Governance for Affordable Energy:

What is the impact of demand-side governance on affordability of energy for domestic consumers in Great Britain?

Submitted by Thomas William Steward to the University of Exeter

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……..

For Lucy

We started out as a campaign organisation, but we've had to start doing support work because people have got in touch who are in need. There were quite a few people, particularly older and disabled people, who described wanting to kill themselves as a way out of waking up and feeling so miserable… and being stuck at home all day in the cold thinking "There's nothing, what's the point in being alive?"

Interviewee Sixteen - Policy Specialist,
Energy Consumer Advocate NGO

Abstract

Affordability of energy in the domestic sector is the product of three interrelated factors - level of household income, level of energy bills (which are a product of prices and levels of energy demand, mediated by tariffs and the retail market), and the amount of energy that a household needs to maintain a healthy living environment. This thesis focusses on the factors of affordability which are most relevant to the energy policy which are energy bills and energy efficiency, both of which are considered in the context of household income.

Affordability of energy in Great Britain is important for separate, but over-lapping reasons. Firstly, it has important political impacts - as energy prices continue to rise, energy is repeatedly highlighted as one of the biggest financial concerns for households (uSwitch, 2013; YouGov, 2015; DECC, 2014f), leading affordability of energy to become an increasingly political issue (Lockwood, 2016).

Secondly, affordability of energy has social implications which stem from the fact that the impact of rising energy bills is felt particularly strongly by those on low incomes and in inefficient homes – the fuel poor. In spite of it being twenty-five years since Brenda Boardman published her first book defining the issue of fuel poverty (Boardman, 1991), millions of households in Great Britain today still cannot afford adequate amounts of energy. This is significant because being able to afford access to basic levels of energy services such as warmth and light is essential for maintaining physical and mental health (Harrington et al., 2005; Stockton and Campbell, 2011).

Thirdly, affordability has important implications for design of the energy system –a system focussed on minimising long-term costs, both through micro-scale features such as efficient network revenue regulation which keep costs down on a year-by-year basis, and macro-scale aspects such as through the development of a low-demand, highly flexible energy system which has the potential to bring costs down in the long term (Sanders et al., 2016), is likely to differ from one which in which affordability is less of a focus, or only a focus over the short term.

This thesis responds to a gap in the literature in relation to the role that governance plays in affecting levels of affordability of energy for domestic consumers in Great Britain. It examines the impact of governance on energy prices and tariffs, and the impact of governance on energy efficiency of the housing stock in Great Britain. Both of these are examined in the context of levels of household income. Greater insight is gained by examining the impact of the energy governance structure in Denmark on Danish domestic energy efficiency standards, which are widely accepted to be very good (IEA, 2011).

This thesis makes use of existing academic and policy literature in tandem with data from fifty-six interviews with individuals from across the energy sectors in Great Britain and Denmark. The governance structure of energy in Great Britain is shown to be, on balance, not supportive of delivering affordable energy to domestic consumers. A number of specific issues within the current governance structure in Great Britain are identified. These include the presence of a limiting narrative, whereby policymakers consider affordability to be achieved principally through delivery of low prices; insufficient institutional capacity within OFGEM to keep network prices low, and monitor suppliers' costs and profits; lack of wholesale market transparency; an anti-interventionist ideology leading to weak energy efficiency requirements for new-build and private rental properties; suppliers as poor executors of energy efficiency policy; weak demand-side interests; tariffs designed around the needs of suppliers, not consumers; an over-reliance on an uncompetitive retail market; a lack of institutional capacity amongst policy makers regarding energy efficiency, and network regulation; and weak consumer representation.

A number of recommendations are put forward, including the fostering of a new narrative centred on energy efficiency; the redesign of tariffs to better protect the interests of consumers; the reallocation of responsibility for energy efficiency to local authorities; the development of greater institutional capacity among policymakers; the support for a more interventionist ideology supporting use of regulation; financial support for energy efficiency retrofit; the fostering of greater policy stability; development of new tariff structures; and the formation of a new consumer representative. Overall this thesis demonstrates that affordability of energy in unlikely to be delivered to domestic consumers in Great Britain unless significant changes are made to the governance structure of the energy sector.

Contents

List of Figures

Acronyms

ACE - Association for the Conservation of Energy

BEIS – Department of Business, Energy and Industrial Strategy

BIS - Department of Business, Innovation and Skills

BSUoS - Balancing System Use of System (charge)

CAB - Citizen's Advice Bureau

Capex - Capital Expenditure

CCC - Committee on Climate Change

CERO - Carbon Emissions Reduction Obligation

CERT - Carbon Emissions Reduction Target

CEPC - Climate and Energy Policy Committee

CESP - Community Energy Saving Programme

CfD – Contract for Difference

CHP - Combined Heat and Power

CMA - Competition and Markets Authority

CME – Coordinated Market Economy

CSCO - Carbon Saving Communities Obligation

CSE - Centre for Sustainable Energy

CSS - Consolidated Segmental Statement

DCLG - Department for Communities and Local Government

DECC - Department of Energy and Climate Change

DERA - Danish Energy Regulatory Authority

DNO - Distribution Network Operator

DWP – Department for Work and Pensions

ECA - Energy Consumers Australia

ECO - Energy Company Obligation

EEC - Energy Efficiency Commitment

EESoP - Energy Efficiency Standards of Performance

EII – Energy Intensive Industry

EPC - Energy Performance Certificate

EU - European Union

FiT - Feed in Tariff

FPAG - Fuel Poverty Advisory Group

GB - Great Britain

GDHIF - Green Deal Home Improvement Fund

GEMA - Gas and Electricity Markets Authority

GIB - Green Investment Bank

GoO - Guarantee of Origin

HEEPS - Home Energy Efficiency Programs for Scotland

HHCRO - Home Heating Cost Reduction Obligation

IHD – In Home Display

IMD - Index of Multiple Deprivation

IQI - Information Quality Incentive

KfW - Kreditanstalt für Wiederaufbau (KfW Banking Group)

kWh - Kilowatt-hour

LA - Local Authority

LCF - Levy Control Framework

LIHC - Low Income High Cost

LME – Liberal Market Economy

LSOA - Lower Layer Super Output Area

NEA - National Energy Action

OFGEM - Office of Gas and Electricity Markets

Opex - Operating Expenditure

OTC - Over The Counter

PCW - Price Comparison Website

PPA - Power Purchase Agreement

PPM - Prepayment Meter

RBT - Rising Block Tariff

REC - Regional Electricity Company

REGO – Renewable Electricity Guarantee of Origin

REV – Reforming the Energy Vision

RIIO - Revenue = Incentives + Innovation + Outputs

RMR - Retail Market Review

RO - Renewable Obligation

ROC - Renewable Obligation Certificate

ROCE - Return on Capital Employed

RPI - Retail Price Index

RUCO - Residential Utility Consumer Office

SAP - Standard Assessment Procedure

SC - Standard Credit

SO - System Operator

SVT - Standard Variable Tariff

TDCV – Typical Domestic Consumption Volume

TER - Target Emission Rate

TFEE - Target Fabric Energy Efficiency

TNUoS - Transmission Network Use of System Charge

Totex - Total Expenditure

VI - Vertically Integrated

VoLL - Value of Lost Load

WACC - Weighted Average Cost of Capital

WHD - Warm Home Discount

Acknowledgements

Although there is only one name on the cover, this thesis would not have come into being without the help and support of a vast number of people.

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Chapter 1 - Introduction: The Context of Governance and Affordability of Energy for Domestic Consumers in Great Britain

1.1 - Introduction

This thesis examines the impact of demand-side governance on affordability of energy for domestic consumers in Great Britain. In Great Britain, affordability of energy for domestic consumers is both a social and political issue. Energy bills have maintained an upwards trend from 2007 to the time of writing in 2016 (BEIS, 2016c), and the impact that this has had on the population has pushed energy up the political agenda (Lockwood, 2016), as well as leaving millions of households struggling to pay for adequate warmth (DECC, 2014a). Governance is broadly defined as the 'Rules of the game, and who is allowed to play' (for discussion of the term 'governance', see section 1.5), and is of particular interest because the governance of an energy system has a significant impact on outcomes and practices, including levels of affordability for domestic consumers (Lockwood et al., 2013). This thesis takes a demand-side approach to understanding governance, taking a bottom-up approach based on the costs which face consumers, with particular focus on the factors which affect the levels of demand of domestic energy consumers.

This opening chapter examines the existing literature relating to affordability of energy and fuel poverty to situate the research in the literature. The governance literature is then reviewed, and explanations for what 'affordability' and 'governance' can each be taken to mean in the context of this thesis. The research questions are then set out, and an overview of the thesis is given. This thesis was undertaken as part of the University of Exeter IGov Project (Innovation and Governance for a Sustainable Economy) between October 2012 and November 2016, with the majority of primary research carried out in 2014 and early 2015 – for this reason there is limited consideration of events from June 2016 onwards.

