mitigation scenarios. The development and application of the Irish TIMES Model drove a more coherent approach to thinking about alternative solutions for decarbonisation optimised for cost. This resulted in a significant reprioritisation of alternatives away from deploying more renewable power capacity to supporting energy efficiency, and the decarbonisation of the heat and transport sectors, often through the use of biofuels. The case narrative shows how this new paradigm was taken up by the policy community, including civil servants and the government in the 2015 Energy White Paper. This problem framing completely relegated any arguments that sought to frame the lack of OFW as a policy problem.

GOV_PRG: One of Fine Gael's many election promises was to lower energy prices, with an explicit commitment to reform the PSO and REFIT subsidies. This commitment aligned with prior opposition from Fine Gael TDs, then in opposition benches to REFITs for offshore wind, wave, and tidal. The government outlined its detailed energy policy position in 2012, which was similarly opposed to supporting OFW. This stance lasted throughout the term in office.

INGRP: IWEA, the dominant interest group for the industry continued to represent the interests of onshore wind developers in renewable energy policy. The zero-sum game between onshore and OFW, elaborated in Chapters 0 and 4.1.7, continued. NOW Ireland had no success in campaigning for its small membership on key policy points.

POL_STR: By definition, POL_STR is the average of GOV_PRG and INGRP representing the MSF concept of politics stream ripeness. Given that both constituent sets were scored at zero, the politics stream was clearly not ready for coupling throughout this period.

SOL_PRICE: Throughout this period the policy community had a tried and tested price support instrument in the REFIT. The initial wind REFIT, which expired at the end of 2010, was renewed and extended to run to the end of 2015 in order to meet the 2020 target. The government abandoned price support for offshore wind, wave and tidal, but not because a policy instrument was not available. It moved ahead with a biomass REFIT along with an extension of the onshore wind REFIT. With the success of these REFITs the Irish energy policy community had largely solved the policy problem of a functional price support instrument.

SOL_GRID: In the analysis of previous episodes, I interpreted the various Gates as offering a viable grid connection policy for wind (in general); i.e. there was an extant policy solution for connecting offshore wind projects as well. This obtained as long as the batches were relatively small and frequent and the prospect of waiting in the queue for an offer did not completely undermine the prospect of project deployment. Indeed, three offshore wind projects did obtain grid connection offers under Gate 3. However, with the refusal or sale of these offers, there was no further prospect for projects to connect to the grid. Although developers could still submit grid connection applications over this period and queue, there was no assurance of when the next batch would be processed. This was due to the massive scale of the batch in Gate 3, calibrated to meet the 2020 target. With Gate 3, the regulator and the transmission system operator had largely solved the policy problem of connecting large amounts of onshore wind to the grid for those projects already in the queue (in the batch), but had unintentionally destroyed any de facto solution for new projects based on the batch processing approach. What had been a feasible solution, no longer was, given the change in context. I therefore calibrate all the cases over this period as not having a viable grid connection option.

SOL_MAR: Unfavourable, 2011/S1 – 2015/S2. The policy community tasked with drafting new marine planning legislation failed to progress a draft that made it through the parliamentary process, although they introduced a heads of bill to parliament. For marine planning legislation, the difficulty of progressing a General Scheme for a bill to a fully worked out draft legislation clearly demonstrated that the Irish planning policy community still lacked technically feasible and/or normatively acceptable alternatives to the 1933 Foreshore Acts. Unlike price support instruments and grid connection policy, no solution appeared available. Civil servants and their enlisted legal advisors were drafting this legislation from scratch and simply lacked the capacity to put forward a sufficiently worked out solution to the Attorney General, prior to the legislature.

POLY_STR: By definition, this set is the average of SOL_PRICE, SOL_GRID, and SOL_MAR and represents the MSF concept of the policy stream being ripe for coupling. The policy stream was not ripe for this entire period, given that there were no solutions for two of the three policy elements.

3. Did a policy entrepreneur connect the streams?

ENTRE: I address policy entrepreneurship across all the noted policy areas together. Over the period, entrepreneurship for OFW was largely missing. Several influential policy actors successfully recommended against the offshore wind REFIT and there was little opposition to this following the financial crash. Following the decision on Gate 3 and connection offers to three offshore wind projects, NOW Ireland lobbied the regulator reconsider the unfavourable connection terms for the offshore grid connection offers. However, the regulator was not interested in making exceptions to the Gate 3 terms. Once the offers had expired, I didn’t find any evidence for NOW Ireland or any other policy makers advocating for an offshore wind-specific grid connection policy. Simon Coveney, the minister for agriculture food and the marine, did take a strong interest in developing a marine planning bill for parliament. His motivation was to progress legislation to open Irish waters for economic growth (‘blue economy’) as laid out in the government’s Harnessing Our Ocean’s Wealth policy. Although his concern was not in supporting OFW per se, his efforts to progress new marine planning and licensing legislation in order to serve the government objectives of developing the marine economy was a significant instance of policy and political entrepreneurship. However, high turnover of staff in the civil service in both the departments of planning and energy and lack of sufficient capacity to develop complex legislation was to blame for the lack in progress in drafting marine planning legislation. Overall, no policy makers sought to link OFW to national decadal energy targets for either 2020 or 2030. The decline in projected energy demand for 2020 and the successful rollout of onshore wind energy, decoupled OFW from the agenda to reach the 2020 RES-E target. Furthermore, early results from the all energy systems least cost approach to energy policy making suggested that OFW would not be part of a least-cost energy mix before mid-century. This view was dominant throughout the period. Advocates did However attempt to link OFW to the direct export scheme opportunity with the UK. Several offshore wind developers and NOW Ireland advocated for the inclusion of OFW projects in the UK's consultation on a direct import agreement (export for Ireland). However, this advocacy did not amount to policy entrepreneurship per se as the direct export opportunity ended abruptly when the respective governments could not agree on regulatory terms for such an agreement.

4. Did OFW feature on any agendas?

AG_CHG: OFW was largely off political agendas between 2011 and the start of 2016.

5. Did policies change to support the deployment of OFW?

POL_CHG: During this period, no policies changed to support the deployment of OFW. The legislative reform of the Foreshore Act that had commenced by the expectation of OFW deployment in 2008 petered out once this expectation changed.

6. Critical reflection on calibration

The direct export opportunity presents an interesting classificatory challenge for MSF hypothesis testing. Empirically, the opportunity of direct export opened an opportunity for OFW deployment. The direct export opportunity generated a policy problem that needed to be resolved before further 'downstream' progress could be made on supporting the pipeline of projects to serve it. Given the failure to solve this prior issue, there was ultimately no policy window for OFW. None of the aforementioned conditions appears to capture this episode in Irish OFW. It seems to illustrate that the causal pathway through which direct export to another jurisdiction may open policy windows for OFW is very different from those at play in meeting national consumption and so requires amendments to the MSF operationalisation.

SOL_GRID: In addition it is worth noting that the MSF struggles to capture the inter-relationship or dependencies between different policy element within the policy stream. After all, three offshore wind projects received grid connection offers and firm access dates. The challenge was that the firm access dates were spread out over a period of eight years, but that the regulator required multi-million Euro deposits within 50 days of the offer to accept it, because of the large capacity scale of the OFW applications. The main underlying issue is that the withdrawal of the offshore REFIT removed the route to market for the projects with a connection offer. If the route to market existed, the payment of the deposit certainly would not have been an insurmountable hurdle. Indeed, one offshore developer did accept the connection offer and retained some of the available capacity for its offshore wind project. Whether grid connection policy for OFW counts as feasible and viable is not just dependent on being able to obtain a connection offer, but on the terms of the offer and the coordination of these terms with a price support instrument. As noted in SOL_PRICE above, the REFIT was available (for other technologies) and adapting it for OFW was a political decision rather than a technical challenge requiring a new solution.

POLY_STR: In addition to the three policy elements considered in the hypothesis testing, the results of the period also highlight the emergent and peripheral area of direct export and interconnection policy. Given that the government failed to develop a solution to an acceptable export policy, this would not have changed the calibration of POLY_STR. In the case of interconnection policy, although the development of the Greenlink and Celtic projects raised the prospect of national policy challenges in Ireland, this did not yet manifest by the end of 2015. I defer discussion of this to Chapter 4.4. However, the QCA does not include a separate set for interconnection policy.

Finally, the three policy elements considered in hypothesis testing do not accommodate the new area of energy systems modelling. Arguably, the largest change in the energy policy stream over this period related to the rise of the all energy system least cost approach to energy policy, driven by technological advances that enabled Irish energy system modellers to build increasingly advanced models around long-term future energy scenarios. This shifted the overall framing and objectives of energy policy, and informed the justification for prioritising particular sectors or technologies through individual policy instruments. My hypothesis testing does not accommodate this as a distinct domain of policymaking. As the results demonstrate, this new approach sat ‘upstream’ from thinking around price support instruments, grid connection policy and marine planning legislation. The most proximate causes of agenda change for OFW, would still ultimately have to run through the three policy elements in question. Whilst it is no doubt important to include developments in energy systems modelling in a richer account to understand deeper causes, the MSF hypothesis testing may suffice without directly taking it into account. Understanding the rise of this ‘evidence based’ approach to energy policy making is key to understand how the Irish policy community went about conceiving viability and acceptability and selecting policy alternatives throughout the 2010s.