1.2 - Thesis in Context

Energy policy is commonly framed as the pursuit of three, often conflicting goals - sustainability, energy security, and affordability (DECC, 2014e). It is the third of these which is the focus of this thesis, however it is written in the context of a need to pursue the other two. In terms of sustainability, the UK has legally-binding targets to reduce CO_2 output by 34% by 2020, and 80% by 2050, compared to 1990 levels (HMG, 2008). The UK also has legally-binding targets to source 15% of all energy from renewables by 2020 (European Commission, 2009), and to reduce primary energy

demand by 18% compared to a 2007 business-as-usual projection, also by 2020 (DECC, 2014o). Energy security has less clearly defined goals, although in recent years 'ensuring the light's don't go out' has often become political shorthand for the pressures of energy security (DECC, 2014h). The priority of the three aspects of the trilemma shifts over time, with a significant focus on sustainability in the early 2000s: 'The Energy Review last year spelt out the big challenges we face: the need to work with other countries to tackle climate change by cutting greenhouse gas emissions, and the need to ensure we have secure energy supplies' (DTI, 2007, p.4). This gave way to a greater focus on energy security in the 2010s: 'Delivering energy security is the number one priority for DECC' (DECC, 2016a, p.8). Any policies put in place to support one aspect of the trilemma operate in the context of the other two objectives however. For example, the building of new coal-fired power stations might help to improve energy security, but would be highly damaging to the environment, and so would be likely to be considered unviable.

There are some technical solutions which support all aspect of the trilemma. For example, as will be set out throughout this thesis, increased energy efficiency standards can improve affordability of energy through reducing the amount of energy that consumers need (Boardman, 2009). However energy efficiency can also support sustainability through reductions in emissions (Pett, 2009; Ürge-Vorsatz and Tirado Herrero, 2012; Cullen and Allwood, 2010; DECC, 2012b; IEA, 2012) owing both to a reduced need for combustion of fossil fuels for energy, and a reduced need to construct additional generation and network infrastructure - which can be a carbon intensive and environmentally damaging processes (Varun et al., 2009). Energy efficiency also has benefits for energy security such as reduced dependence on imported fossil fuels (DECC, 2012b; OCN and ECOFYS, 2014; IEA, 2012), and reductions in peak electricity demand, so reducing risk of black-outs or brown-outs (Boardman, 2014; Hoggett et al., 2013).

1.3 - Why Does Affordability of Energy Matter in Great Britain?

Affordability of energy is important for separate, but over-lapping reasons. Firstly it has important political impacts - as energy prices continue to rise, energy is repeatedly highlighted as one of the biggest financial concerns for households (uSwitch, 2013; YouGov, 2015; DECC, 2014f), leading affordability of energy to become an increasingly political issue (Lockwood, 2016). Energy bills have also been identified by the Conservative think tank Policy Exchange as an issue of importance for those households which are 'just about managing', whom it is suggested may prove to be an important target for electoral success (Policy Exchange, 2015).

Affordability also has important implications for design of the energy system – a system focussed on minimising long-term costs, both through micro-scale features such as efficient network revenue

regulation which keep costs down on a year-by-year basis, and macro-scale aspects such as through the development of a low-demand, highly flexible energy system which has the potential to bring costs down in the long term (Sanders et al., 2016), is likely to differ from one which in which affordability is less of a focus, or only a focus over the short term.

Affordability of energy also has important social implications, stemming from the fact that the impact of rising energy bills is felt particularly strongly by those on low incomes and in inefficient homes – the fuel poor. In spite of it being twenty-five years since Brenda Boardman published her first book defining the issue of fuel poverty (Boardman, 1991), millions of households in Great Britain today still cannot afford adequate amounts of energy. This is significant because being able to afford access to basic levels of energy services such as warmth and light is essential for maintaining physical and mental health (Harrington et al., 2005; Stockton and Campbell, 2011). Older households are particularly at risk of the effects of a cold home, with increased risk of heart attack, strokes, respiratory problems, depression, worsening arthritis, and increased accidents such as falls (AgeUK, 2015). The recommended indoor temperatures for maintaining a healthy living environment is 21°C in the living room and 18°C in the other occupied rooms (World Health Organisation, 2007; DECC, 2015a). The effects of unaffordable energy are felt particularly acutely by those on low incomes, as these testaments from interviews by Anderson et al. (2010) demonstrate:

> *"It's hard at the moment because I'm on just a small budget and I find that we're having to sit in the cold because if the money runs out on the meter, you haven't got any more money to put on it."*
>
> (Lucy, not working, single, living with 12-year-old granddaughter)

> *"…If we know we've got a bill coming up, then we know that we can't get extra food or something. So, we sort of chop down the food bill."*
>
> (Colin, retired couple)

> *"…It's not very nice when you're having to worry about money all the time. You know, everyone wants to be warm, don't they? But it's just what you have to do. If you haven't got the money, you can't, can you?"*
>
> (Emily, young single mother, not working, living with her son)

In spite of some small price cuts in 2015 (see Figure 1), the general trend of energy retail prices over the past decade has been of significant increases - 30% for the average gas consumer, and 16% for the average electricity consumer since 2007 (Dempsey et al., 2016). During this time, average

household income fell between 2007 and 2012, and only recovered to 2012 levels in 2016 (ONS, 2016). Although there are significant issues with measuring affordability (discussed below), the closest government figures to measurement of affordability (those of fuel poverty) showed that in 2013, the most recent year where aggregate figures for Great Britain are available, approximately 4.2 million households in Great Britain had to spend more than 10% of their income to maintain a healthy living environment (DECC, 2015a).

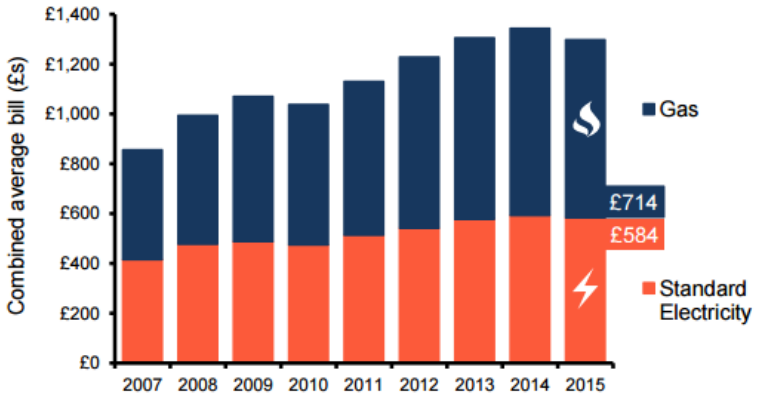


Figure 1 - Average energy bills 2007-2015, non-E7 domestic consumers (assuming fixed demand), Source: BEIS, 2016c

If energy prices continue to follow this upward trend, issues of affordability (and associated welfare impacts) will continue to worsen. This is unless significant changes can be made to the energy system to protect and improve affordability of energy for domestic consumers. This thesis sets out to establish what those changes should be, specifically in relation to the governance structure of the energy system.

1.4 - What is 'Affordable'?

Defining affordability presents a challenge for academics and policy-makers because what might be considered 'affordable' can be seen as subjective (Owen, 2010), and normative (Feitelson and Chenoweth, 2002; Niëns and Brouwer, 2013) - attitudes vary among different consumer groups as to what may be considered 'affordable' (Palmer et al., 2008). This can lead to use of vague framings for affordability such as 'reasonable prices for all users... [with] ...provision of services for those who cannot afford it under normal market conditions' (Bartl, 2010: 227). Such definitions are difficult to apply however because they give no explanation of what is considered 'reasonable', what ‘normal market conditions’ are, or what level of service should be provided to those who cannot otherwise afford it.

1.4.1 - Measuring Affordability

Many scholars attempt to address issues of definition by creating quantitative metrics of affordability. Some use a ratio of expenditure on energy against *disposable* income (He, Xia, Liu, Zhou & Zhou, 2013, Winkler et al., 2011). This however frames energy as a non-staple item. Other scholars make use of expenditure on energy as a proportion of *total* income (Niëns and Brouwer, 2013; Gan and Hill, 2009; Fankhauser and Tepic, 2007; European Bank, 2003; Hancock, 1993), this appropriately assesses energy as an item which must be purchased but household income data rarely capture all sources of household income (Fankhauser and Tepic, 2007). This is why Fankhauser & Tepic (2007) suggest that using expenditure on energy as a proportion of total *expenditure*, rather than income, gives a more accurate picture. However, any measure based on actual expenditure risk underestimating issues of affordability as they will not capture instances of late or non-payment (Fankhauser et al., 2008), and also fail to capture where households may be under-heating their homes - something which is common in Great Britain (CSE, 2011). As living in a cold home is associated with significant health risks such as physical and mental ill-health (Harrington et al., 2005; Stockton and Campbell, 2011), any metric of affordability which does not capture those that under-heat their home, fails to take account of some of households that suffer most from being unable to afford their energy bills (See Box 1). This is why measures of fuel poverty are based on *necessary,* rather than actual expenditure (see below).

Box 1 - Comparison of two households with differing heating regimes

Household 1	**Household 2**
Heats home to 21°C	Heats home to 14°C
Income: £600 per month	Income: £600 per month
Expenditure on Energy £50 per month	Expenditure on Energy £50 per month
Spends 8.3% of Income on energy & has a healthy heating regime	Spends 8.3% of Income on energy & faces significant health risks

Measurement of affordability is of interest to policy-makers because it allows them to track levels of affordability over time. This allows them to ensure the needs of consumers are being met, and to measure the efficacy of policy measures. Measurement of affordability is also necessary for effective targeting of policy measures, in order to identify those who face the biggest financial challenge in meeting their energy needs. In Great Britain, this group of consumers are known as the 'fuel poor'.

1.4.2 –Measuring Fuel Poverty

Beyond monitoring of average bill levels, the government in Great Britain does not measure general affordability of energy. It does however monitor levels of fuel poverty but the metric used to identify them has changed over time. The measurements resemble the measures of affordability set out above, but also include thresholds, below-which households are considered fuel poor.

1.4.2.1 – Fuel Poverty: The 10% Measure

Boardman (1991, 2009) gives a detailed account of the history of fuel poverty, explaining how it was first identified as an area of public concern following the oil shocks of the 1970s. However a succession of British governments considered fuel poverty as indistinct from general poverty (often called income poverty), arguing that an inability to afford energy is no different from an inability to afford food or clothing (Boardman, 1991). Although it is true that general poverty and fuel poverty are related, they are not equivalent to one another. Figure 2 and Figure 3 show the overlap between households facing fuel poverty (based on those needing to 10% or more of their income in order to maintain a healthy living environment), and households facing income poverty (generally recognised as having an income below 60% of the median) (Palmer et al., 2008). Box 2 gives a written explanation of the differences in the effects of income poverty and fuel poverty on a household.

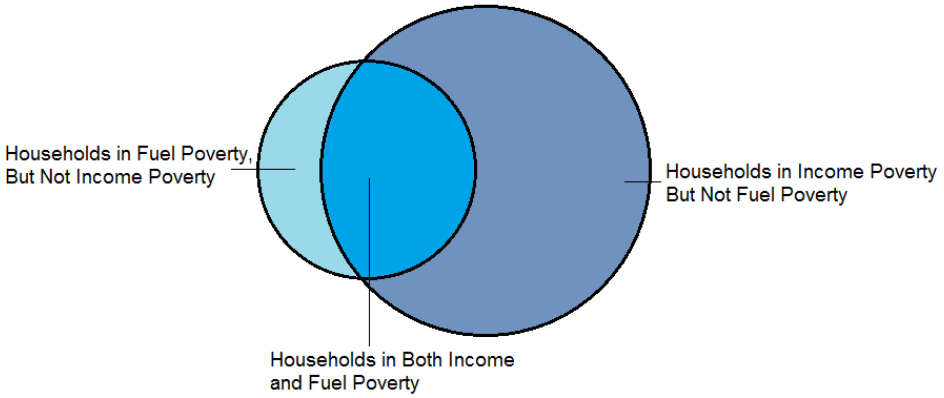


Figure 2 - Overlaps Between Income Poverty and Fuel Poverty – Before Price Increase, Source: Palmer et al., 2008

If energy price rises outstrip wage increases, the diagram will shift, meaning that although the number of households in income poverty will not change, the number of households in fuel poverty will increase.

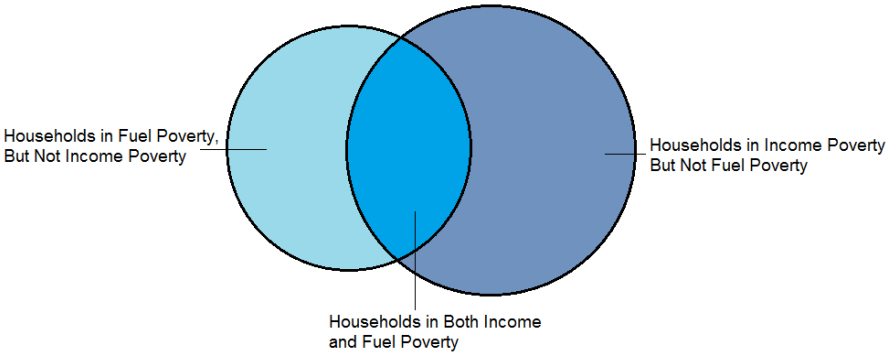


Figure 3 - Overlaps Between Income Poverty and Fuel Poverty – After Price Increase, Source: Palmer et al., 2008

Box 2 – Explanation: Why is Fuel Poverty Distinct From General Poverty?

Fuel poverty is unique, and distinct from general poverty, as this example demonstrates.

In a universe where people buy and use only what they need:

If you are well off, and the price of bread goes up, it is inconvenient but you have many options. You may be able to get cheaper bread by shopping around. Alternatively, you can substitute bread in your diet for potatoes, rice or pasta, or you can simply accept that prices have increased and pay more.

If you are on a low income, and bread prices increase, it is inconvenient but you have a few options. You may be able to get cheaper bread by shopping around. Alternatively, you can substitute bread in your diet for potatoes, rice or pasta.

However, energy is different…

If you are well off, and the price of energy goes up, it is inconvenient but you have many options. You may be able to get a cheaper tariff by shopping around. Alternatively, you can invest in a range of energy efficiency measures such as a more efficient boiler, loft insulation, cavity wall insulation, energy efficient light bulbs, double glazing etc. Finally, you can simply accept that prices have increased, and pay more.

If you are on a low income, and the price of energy goes up, you *may* have a few options. You are less likely than your well-off counterparts to know how (or indeed that you can) shop around for a cheaper energy tariff (Anderson et al., 2010). You may also not have access to the cheapest deals in the market either because you do not have access to the internet or because the type of meter you have prohibits you from accessing the cheapest deals (TNS and OFGEM, 2015). Being on a low income, you are unlikely to have sufficient income, or savings, to pay for energy efficiency measures (Boardman, 2009), and if in rental accommodation you are unlikely to have the option to improve the buildings' fabric (Golubchikov and Deda, 2012). Being on low income, you will also be unable to simply accept prices have increased and pay more. With energy there is almost no substitute like swapping bread for potatoes. The only option that is clearly at your disposal is to consume less energy - it's as if in response to the price of bread going up, your only clear option was to eat fewer meals.

The framing of fuel poverty as equivalent to income poverty continued until Labour came to power in 1997, and policy work on quantifying and addressing fuel poverty as a distinct issue began. The first official definition of fuel poverty was put in place in the early 2000s, based on the work of Boardman (1991). The definition relied on calculating the number of households that needed to spend 10% or more of their income to maintain a healthy living environment, including a minimum healthy heating regime. The new focus on levels of fuel poverty led to the creation of the Warm Homes and Energy Conservation Act (HMG, 2000b), and later the first fuel poverty strategy (see chapter 3).

1.4.2.2 - Fuel Poverty: The 'Low-Income, High-Cost' Measure (LIHC)

A review of the 10% measure was commissioned in 2011 by the Coalition government (Hills, 2011). This led to the replacement of the 10% measure in England (although not in the devolved administrations) in 2013 with the Low Income High Cost (LIHC) measure, devised by Hills (2012). The new measure defines those in fuel poverty as households with earnings (after housing costs) that put them below the poverty line (set at 60% of median income), with an above-median required expenditure on energy in order to maintain a healthy living environment.