Appendix M – QCA calibration, 2016-2020

In this section, I use the qualitative data that informed the narrative results in Chapter 4.5, p. 149, to calibrate the set scores for the QCA analysis. I work through each of the sets from Table 7 in order. Table 8 presents the QCA calibration for cases in the period 2011S1 – 2015S2.

1. Did a policy window open?

ENIMP: The Corrib gas field started production on 30 December 2015. Thanks to the flows from Corrib, Ireland’s energy import dependence dropped rapidly in 2016, from almost 90% to just below 70%. It remained at roughly this level for the remainder of my period of analysis. It represented a vast improvement on what had remained a problem of sustained scale since the late 1990s. Clearly, Corrib had ameliorated Ireland’s extremely high energy import dependence to some degree, but there was good reason for policy makers to remain concerned. After all, Corrib was only one field and in spite of it, Ireland still had an import dependence significantly higher than the EU average. Its energy security improved for the foreseeable future, but the problem of energy insecurity had not been solved. The level of the indicator retained potential for problematization.

CO2: By 2016S2, it became clear that Ireland’s emissions was far above its target trajectory for 2020 and far above a pathway to its long-term goal for 2050. The indicator became progressively worse over the period and by 2018 the EPA projected that Ireland would only decrease its emissions by 1% by 2020, a dismal failure on the 20% emissions reduction target (Environmental Protection Agency, 2018). I grade all cases over the period accordingly.

RET: During this period there was a dramatic recalibration of expectations around the contribution of renewable electricity to an emerging 2030 climate change target. From 2016 to the end of 2017, RET was still calibrated to meeting the 2020 target of 40% RES-E, and very nearly on track for this. Although some policy makers had started thinking about the 2030 target, the dominant all systems least cost approach to scenario planning had not yet recommended a more ambitious RET target by 2017S2. However, as soon as civil servants in the department of energy commenced work on establishing the 2030 target (most notably through drafting the NECP), the contribution of the power sector to this target increased rapidly and significantly, resulting first in a 55% RES-E target and then a 70% RES-E target. Projected against these benchmarks, the RET indicator fell far short. I grade cases for RET as switching from being on track or almost on track until 2017S2 (RET = 0.33) to falling far below the target trajectory (RET = 1).

INDI: INDI is, by definition, the average of ENIMP, CO2, and RET. This period starts with indicators being somewhat favourable for a policy window for OFW. As the CO2 indicator (2016S2) and the RET indicator (2018S1) switched to more favourable, the overall status of indicators from 2018S1 onwards become very favourable for a policy window opening in the problem stream.

FB_PRICE: Feedback on a new price support instrument commenced informally in 2016S1 with the expiration of the REFIT, creating an opportunity for OFW advocates. By 2017S2, the department had formally opened public consultation on the economic analysis underpinning alternative proposals for the instrument. Henceforth, relatively sustained work to develop the high level design of the Renewable Electricity Support Scheme included a sustained opportunity for stakeholder to provide formal and informal input on terms and alternatives. What was clear from 2017S1 is that feed-in tariff schemes would no longer be compliant with EU rules under the latest Renewable Energy Directive. Ireland’s extant instrument would fail to support RES-E target attainment going forward. I calibrate cases accordingly.

FB_GRID: During this period, the regulator hosted several public consultations and calls for evidence as it sought to move away from the batch processing approach to a new ‘enduring’ connection policy. Each of these consultations, hosted in 2015S2 – 2016S1, 2017S2, and 2019S2 offered an opportunity for OFW advocates to provide feedback on the failures of connection policy to support OFW deployment and advocate for different policy terms. I score these cases as favourable for feedback.

FB_MAR: The status on feedback for marine planning legislation remained the same as it had been for the previous two periods. It remained impossible for OFW developers to obtain the necessary licences and leases to develop OFW projects.

FB: By definition, FB is the average of FB_PRICE, FB_GRID and FB_MAR, representing the MSF concept of feedback on policy implementation that serves to open a policy window in the problem stream. Throughout this period, feedback on at least two of the three policy elements, and sometime all three were possible and hence FB contributed to positively to policy window opening for all cases.