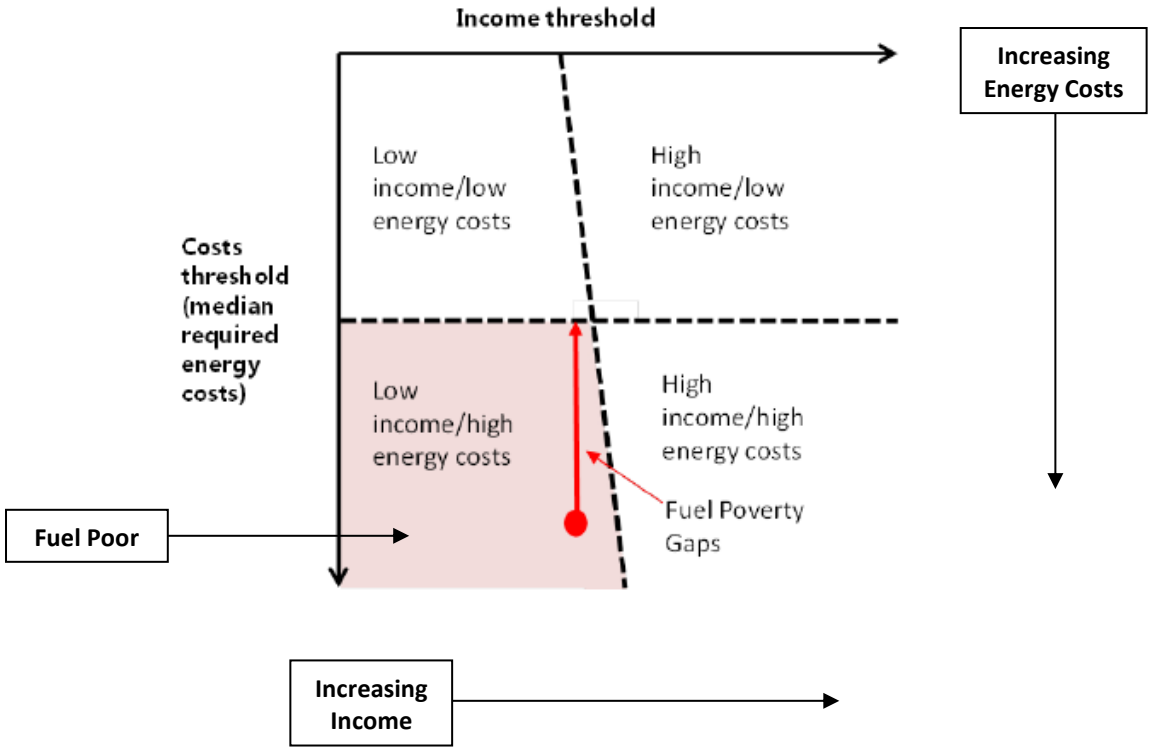


Figure 4 - Low Income High Cost Threshold Diagram, Source: DECC, 2013b

Figure 4 shows a diagrammatic representation of the LIHC measure of fuel poverty. The vertical axis represents modelled necessary cost of energy based on achieving a healthy heating regime. This

takes into account the size and efficiency of properties, the number of people in the household, and the cost of energy. The households facing higher costs are at the bottom of the diagram, and the households facing lower costs are at the top. The threshold is set at the median required cost of energy.

The horizontal axis reflects the income of households, with higher incomes on the right-hand side and lower incomes on the left. An after-housing costs figure is used, and the threshold is set in line with the measure of income poverty; which is 60% of the median income. The cost of the energy bill is added, so its effects are not double-counted.

This means that the bottom left quadrant represents the combination of those with above average costs who are also deemed to be in income poverty, which together under this definition qualify them as fuel poor. Put simply this means that households are considered fuel poor if:

- They have required fuel costs that are above average (the national median level).
- Were they to spend that amount, they would be left with a residual income below the official poverty line.

(DECC and BRE, 2016)

This has the effect of making income poverty a prerequisite to fuel poverty (See Figure 5), which differs from the 10% measure (See Figure 2 and Figure 3).

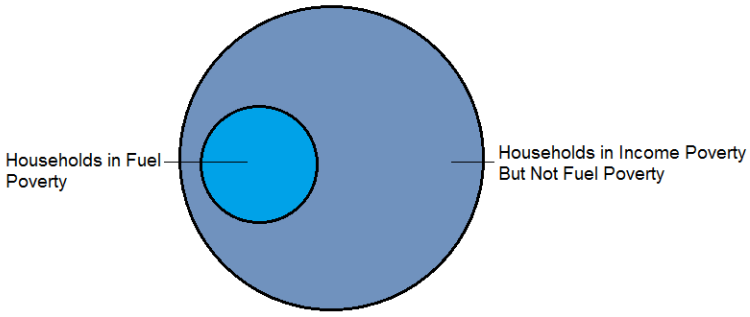


Figure 5 - Overlap Between Income Poverty and Fuel Poverty Under LIHC Measure, Source: Author's Own

The thick red arrow on Figure 4 represents the fuel poverty gap. This represents the distance below the fuel poverty threshold that a household exists, and is equivalent to how far the household's energy bill would have to fall for it to move out of fuel poverty. This means that a household with a fuel poverty gap of £3 only just qualifies as fuel poor, whereas a household with a fuel poverty gap of £300 is deep in fuel poverty. The fuel poverty gap can be reported as an average figure, or as a total figure, alongside the number of households in fuel poverty. This gives an indication of the severity of fuel poverty that households are facing – i.e. if there are many households facing a small fuel poverty gap, or a small number of households which are deep in the depths of fuel poverty.

Both the 10% measures, and the LIHC measure use *necessary* expenditure to achieve a healthy living environment, rather than actual expenditure, and so avoid the issues faced by the above-explored quantitative measures of affordability which rely on actual expenditure, such as missing under-heated homes.

The LIHC definition is not without its shortcomings however. This measure makes the headline figure, the proportion of the population that is fuel poor, far less responsive to changes in energy prices than the previous 10% measure (see Figure 6). This is because of its relative nature and may be considered counter-intuitive given 'Sharp price rises exacerbate budgeting difficulties for all consumers, particularly for low-income families, where fuel is already a large proportion of expenditure' (Boardman, 1991, p.20). Although rising prices do affect the majority of households, it falls most heavily on those on low incomes - between 2002 and 2012, spending on energy by those in the richest quintile increased from 2%-3% of their disposable income, whereas for those in the poorest quintile, the increase was from 8% to 11% over the same period (ONS, 2014). It is counter-intuitive therefore to suggest that significant price rises will have such a limited effect on the reported number of households that face difficulty meeting their energy needs.

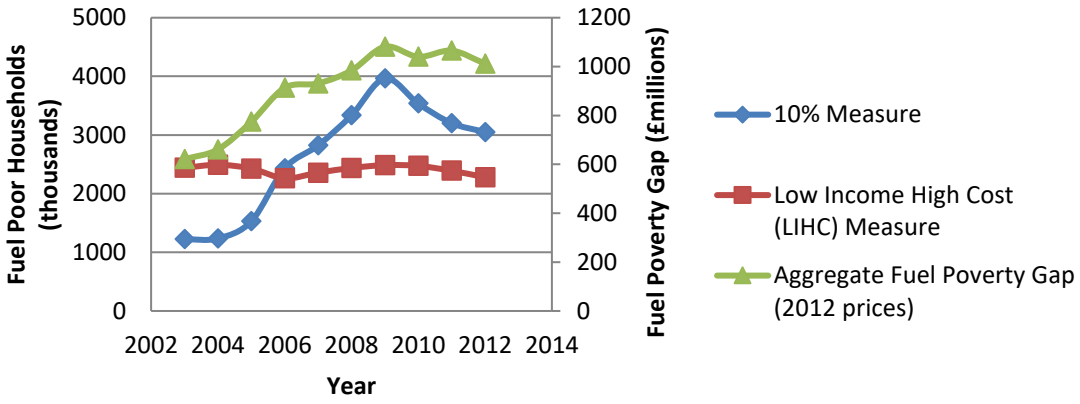


Figure 6 - Severity of Fuel Poverty in England Over Time by Indicator, Source: Based on figures from DECC, 2014a

In addition to a lack of responsiveness, the impact of price rises can have other counterintuitive outcomes under LIHC. It would be possible, under a universal price increase, for a number of high-income households to move into fuel poverty, but without any low-income households moving into fuel poverty. This is because although fuel costs affect both the vertical, and horizontal position of a household on the axis, a households' vertical position is based on a relative measure (median necessary expenditure). This means that under a universal price rise, all households spending will increase by the same rate – keeping their relative vertical axis position fixed. However, the horizontal position is based on the combination of a relative measure (60% of the median income) and an absolute measure (the impact of energy costs on that household's income). This means that a

price increase can move a household from having an above 60% of median income, to below. This is set out in Figure 7, which shows the possible impact of a price increase on a 'Low-Income Low-Cost' household and a 'High-Income High-Cost' household. A metric which depicts an energy price rise leading to a high-income household moving into fuel poverty, but the same price rise not moving a low-income household any closer to fuel poverty is highly counterintuitive.