EVENT: During this period, the build-up of grid-development delays continued as the TSO pivoted to investigating options for developing out the grid towards potential offshore wind plant off the east coast instead. It is unclear exactly when the challenges with delivering the Grid25 programme started significantly strengthening the case for OFW made by the TSO. By 2017S1 the TSO was already publicly including OFW in all of its scenarios for grid development out to 2030, noting the assumptions underpinning this as the outcome from consultation with other policy makers as well. It is therefore likely that it was already apparent in 2016, if not yet widely discussed on the public record. I code all cases from 2016S1 onwards accordingly.

WIND_PR: By definition, WIDN_PR is the average of INDI, FB, and EVENT and represent the MSF concept of a policy window opening in the problem stream. Such a policy window is open for all cases from 2016S1 onwards (WIND_PR > 0.5) with the policy window becoming wider as time progressed, with more indicators, feedback and Focusing events adding up to provide a strong bases for problem framing in favour of prioritising policy support to OFW.

CHG_GOV: In this period there was the general election (2016S1) and two relevant changes in government (2017S1 and 2018S2), most notably the appointment of Richard Bruton as the minister for the DCCAE. The window in the politics stream opened again when Naughton resigned and Bruton took over the ministerial post (2018/S1).

MOOD: The process tracing for this period along with opinion poll data in Appendix B clearly show a shift in public mood in 2016S1 and a concomitant recognition of the incoming government that a strong majority of the public thought the government had to take more ambitious action on climate change. This lasted throughout the term in office.

WIND_POL: By definition WIND_POL takes the highest value of CHG_GOV and MOOD and represents the MSF concept of a policy window opening in the politics stream. Given the sustained high support for more ambitious climate action throughout this period along with changes in government, a policy window remained open throughout.

2. Were the streams ready for coupling?

PRO_STR: When the new government's term started, no one in the policy community were framing OFW as necessary to solve any policy problems on the government's agenda. However, as the process tracing shows, it is likely that the TSO had already started framing the problem in 2016. In 2017S1, a few more actors started framing the lack of OFW as a policy problem that needed urgent action. Initially, agreement between the TSO and civil servants in the ministry of energy emerged in 2017. I calibrate PRO_STR ambiguously favourable at this point as the TSO and some civil servants in the department of energy (a key locus in energy policy making) had started problem framing on this matter. However, the scale of the problem was not yet agreed on as long as the nature and scale of the 2030 target remained up for debate. Over the course of 2018, as the 2030 RES-E target shifted from 55% to a mooted 70%, wider agreement in the policy community converged on the necessary and significant contribution that OFW would have to make to this. Over this period, different members in the policy community generated further reasons supporting this problem framing. This included projections by the ESRI that confirmed that deployment of OFW would only be marginally more expensive by

2030 and offer benefits to Irish grid congestion. By 2018/S2 I calibrate the problem stream as being unambiguously ripe for coupling as by this point agreement had spread beyond the department and TSO to the government (Cabinet) and influential experts within ESRI. This problem framing lasted for the remained of the period.

GOV_PRG: After the 2016 general election, the politics stream may be considered as largely unripe. The Fine Gael PfG did not explicitly include any commitments on supporting OFW, and the general government priorities did not align with potential technology-specific support either.

INGRP: The clearest shift in the politics stream during this period was the change in the wind industry's position on OFW. The wind industry first advocated for the possibility of meeting a 70% RES-E target by 2030, purely from onshore wind power. During 2018, IWEA started shifting its position, establishing explicit policy positions in favour of OFW, establishing working groups on the matter and gaining a larger membership with an interest in OFW. I calibrate INGRP as shifting to favourable from 2018S1 with a noticeable shift in IWEAs position over this period.

POL_STR: By definition, POL_STR is the average of GOV_PRG and INGRP and represents the MSF concept of the politics stream being ripe for coupling. The politics stream moves towards being more ripe in 2018S1 when the central interest group on the matter, IWEA, shift their support from being exclusively focused on onshore wind to supporting OFW.

SOL_PRICE: Between 2016S1 and 2017S2 the policy community was working out a solution for a new price support instrument. An acceptable solution was agreed with the publication of the high-level design of the Renewable Electricity Support Scheme in 2018S2.

SOL_GRID: The grid connection policy stream first ripened in response to a final push to reach the 2020 target. By 2018S1 the regulator confirmed the terms of an Enduring Connection Policy (ECP) that promised to be responsive to various policy goals, firstly the goal of reaching the 2020 target by prioritising 'shovel ready' projects and system services. From this point, a viable grid connection policy was again available for connecting wind and solar (in principle and subject to new and more frequently evolving terms).

SOL_MAR: Over the entire period, the marine planning policy stream remained unripe for coupling. Civil servants tasked with developing the bill had, by the end of the government's term, not yet produced a draft bill for parliamentary scrutiny.

POLY_STR: By definition, this set is the average of SOL_PRICE, SOL_GRID, and SOL-MAR and represents the MSF concept of the policy stream being ripe for coupling; i.e. when the policy community had issued technically feasible and normatively acceptable policy solutions to support OFW. In 2016, the policy stream was not ready for coupling for any of the three policy measures. The policy stream ripened in 2018 as different groups of policy makers devised general solutions for new price support and grid connection for wind energy.

3. Did a policy entrepreneur connect the streams?

ENTRE: I address policy entrepreneurship across all the noted policy areas together. The transmission system operator, Eirgrid, became an early policy entrepreneur for OFW in 2017. Delay in delivering its grid development strategy for 2025 and the confirmed expectations of significantly more renewable capacity required by 2030 drove this entrepreneurship.

ESRI adopted Eirgrid and ESB's positions that Ireland would not have sufficient space for onshore wind to meet an ambitious 2030 target. By 2018S2 ESRI added its analysis to the case for putting OFW on the agenda, officially shifting its long-held opposition to OFW based on economic grounds. It commissioned and conducted the economic analysis that demonstrated only a marginal price increase for consumers and the added network security benefits. ESRI research was key for civil servants in the DCCAE to have the confidence to proceed with building the policy case for offshore wind. Therefore, by the end of 2018 the system operator, ESRI and civil servants in the department of energy had reach a consensus that a significant contribution from OFW would be necessary to meet an emerging 2030 RES-E target. As a strong grouping in the policy stream shifted support to this, IWEA also shifted its long-held opposition towards actively advocating for OFW.

With the shift also came the need to drive this up the government agenda, i.e. on to the cabinet agenda and on to the agenda of other departments. It is only in 2019S1 that evidence emerges of the government taking an interest in progressing marine planning legislation. In this instance, the cabinet including the Minister of Energy, the Taoiseach, and Minister of planning started driving inter-departmental coordination to progress the MPDM bill. Up until then it was a few civil servants, working in isolation progressing the NMPF. Drafting of complex marine planning legislation lacked a policy entrepreneur until the cabinet took an interest when it became apparent that OFW would have a significant target within the Climate Action Plan and that accordingly, one of the key hurdles to its deployment (outdated marine planning legislation) had to be overcome. Following an all-of-government approach to taking this issue seriously, and in anticipation of actions from the Climate Action Plan, the affected departments assigned more resources to developing the legislation and collaboration between the departments of planning, energy, and fisheries improved significantly.

4. Did OFW make it on to agenda

AG_CHG: At the beginning of this period OFW was not on a single institutional agenda, but by the end it was on all the relevant institutional agendas, except for the legislature. It first appeared on the TSO's agenda (2017S2) when its long-term scenario planning indicated that the technology would be necessary to reach a 2030 target under a range of scenarios. After that it enters the Department of Energy's agenda (2018S1) through senior civil servants tasked with drafting the NECP that would formalise Ireland's legally binding target and layout a broad range of actions for reaching it. It enters the government agenda (2019S1) as the drafting of the final NECP and the CAP 2019 make it apparent that OFW would take on an increasingly important role in target attainment and that marine planning legislation will require high-level coordination to overcome institutional silos; most notably between the department of energy and the department of planning. With this, it also moves up the agenda of the department of planning (2019S1) as the demands of the renewable energy policy community drives the need for progress on the MPDM Bill via the cabinet's concern with progressing action on climate change. Shortly after it also spills over to the regulator's agenda (2019S2) with the need to confirm a connection policy for a sufficient number of wind projects to meet the proposed goal and with grid connection offers seen as a potential pre-requisite for participation in RESS auctions. For the legislature, the agenda status is more ambiguous. From 2018S1, OFW was a frequent point of discussion on the cross-party Joint Committee on Communications, Climate Action and Environment, in relation to 2030 target setting and the report from the Citizens Assembly on climate change. However, neither the government (working on the MPDM Bill) nor opposition parties had yet tabled a motion or a piece of legislation for the legislature to consider. It would not be until the following government took office that civil servants would bring the MPDM Bill to parliament.

5. Did policy on OFW change

The first policy shift with regards to OFW, was the government's target, set out in the climate action plan, to facilitate the construction of 3.5 GW of OFW by 2030 (2019S2). This was subsequently repeated in the final NECP as a means to reach the legally binding RES-E target. As the narrative clearly shows, adopting this target was in and of itself a substantial policy position.