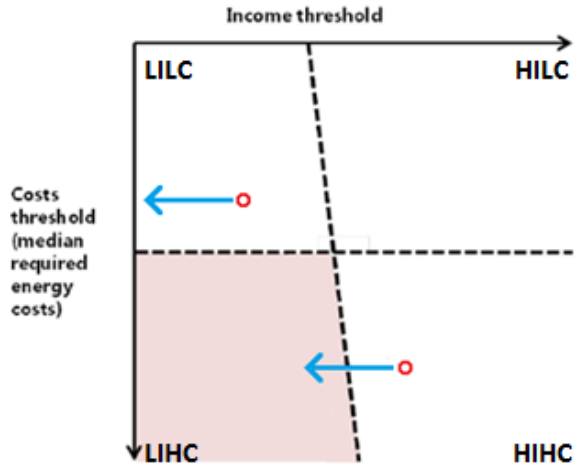


Figure 7 - Impact of Price Increases on Different Households, Source: Author's Own

The new measure does however bring some benefit in the form of the 'depth' measurement, which gives some perspective of how severe the situation is for those that are facing fuel poverty. This arguably gives a more nuanced picture than the simple 'in/out' of the 10% measure. The depth measure *does* change with increasing prices (See Figure 6), however, both the fuel poverty gap, and the definition for fuel poverty are significantly less straight forward to communicate and therefore risk making levels of fuel poverty less transparent (Preston et al., 2014), making them harder to communicate to policy-makers and the public.

A number of reasons were given for this change in measurement from using the 10% measure to the LIHC, that the 10% measure was over-sensitive to changes in price, risked labelling those on high incomes with particularly large old properties as fuel poor, and gave no incentive to improve the situations of those whose lives could be made better, even if they could not be easily lifted out of fuel poverty (Hills, 2011). The introduction of the new measure also had political implications. Firstly its introduction in 2013 had the effect of instantly reducing the most up to date figure for the number of households considered in fuel poverty at the time by approximately 800,000[1] (DECC, 2013b) which improved the appearance of fuel poverty figures. Additionally, as the change of metric made the headline number of fuel poor households considerably less sensitive to price changes, it is

[1] This refers to the 2011 value, because fuel poverty figures are published two years in arrears.

therefore unlikely to change dramatically from year to year. This may serve to reduce political pressure on the government to address the issue – even in the face of rising prices.

The new measure was accompanied by a removal of the 2016 target to eradicate fuel poverty (HMG, 2013c), which was later replaced by a 2030 target based on improving energy efficiency for fuel poor homes, and there are a number of possible reasons this. For example, the high levels of fuel poverty in the lead-up to 2016 made eradication highly unlikely (in 2013, over two million households were in fuel poverty in England, over four million households across the whole of Great Britain (DECC, 2015a)).

Additionally, the relative nature of the new measure makes fuel poverty under the new definition practically impossible to eradicate (CSE, 2012), meaning that an eradication target would no longer be viable. This is because the LIHC definition of fuel poverty is related to the average cost of energy, meaning that for fuel poverty to be eradicated, every household in poverty would have to have below-average energy costs. This is particularly challenging to achieve because any bill reductions, either through improved energy efficiency or energy bills discounts, would cause a shift in the median bill level, which could move other households into the fuel poverty quadrant even if these reductions were perfectly targeted at fuel poor households (See Figure 8 for a depiction of changing axis following deployment of targeted energy efficiency measures, perfectly targeted at LIHC households). Increasing the incomes of fuel poor households would have a similar effect along the X-axis, pulling other households into income poverty. It is not clear if the 2016 target was removed because the design of the new definition made eradication impossible, or if the new target was designed to make eradication impossible so that the removal of the 2016 target could be justified. However, the political benefit to policymakers of the day should not be overlooked.

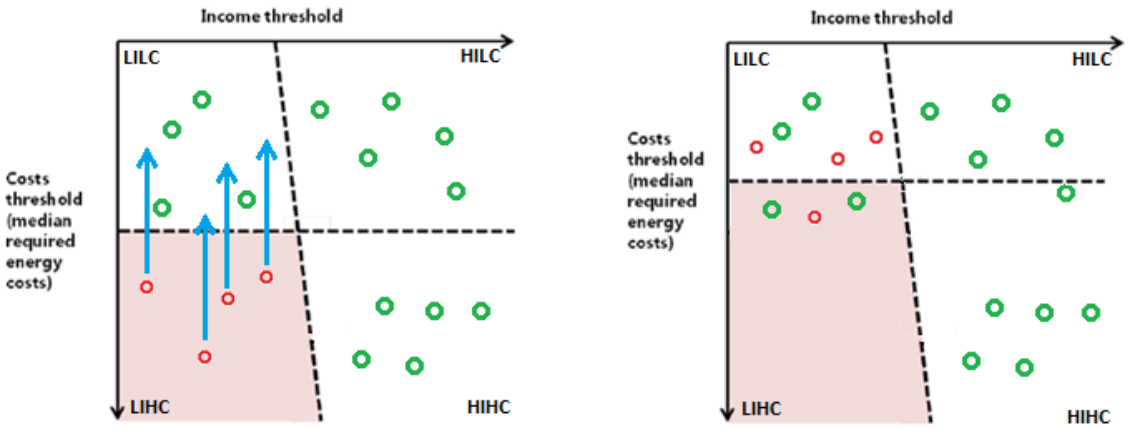


Figure 8 - Impact of Improved Energy Efficiency on Levels of Fuel Poverty Under LIHC Definition, Source: Author's Own

It is worth noting that neither measure of fuel poverty takes account of specific tariffs in their modelling, relying instead on average prices by payment type (DECC and BRE, 2016). The range of tariffs available in the retail market is significant - at the time of writing the difference between the cheapest and most expensive tariff in the market was in excess of £400 at typical consumption levels (uSwitch, 2016), this is likely to lead to a distorted picture of fuel poverty – depicting the circumstances of those on the cheapest tariffs as worse than they are in reality, and those on the most expensive tariffs as better than they are.

This thesis will not seek to define a new method of quantifying fuel poverty, and will therefore where necessary make use of published figures, but will generally take a broad view of fuel poverty as 'a social problem that affects the poor, with its roots in the quality of the housing stock and the cost of fuel' (Boardman, 2009, p.1).

1.4.3 - Affordability in this thesis

The common themes that emerge from the above analysis of affordability of energy show that it principally is the product of three factors - level of household income, the level of energy bill, and the amount of energy that a household needs to maintain a healthy lifestyle. The relationship between income and energy policy is complex; policies to improve income are generally connected with macro-economic or social welfare policy - such as levels of taxation or income support. This means that although income forms an essential part of the context to understanding affordability of energy, the policies which affect income generally lie outside energy policy, and therefore beyond the boundaries of this thesis. The exception to this is where income is increased for the express purpose of supporting the purchase of energy - such as in the winter fuel payment (discussed in chapter three).

Energy bills are the combination of prices (driven by various policies and practices in the energy supply chain) – see chapter two, and the amount of energy that a household consumes – see chapter three. The energy tariff mediates the relationship between energy prices, and a household's energy demand – commonly expressed as a price per unit of energy consumed – see chapter two. As will be set out in this thesis, each of these features of the energy bill are heavily influenced by the governance structure in place in the energy system.

The amount of energy a household needs to live healthily is affected by a number of drivers such as day-to-day behaviours (e.g. wearing additional layers of clothing, turning off lights when leaving a room etc.), number of household occupants, climatic conditions, property size, social trends, and domestic energy efficiency standards (Yohanis et al., 2008). The last among these, domestic energy efficiency, is one of the main factors which are most relevant to discussions of affordability, and in

reference to energy policy. It is important to note that although there is a close relationship between energy need, and actual energy demand (a driver of the energy bill), they are not necessarily equal - such as when households under-heat their homes.

Therefore, affordability of energy is considered to be a product of three interrelated factors - level of household income, level of energy bills (which are a product of unit prices and levels of energy demand, mediated by tariffs) and the amount of energy that a household needs to live healthily. However, the factors of affordability of energy which are most relevant to energy policy in this thesis are energy bills, and energy efficiency, both considered in the context of household income. This thesis will examine the impact of governance on each of these drivers, as summarised below in Table 1.

Table 1 – Impact of governance on drivers of affordability focussed on in this thesis

Impact of governance on:	**Investigated in this Thesis?**
Prices	✓
Tariffs	✓
Income	✓ / ✕ [Context, not central consideration]
Energy Efficiency	✓
Social Trends	✕
Day-to-day behaviours	✕
Climate	✕
Household Size	✕

1.4.4 - Affordability vs. Fuel Poverty

It is important to note that although issues of fuel poverty overlap considerably with issues of affordability, they are not equivalent to one another. Just as the fuel poor are a subset of the whole population, this thesis understands fuel poverty as being conceptually nested within affordability (See Figure 9), but affordability is a much larger concept. This is because factors affecting general affordability pertain to the whole population, whereas factors affecting fuel poverty relate specifically to the fuel poor.