In 2020S1 the regulator also officially announced its new policy on connecting OFW with a direction to the system operator to process grid connection applications for five 'relevant projects' separate from the ECP process through which the system operator processed grid connection applications for onshore wind and other technologies.

There is a noteworthy, but ambiguous change in policy for marine planning. Whilst civil servants were still working on the MPDM bill, the government published a statement on marine planning and what it called a 'transitional protocol' to progress the consenting of certain offshore wind projects in advance of the new bill becoming an act. It essentially defined a new category of 'relevant projects' as OFW projects where there had been some significant progress in developing them. I therefore judge condition CHG_MAR as ambiguous. However, it does not affect the calibration of POL_CHG.

6. Critical reflection on calibration

SOL_PRICE: The high-level RESS design signalled that the policy community had converged sufficiently on a particular type of price support instrument and some of the detailed technical terms for its implementation. However, the process tracing also reveals that key terms were still up for debate. For instance, the government did not commit to a technology-specific auction for offshore wind, posing it as one possibility alongside others. Innitially the government preferred a market-led transition to OFW. If the technology were to receive some preferential terms, it would be within the RESS floating FIP competitive auction framework. Similar to pervious episodes it raises a theoretical point for MSF on the classification of policy solutions and the political acceptability of technology specific terms within a given solution.

Appendix N – QCA recalibration of ambiguous cases

In this appendix, I provide justification for recalibrating cases where the set scores are ambiguous, i.e. where cases have a set score of 0.5 when rounding to the first decimal. I only recalibrate ambiguity that emerges for the higher-order sets used directly in the QCA; i.e. WIND_PR, WIND_POL, POL_STR, ENTRE. Although some statistical ambiguity arises for INDI and FB, the QCA does not directly utilise these sets. They form conceptual subsidiaries along with EVENT for the higher-order concept of WIND_PR which is used in the QCA. If any future study were to utilise INDI or FB individually in a QCA, then ambiguity would also have to be resolved at this level, prior to revisiting WIND_PR for any residual ambiguity.

WIND_PR

- 2001S1 – 2001S2 had a score of 0.52. I recalibrate these cases down; as more out then in (i.e. a policy window more closed than open in the problem stream). The narrative provides strong support for the fact that feedback on policy implementation failures for the chosen policy elements (price support, grid and marine planning) drove policy makers to develop new policies. However, taken together, these did not provide strong reasons for supporting OFW in particular over this period, because they do not account for the reasons against technology-specific policy support for the technology. Arguments about the cost differential between available renewable alternatives, most notably an abundant supply of cheaper onshore wind energy resource, and grid constraints to absorb OFW at scale, mediated the problem framing discourse. I adjust the cases down to 0.37 to match the subsequent cases 2002S1 – 2003S1 as the reasons above obtained consistently over this period.

- For three years, between 2003S2 – 2006S1, the calibration alternates several times between 0.44 and 0.56, around the point of maximum ambiguity. These shifts technically mean that a window opened and closed repeatedly if slightly. A return to a richer understanding of the case data underlying INDI and FB calibration (and their constituent sets) are necessary to adjust for this statistical ambiguity. One of the key points that stand out is that, although all three indicators became well established over this period in the framing of renewable energy policy problems, some appeared more influential in driving the priorities of policy makers. Renewable energy policy makers, and the government, did not weight the importance of these indicators equally (as this study's QCA does). Most important was the shift in policy makers' focus in 2004 to reaching the 2010 renewable energy target. This calibrated renewable energy policymaking efforts much more than emissions trajectory or energy import dependence. As long as policy makers estimated that Ireland would fall far short of the target and didn't have a worked out solution for getting back on track, the policy window remained open. With regards to feedback, an analogous dynamic is at play: feedback on the failures of grid connection policy, particular those provided during the moratorium on new wind grid connections and informing the Batch Processing Approach, was much more important in opening a policy window than feedback on the challenges with extant marine planning legislation. The narrative provides strong evidence that the coincidence of the grid connection moratorium and failure of the AER scheme opened a significant window for renewable energy policy. It was not until development of the REFIT was completed and the decision on Gate 2 was made that the reasons for frenzied policy activity decreased. I therefore recalibrate the ambiguous sets from 2003S2 – 2005S2 as 0.67. I recalibrate 2006S1 to 0.33 as the policy window largely closed with the completion of the REFIT development and consultation on Gate 2.
- 2008S2 has a score of 0.52. I recalibrate this case as 0.33; more out than in (i.e. a policy window more closed than open in the problem stream). Although averaging the underlying set scores provides an

ambiguous set score for this case, an interpretation of the qualitative data suggests that a policy window was more closed than open at this point. This matches the preceding temporal case 2008S1.

- 2014S1 - 2015S1 has scores of 0.45 – 0.52 over this period. I recalibrate these sets down; i.e. a policy window in the problem stream was more closed than open. This is because there is still uncertainty at that point on a) the extent to which delays in implementing the grid development plan (Grid 25) served as a Focusing event to favour OFW, and b) the extent to which policy makers saw the CO2 indicator as an opportunity to push OFW.

ENTRE

ENTRE averages out over the four constituent sets; ENTR_OFW, ENTR_PRICE, ENTR_GRID and ENTR_MAR.

- 2002S1 has a score of 0.5. I recalibrate it as 0.25 (more out than in) because Airtricity at the time had limited access as arguably the sole actor promoting policies to support OFW.
- 2007S1 – 2007S2 both cases have a score of 0.5. I recalibrate 2007S1 as more out than in (0.25) and 2007S2 as more in than out (0.75). This is to account for the ramp-up of Ryan's entrepreneurial activities in the coalition government and in his department. Given that there was also shortly after this (from 2008) evidence of significant policy entrepreneurship to reform marine planning legislation, it is likely that some of that may already have been going on in 2007S2 in the cabinet, especially as the Green Party also had the post for the DAFF at the time. However, in 2007S1, prior to the establishment of the new government, it is reasonable to assume that entrepreneurial agency (and associated action) was much more restricted. Although Ryan may already be counted as a policy entrepreneur for OFW prior to the formation of the new government (particular on the issue of having an OFW REFIT), it is only after his inclusion in the coalition government and his new position as Minister for the line department with the energy mandate, that he could exercise entrepreneurial agency over the REFIT.

- 2010S2 has a score of 0.5. I recalibrate this as 0.25, more out than in, as the evidence suggests that the main policy entrepreneurs, most notably Ryan, had already deprioritise the issue by then.
- 2018S2 scores 0.5. I recalibrate this as 0.75, as significant entrepreneurial influence was being exercised over this period by civil servants in the department of energy along with the system operator, and it is likely that this escalated the issue on the government's agenda, even if there were no entrepreneurs explicitly promoting an OFW price support instrument or marine legislation yet.

POL_STR

- 2007S2 – 2009S1 have a score of 0.5 because the average of the government programme in favour of wind (score 1) is offset by the balance of influence between interest groups (score 0). I recalibrate these cases as 0.6 (more in than out). The influence of Eamon Ryan as a political entrepreneur in the cabinet, in agreement with the advocacy points from NOW Ireland, means the politics stream was more ripe than not ripe.

Appendix O – QCA recalibration for outcome drift

In this appendix, I explain the rationale for adjusting cases' set scores for agenda change (AG_CHG) to account for temporal drift between cases. These were periods where there is strong evidence that changes in certain conditions led to a change in the agenda status of OFW, but where the agenda change falls in a subsequent QCA case. For instance, certain conditions may have changed between January and June of a particular year, but the associated agenda change only occurred somewhere between July and December. Or certain conditions changed between July and December, but the associated agenda change only occurred between January and June of the following year. Not all cases have to be checked for drift. The important periods are when there is a change in the agenda status of OFW; when it moves on to or off the agenda.

The qualitative narrative and initial QCA calibrations provide strong support for the general claim that OFW was more off than on the political agenda for two extended periods, roughly 1999S1 – 2007S1 and 2010S1 – 2017S2. Conversely, it was more on than off the agenda for roughly 2007S2 – 2009S2 and 2018S1 – 2020S1. The cases of interest are therefore those before and after the changes in agenda status. A closer look at the qualitative within-case data is the most sophisticated way to trace the changes of conditions associated with agenda change at these margins. I therefore consider the following pairs: 2007S1 – 2007S2, 2010S1 – 2010S2, 2017S2 – 2018S1.

To be clear, the objective of these interrogations are to see if the configurations in conditions in the first (prior) case in a pair explains the new agenda status in the subsequent case in the pair. Where this is the case, I adjust AG_CHG in the updated dataset to accommodate this explanation in the QCA analysis.

2007

It is worth noting that the adjustments for ambiguous set scores for policy entrepreneurship (ENTRE) for 2007S1 and 2007S2 already took account of the qualitative within-case data that aligned the shift in agenda status for OFW with the noted entrepreneurial activity. Please refer to Appendix B for this justification. There is therefore very little remaining drift to account for on this cusp.

The qualitative data clearly reveal how the general election in 2007S1 opened a policy window in the politics stream to get OFW on to the political agenda in Ireland.