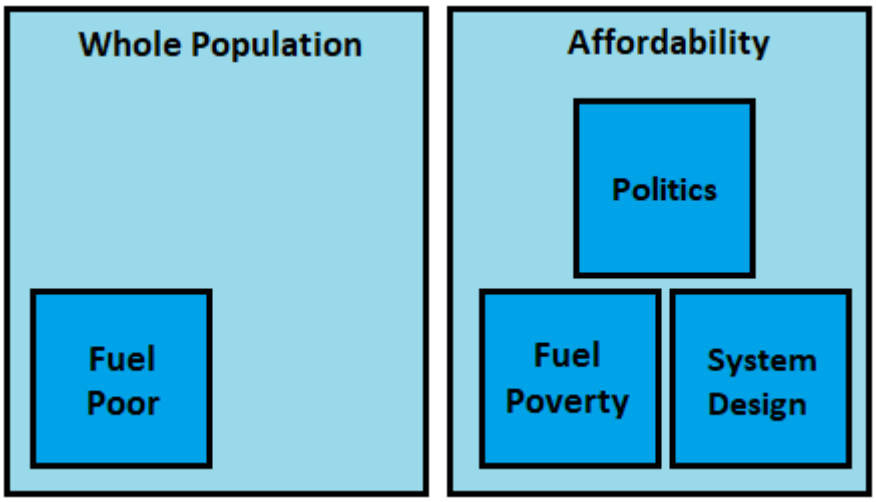


Figure 9 - Fuel Poverty as a Nested Phenomenon, Source: Author's Own

The difference between fuel poverty and general affordability lies in who is affected, and the wider implications this has. For example, if energy prices increase, this affects the whole population – including the fuel poor, therefore it worsens both fuel poverty and affordability. Crucially also, because a rise in energy prices affects the whole population, not just a smaller (possibly politically less engaged (JRF, 2015; Weeks, 2013; IPPR, 2013a)) subgroup, the political implications are different – it is likely to lead energy bills to become more politically salient (Lockwood, 2016). If energy bills are high because the system structure does not minimise costs and demand, this is an affordability issue. However, if cuts are made to energy policies designed to support the most vulnerable, or if policies are designed that exclude poor or vulnerable consumers, this affects fuel poverty. There are inevitable areas of overlap between fuel poverty and affordability, however it is important to make the distinction between the two because the governance issues and solutions pertaining to general affordability may differ from those relating specifically to the fuel poor.

1.5 - The role of Governance

There are numerous factors which affect affordability of energy for domestic consumers, however, there is little in the literature which examines the overall impact that the governance structure has on affordability of energy for domestic consumers. The closest work is that of Boardman (2009) who sets out some of the core governance challenges to addressing fuel poverty – noting that there is no single institution or government department with the explicit obligation to ensure fuel poverty targets are met, and that the targets themselves are weakly defined – with no clarity over the term 'reasonably practicable' which is fundamental to assessing if the fuel poverty target has been met. Boardman (2009) also identifies the cross-departmental nature of the causes of fuel poverty affecting both housing, and energy, and health, and that this can create a barrier to progress.

This thesis aims to address the significant gap in the literature joining affordability of energy for domestic consumers and the governance of the energy sector. To do this effectively, the term 'governance' should be explored, and what it means for this thesis set out.

1.5.1 - Governance as Government

Formerly, governance was considered to be limited to the actions of government, and so analysis of governance in the literature was focused on governmental institutions at all levels. Sovacool (2011) shows this approach to consider government as a 'nested hierarchy' whereby international and national governments exist above regional or state governments, which in turn exist above city-level governments. However, governance is now increasingly understood to reach beyond forms of top-down control had by government (Folke et al., 2005) to other institutions (Smith, 2007), meaning the understanding of 'government as governance' has largely been replaced by a broader understanding (Florini and Sovacool, 2009).

This shift is in large part owed to the increasing importance of the international environment, and the 'arguably diminished capacity of those governments to insulate their economies and societies from the global pressures' (Peters and Pierre, 1998, p.223). The effects of the international environment are in of themselves of course not a new development, and do not necessarily lie outside traditional understandings of governance (for example through the influence of the European Union). However the increasing impact of less formal lines of influence, such as international capital markets, trans-national companies, Non-Governmental Organisations (NGOs), civil society, and new communications media, may be said to have an erosive effect on a government's exclusive control over its national territory (Hirst et al., 2009). This has progressed to the point where some institutions, such as large multi-national corporations, may be suggested to have become even more powerful than state actors (Newell, 2006), however governments still remain key actors in any governance structure (Newell, 2006).

1.5.2 - Institutions

Institutions are another widely-discussed factor of governance, however there is much variation in how exactly they are defined. Some scholars consider institutions to be individual actors (Kern, 2011; Bernstein, 2005; Meadowcroft, 2011, 2007) or collaborating groups of actors (Biermann et al., 2012; Florini and Sovacool, 2009). Networks formed by institutions can be formal, or informal temporary collaborations or sharing of resources between actors working towards a common goal (Loorbach, 2010). These networks often span sectors and scales, and work to influence the creation, implementation, and monitoring of policy (Koliba et al., 2011).

Institutional capacity can have a significant impact on outcomes of a governance system - transition to a more efficient, lower carbon energy system cannot take place without having the appropriate institutions in place, who are both supportive of transition, and who have the right capacities/resources (Varone and Aebischer, 2001; Golubchikov and Deda, 2012; Grubb et al., 1991; Lockwood, 2013; Kuzemko et al., 2016), and operate at the appropriate level to support their goals (i.e. international, national, regional or local) (Mallaburn and Eyre, 2013; DECC, 2014c; Grubb et al., 1991). Wilson, Chryssochoidis and Pettifor (2013) highlight the significant role that some institutions can play in supporting greater energy efficiency in a very practical sense - highlighting that those in the building trade can help to trigger decisions, and provide information to households regarding possible energy efficiency improvements.

Decision-making Institutions can sometimes bear 'engrained' ways of operating or thinking (UNEP, 2001), which lead them to support the status quo (Goldthau and Sovacool, 2012), a type of 'institutional lock-in' (Unruh, 2000) can develop. This means institutions can have a material effect on if and how transitions (such as that to a more sustainable, or affordable energy system) come about (Meadowcroft, 2011).

Institutions may not necessarily be actors, but formalised legal and political frameworks, such as laws, regulations or markets (Biermann et al., 2012; Shleifer and Vishny, 1997; Pahl-Wostl, 2009; Brousseau et al., 2011). Although often formalised, institutions are not necessarily always so (Pahl-Wostl, 2009; Goldthau and Sovacool, 2012; Brousseau et al., 2011). Formal institutions are 'linked to the official channels of governmental bureaucracies... codified in regulatory frameworks or any kind of legally binding documents... [and] enforc[able] by legal procedures' (Pahl-Wostl, 2009: 356). Whereas informal institutions can be framed as 'socially shared rules such as social or cultural norms...[generally] not codified or written down... enforced outside of legally sanctioned channels' (Pahl-Wostl, 2009: 356). The nature of an institution as formal or informal is likely to have an impact on the speed and fashion in which change may be brought about. Formal institutions can change as the result of direct engagement such as through lobbying (Brousseau et al., 2011), however informal intuitions may be considered as more 'slow moving' (Roland, 2004) and less likely to change as the result of direct negotiation (Brousseau et al., 2011). There are examples of informal institutions being altered by means of direct action however, such as when conscious steps are taken to alter the culture within an organisation or industry.

1.5.3 - Paradigms & Ideologies

The mix of institutions that exist in a governance structure are both the result of, and drivers for, other aspects of governance. New institutions are created, or come about, in relation to the

dominant 'ideas' (Hall, 1993) or ideologies of the time, and then go on, alongside paradigms (Kuzemko et al., 2016), to affect choices around policy instruments (Kern, 2011).
Paradigms can be defined as 'informal guiding principles' which generate an 'internal logic and selection environment which exclude non-compatible approaches' (Pahl-Wostl, 2009, p.355), or 'interpretive frameworks' through which both policy objectives, and the policy instruments which may be used to attain them, are viewed (Hall, 1993). Kuzemko et al. (2016), Lockwood et al. (2013), Grubb et al. (1991) all demonstrate the impact that paradigm can play in outcomes. They suggest that the dedication to a neoliberal paradigm, characterised by support of market mechanisms over direct intervention, that exists in Great Britain is slowing the pace of transition to a decarbonised energy system. Dedication to particular forms of policymaking can become heavily embedded in the governance system, meaning these ideas can 'emerge as orthodoxy, taken for granted, and highly self-referential' (Kuzemko et al., 2016, p.99). This can lead to ideology overriding evidence and channelling decisions by policy-makers (Metcalfe, 1993). Helm (2003) argues that the widespread privatisation of formerly nationally owned industries which dominated the nineteen-eighties and nineties occurred as a result of a shift in paradigm – the belief that the most effective means of driving the economy was through governmental ownership and control of industry was replaced by the view that private companies and market mechanisms were more effective.