Energy security, sustainability and competition featured far more prominently in Fianna Fail's manifesto along with several specific sectorial objectives (Fianna Fail, 2007). The Irish Green Party's election manifesto explicitly promised an offshore wind REFIT, and to "encourage investment" in a European offshore electricity transmission grid (Green Party, 2007). In the coalition formation negotiations, the Greens secured tempered coalition support for "examining the possibility of appropriate support measures for offshore wind" (Government of Ireland, 2007a). Importantly, Green Party deputy Eamon Ryan secured the Ministerial post for the Department of Communications Energy and Natural Resources (DCENR).

This all occurred in 2007S1. However, it was only in 2007S2 that OFW moved up the political agenda, as Eamon Ryan moved it on to the departmental and legislative agenda (through a new Oireachtas Joint Committee). In order to account for the fact that the conditions in 2007S1 were pivotal for the agenda change in 2007S2, I shift the CHG_GOV set score for 2007S1 to 2007S2.

It should be noted, However, that this only changes the WIND_POL set scores for these cases between 0.67 and 1, as for both cases the MOOD set scores are 0.67; i.e. public support for climate action was high. The adjustment therefore is one of degree rather than kind; i.e. a policy window in the politics stream opens wider for 2007S2 and slightly less wide for 2007S1.

2010

A closer inspection of the calibration of set scores for cases 2010S1 and 2010S2 reveal that the shift in OFW off the political agenda is already accounted for in the change in set scores of entrepreneurship (ENTRE) and problem stream ripeness (PR_STR) between the two cases. There is no noticeable temporal drift between the two cases; i.e. where the effects of shifts in conditions in 2010S1 are only registered in agenda change in 2010S2. No adjustments are needed.

2017

A closer inspection of the calibration of set scores for cases in 2017S2 and 2018S1 reveal that there are no noticeable shifts in underlying conditions from the prior set that explains agenda change in the subsequent set. Shifts in certain underlying conditions already happen to align temporally with the boundaries of the 2018S1 case. No adjustments are needed.

Appendix P – QCA skewness check

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[1] "Set WIND_PR - Cases > 0.5 / Total number of cases: 15 / 43 = 34.88 %"
 [2] "Set INDI - Cases > 0.5 / Total number of cases: 40 / 43 = 93.02 %"
 [3] "Set ENIMP - Cases > 0.5 / Total number of cases: 43 / 43 = 100 %"
 [4] "Set CO2 - Cases > 0.5 / Total number of cases: 32 / 43 = 74.42 %"
 [5] "Set RET - Cases > 0.5 / Total number of cases: 27 / 43 = 62.79 %"
 [6] "Set FB - Cases > 0.5 / Total number of cases: 17 / 43 = 39.53 %"
 [7] "Set FB_GRID - Cases > 0.5 / Total number of cases: 14 / 43 = 32.56 %"
 [8] "Set FB_MAR - Cases > 0.5 / Total number of cases: 26 / 43 = 60.47 %"
 [9] "Set FB_PRICE - Cases > 0.5 / Total number of cases: 21 / 43 = 48.84 %"
[10] "Set EVENT - Cases > 0.5 / Total number of cases: 13 / 43 = 30.23 %"
[11] "Set WIND_POL - Cases > 0.5 / Total number of cases: 24 / 43 = 55.81 %"
[12] "Set CHG_GOV - Cases > 0.5 / Total number of cases: 10 / 43 = 23.26 %"
[13] "Set MOOD - Cases > 0.5 / Total number of cases: 21 / 43 = 48.84 %"
[14] "Set PRO_STR - Cases > 0.5 / Total number of cases: 13 / 43 = 30.23 %"
[15] "Set POL_STR - Cases > 0.5 / Total number of cases: 9 / 43 = 20.93 %"
[16] "Set GOV_PRG - Cases > 0.5 / Total number of cases: 14 / 43 = 32.56 %"
[17] "Set INGRP - Cases > 0.5 / Total number of cases: 5 / 43 = 11.63 %"
[18] "Set POLY_STR - Cases > 0.5 / Total number of cases: 25 / 43 = 58.14 %"
[19] "Set SOL_PRICE - Cases > 0.5 / Total number of cases: 33 / 43 = 76.74 %"
[20] "Set SOL_GRID - Cases > 0.5 / Total number of cases: 24 / 43 = 55.81 %"
[21] "Set SOL_MAR - Cases > 0.5 / Total number of cases: 16 / 43 = 37.21 %"
[22] "Set ENTRE - Cases > 0.5 / Total number of cases: 16 / 43 = 37.21 %"
```

Full code for QCA analysis available in the supplementary files folder.