Soskice & Hall (2001) demonstrate the role that paradigms can take in steering decision-making though their work on 'Varieties of Capitalism'. They argue that there are principally two forms of capitalism - Liberal Market Economies (LMEs) such as the US and UK, and Co-ordinated Market Economies (CMEs) such as Germany and Denmark. LMEs follow a neo-liberal market paradigm, reliant upon markets, and arm's-length relationships for trade. CMEs follow a model of greater social democracy, with a greater level of direct interaction and collaboration between actors in order to build core competencies. The UK's status as an LME may have a material impact on which policy options are viewed as viable, and which are 'locked out' (Kuzemko, 2013; Mitchell, 2008), and so this may go some way to explaining why Denmark and Germany (CMEs) have made greater progress toward decarbonisation than either the UK or the US (LMEs) (Kuzemko, 2013).

1.5.4 - Power

A key pillar of governance is power. Relative power of different institutions can affect outcomes of existing systems of governance (Geels, 2010), as well as the evolution of future governance systems (Acemoglu et al., 2004). This is because 'different actors do not have equal power or strength. They have unequal resources (e.g. money, knowledge, tools) and opportunities to realise their purposes and interest, and influence social rules' (Geels, 2004, p.909).

There are many forms of power, derived from differing sources. An actor may have power because of their position, or by having power bestowed to them (Acemoglu et al., 2004), or because of the resources they possess are particularly large, or important (Acemoglu et al., 2004; Newell, 2006). Positional power is not always explicit, for example the White House Chief of Staff John Sununu, a climate-change denier, was in a position to decide which views on the costs of abatement technologies President Bush should be exposed to (Newell, 2006). Power is likely to have a substantial impact on the transition to an affordable energy system because change is most challenging in systems that 'give dissenters substantial powers to delay or block it' (Grubb et al., 1991, p.916). Regulatory capture is an effect of power which is particularly problematic for affordability of energy in the domestic sector. This is because wherever regulation is captured (Laffont and Tirole, 1991), it is done so by politically effective interest groups, which are usually producers or sections of the regulated industry, rather than consumers (VelJanovski, 2012). Consumers are likely to be less able to mobilise into politically active collectives (See: Olson, 1965). That is not to say that consumers are entirely without power, democratic governments respond to the attitudes and actions of consumers, who are also voters (Fuchs and Lorek, 2005; Grubb et al., 1991; Lovell et al., 2009; Lockwood et al., 2016). However, that does not imply that all groups of the population wield equal power – although, as set out above, affordability of energy is gaining greater political salience (Lockwood, 2016), given that those on low-incomes are less likely to vote than their higher income counterparts (JRF, 2015; Weeks, 2013; IPPR, 2013a), there is lower political incentive for policy-makers to protect the interests for those on low incomes (IPPR, 2013a), this is likely to have an effect on the allocation of resources to protecting the interests of the fuel poor.

Ultimately governments have power of final decision over introduction of policy, however the governance structure is now broader than simply the institutions of government, and that other actors can often levy considerable power against government to affect policy decisions (Mitchell, 2008).

Therefore, for the purposes of this project, a broad definition of energy governance is taken: 'The dynamic network of power and relationships between actors at all levels, and other institutions, operating within a particular political paradigm, which lead to outcomes and practices including (although not limited to) levels of affordability of energy in the domestic sector'. This definition can be broadly summarised as governance being **'The rules of the game and who is playing, in relation to affordability of energy'.** This broad definition is chosen to give space to establish which features of governance are most relevant in discussions regarding affordability of energy for domestic consumers in Great Britain, and how outcomes are affected. This is consistent with the view of

governance used by the Innovation and Governance for a Sustainable Economy (IGov) project to which this PhD was attached - summarised in Figure 10.

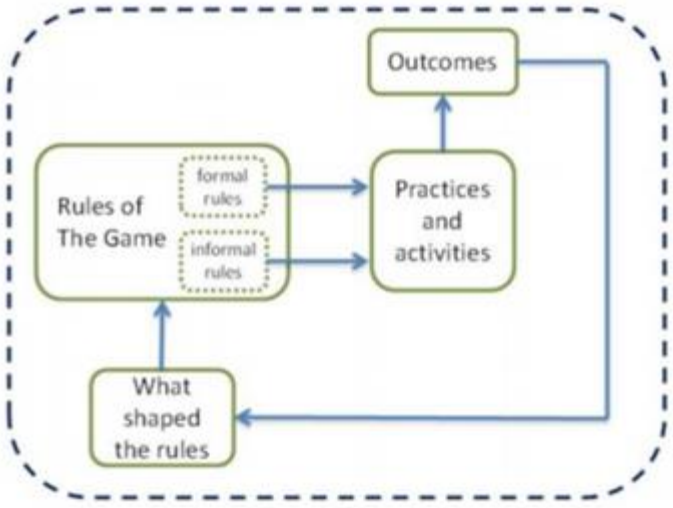


Figure 10 – IGov Understanding of Governance

Source: Mitchell, 2014

This means that this thesis will examine the impact of each of the features of the governance structure (the actions of government, the role of other actor and non-actor institutions, power, ideology, and paradigm), on the aspects of affordability of energy more relevant to energy policy (energy prices and tariffs, and energy efficiency).

1.6 - Key Actors in the Governance Structure

Having defined the term 'governance', it is worth setting out the key actors within the current governance structure. An explanation of the energy value chain is included in chapter two, but an overview of the role of those institutions which have a bearing on levels of affordability of energy for domestic consumers in Great Britain is set out here as it forms part of the context to the thesis.

Suppliers

The retail market in Great Britain is dominated by six large energy supply companies (referred to as the Big Six – British Gas, EDF, Eon, RWE Npower, Scottish Power and SSE), which are responsible for the sale of gas and electricity to a wide portfolio of customers. In 2016, the Big Six supplied ~87% of the domestic electricity market and ~86% of the domestic gas market (OFGEM, 2016f). These Big Six suppliers were formed from the several regional electricity companies (RECs), and the one national gas supplier which existed prior to privatisation of the gas industry in 1986, and electricity industry in 1990 (Helm, 2003). Prior to liberalisation of the market, it was not possible to shop around for an alternative energy supplier, this means that the Big Six are left with a number of legacy customers. A

number of new firms have also entered the market since privatisation, many of whom have grown quickly. In 2016, these small and medium sized suppliers held 13% of the domestic electricity retail market, and 14% of the domestic gas retail market (OFGEM, 2016f). In March 2016, there were 43 suppliers operating in the retail energy market, the majority of which offered both electricity and gas (OFGEM, 2016f).

In order to become a supplier, a firm must be granted a supply licence (GEMA, 2015). This sets out a number of requirements for suppliers to adhere to, including (but not limited to) listing the industry codes that suppliers are required to follow, requirements around conduct, billing, tariffs, methods of payment, and theft of power (OFGEM, 2015g). Many suppliers also operate a gas shipping function (responsible for the purchase of gas and its movements across the gas network), and operate their own electricity generation assets - in 2014, the Big Six owned ~70% of the electricity generation capacity in Great Britain (OFGEM et al., 2014). Some suppliers also own and operate either network companies, or gas production operations.

Network Companies

Networks are made up of the cables and pipes that bring electricity and gas respectively, to consumers. The institution which owns and operates each of these stretches of cable or pipe, known as a network company, varies depending on the scale and location of the pipe or cable in question. They operate as regulated monopolies, and so are subject to a complex arrangement of price control regulation, which affects the costs that go into consumers' energy bills. There are seven electricity network companies, and six gas network companies. The charges for running the electricity and gas networks are passed onto consumers via suppliers in energy bills. Ownership and operation of a network is also a licensable activity – meaning that all network companies are required to adhere to a licence which sets the standards for their operation.

The Department for Business, Energy and Industrial Strategy (BEIS)

The Department for Business, Energy and Industrial Strategy (BEIS) is the arm of the government which oversees the energy sector. It states its purpose relating to energy as 'Ensuring that the country has secure energy supplies that are reliable, affordable and clean' (BEIS, 2017:Online). To this end, it is the department responsible for setting a wide breadth of policies relating to the generation and consumption of energy in Great Britain. Prior to its inception in 2016, BEIS' duties were split between the Department of Energy and Climate Change (DECC) and The Department for Business, Innovation, and Skills (BIS). The secretary of state for BEIS is empowered to give guidance

to OFGEM on social and environmental matters (OFGEM, 2013d), which could be viewed as undermining OFGEM's independence as a regulator.

Office of Gas and Electricity Markets (OFGEM)

With the privatisation of the electricity and gas industries, new regulators were created – the office of electricity regulation (OFFER) and Office for Gas Regulation (OFGAS). OFFER had three main duties (a, b and c below) and OFGAS had just two (a and b below) - this difference reflecting the different structures under which the two industries were privatised. These duties were set out in the 1989 Electricity Act (HMG, 1989), and the 1986 Gas Act (HMG, 1986), respectively.

a. To secure that all reasonable demands for electricity (gas) are satisfied.
b. To secure that licence holders are able to finance the carrying on of the activities which they are authorised by their licence to carry on.
c. To promote competition in the generation and supply of electricity.

(HMG, 1989, 1986)

OFFER and OFGAS were merged in the Utilities Act in 2000 (HMG, 2000a) to create OFGEM, and it was at this time that a number of duties were introduced, including the primary duty to protect the interests of current and future consumers of mains-fed electricity and gas wherever appropriate by promoting effective competition between generators and suppliers of electricity/gas (HMG, 2000a). Although this meant that duties a and b (above) became secondary to the principal duty, this demonstrates the significance for OFGEM of the promotion of competition - as a codified pillar to its approach to consumer protection.

The Utilities Act (HMG, 2000a) also required OFGEM to carry out its principal duty with regard to the interests of individuals who are disabled or chronically sick, individuals of pensionable age, individuals with low incomes, and individuals residing in rural area. It is specifically noted however that '…that is not to be taken as implying that regard may not be had to the interests of other descriptions of consumer'(HMG, 2000a, p.7). Given OFGEM's primary duty to protect all consumers, is it not clear what additional value is provided by a secondary duty to protect particular groups of consumers.

In the 2010 Energy Act (HMG, 2010b), OFGEM's duties were further clarified to include that reduction of greenhouse gasses, and maintaining security of supply were both also facets of the consumer protection set out in the primary duty. This left OFGEM in effect with a primary duty to meet all aspects of the energy trilemma. This inevitably means that OFGEM is forced to make trade-offs between competing aspects of consumer protection.

In addition to those relating to the trilemnna, OFGEM's other duties include the regulation and monitoring of the licenced operations of firms operating in the gas and electricity wholesale and retail markets (OFGEM, 2013d), monitoring of firms' conduct in wholesale markets under the European Regulation on Energy Market Integrity and Transparency (REMIT) (OFGEM, 2015j), and the revenues and operation of the licenced distribution and transmission operators of both the gas and electricity networks (See: OFGEM, 2010). OFGEM is also responsible for setting the regulation of various government schemes such as the energy company obligation (ECO) (See: OFGEM, 2015).

OFGEM was designed to be an independent regulator (Kuzemko, 2014), free from political interference, however BEIS has some official powers over OFGEM, such as to veto proposed licence changes (Bohne, 2011). This, along with the definition of OFGEM as a department of government (OFGEM, 2013d), and the Secretary of State's power to offer guidance to OFGEM (OFGEM, 2013d), may limit the degree to which OFGEM is truly isolated from political pressures. Indeed there is evidence of OFGEM managing some code modification processes with regard to network charges for small generators in a way which appears to be in response to Governmental pressure (Cornwall, 2017). In addition, ultimately parliament has the power to abolish OFGEM, as was proposed by Labour in 2012 (Flint, 2012) – this potentially gives government significant power over OFGEM. All this means that although OFGEM was initially designed to be independent from the political process, the government appears to be both able and willing to exert significant political pressure over OFGEM.

European Union

The European Union has a range of legislation in place which requires certain policies or policy designs to be put in place in member states. For example, various directives such and the Renewable Energy Directive (European Commission, 2009), or the Energy Efficiency Directive (European Commission, 2012a), require member states to operate policies in pursuit of increased deployment of renewable energy sources and energy efficiency measures respectively. There are also EU-level regulations to guard against market abuse in wholesale energy markets (OFGEM, 2015j), and state-aid rules which give the European Commission the power to investigate and brand unlawful any policies which may be considered to constitute state aid to a particular industry or firm (European Commission, 2012b). The Eco-Design directive (European Commission, 2014a) also sets energy efficiency standards for a number of domestic appliances. Interestingly, much of the energy policy which exists at the European level was inspired by British approaches to policy and regulation (Bohne, 2011).

Citizen's Advice Bureau (CAB)

The official consumer advocate role within the energy sector is undertaken by the Citizen's Advice Bureau. The role has shown a trend of consolidation; it began as separate bodies for electricity and gas, but through a number of stages has been combined with other institutions and since 2014 has been the responsibility of the CAB (CAB, 2015)[2]. The CAB today provides direct support to consumers, provides comments and consultation responses relating to policy changes, and represents consumers at code review panels (GEMA, 2014). This involvement in code panels is the CAB's only formal place in the policy-making process however.

Citizens - Consumers/Electorate

Citizens are an implicit part of the governance structure, and take a number of roles. Citizens as consumers are responsible for paying energy bills which fund the costs and profits of the energy supply chain, as well as a number of social and environmental policy costs. It is also consumers which engage (or not) in the retail market, and many consumers face fuel poverty. The sentiment of citizens as voters is likely to have an impact on the actions of policymakers. Although not all groups are equally likely to vote, and feel the impact of outcomes of the governance structure differently, impacts upon them is likely to influence those active in the governance structure.

Other Institutions

There are myriad other institutions who have some involvement in the Governance structure affecting affordability of energy for domestic consumers in Great Britain, in their impact on the amount of energy that households consume – such as the building industry, landlords, and manufacturers of domestic appliances. Their roles and impacts of these other institutions will be set out in the body of this thesis wherever pertinent.

1.7 - Research Questions

Having set out the context to the research, it is now possible to set out research questions. The central question which this thesis sets out to examine is:

> *What is the impact of demand-side governance on affordability of energy for domestic consumers in Great Britain?*

In order to carry out the research, the central question is broken down into separate research questions. These are based on the understanding of affordability of energy set out above. To add richness of understanding, a comparison will be made with the governance structure in another

[2] For a more detailed overview of this evolution of consumer representation in Britain - see appendix I.

country. Denmark was selected because of its high standards of energy efficiency (IEA, 2011). The research will then be used to inform policy recommendations. The four research questions which form the foundation of this thesis, based to the factors of affordability, are:

1. Are current governance arrangements regarding pricing and tariffs supportive of affordability of energy for domestic consumers in Great Britain?

2. Are current governance arrangements regarding domestic energy-efficiency supportive of affordability of energy for domestic consumers in Great Britain?

3. What lessons may be learned from the Danish system of energy governance which may be beneficial to affordability of energy for domestic consumers in Great Britain?

4. How might the governance structure in Great Britain be reformed to improve affordability of energy for domestic consumers?

1.8 - Thesis Overview

This thesis departs slightly from a traditional thesis structure. Instead of having a number of chapters dedicated to setting out the existing policy and academic literature to lay foundations for the primary research, the analysis of the governance structure will also be carried out throughout the opening chapters, alongside review of the literature. This is done both to avoid large amounts of repetition, and because there is very little in the literature which focuses on the governance arrangements relating to those matters discussed in chapters 2 and 3. Therefore, these chapters will examine existing literature in a new light – through a governance lens. This means that they will contribute significantly to findings and offer new insight regarding governance and affordability, rather than primarily offering a review of the existing literature.

Following this introductory chapter, chapter two applies a governance lens to literature regarding the impact of pricing and tariffs on affordability. The different costs contained within domestic electricity and gas bills in Great Britain are broken down into wholesale costs, network costs, supplier costs, VAT, and environmental and social policy costs. The governance of the drivers behind these costs are examined, along with their relative impacts on affordability. The impact of governance on the nature of the retail market, consumer engagement and tariff design is also explored in this chapter.

Chapter three applies a governance lens to literature regarding drivers of energy demand, and policies relating to energy efficiency. The fuel poverty strategies from each of the administrations in

Great Britain are then set out, followed by a review of the impact of governance on income policies designed to support spending on energy.

Having examined the policy literature through a governance lens, primary research is undertaken. Chapter four sets out the research methodology that is employed to carry out this primary research, based on 56 semi-structured interviews with a range of stakeholders from across the energy sector in both Great Britain and Denmark. The chapter also highlights possible methodological dangers, how ethical considerations were addressed, and closes by setting out the research questions which are investigated in this thesis.

Chapter five sets out the results from the data collection and analysis for Great Britain, grouping data from interviewees into themes in order to bring clarity to the large amount of data collected. This chapter highlights that there are significant governance issues affecting policies both around prices, and effective deployment of energy efficiency measures. It is suggested that the current design of tariffs is not supportive of affordability, particularly for the fuel poor. A significant reliance upon a highly competitive retail market in order to deliver affordability is also highlighted as an issue, along with a lack of long-term policy-making, and an absence of effective consumer representation. Energy suppliers' role as the primary conduit for delivery on energy efficiency policy are also shown to have negative impacts on affordability of energy for domestic consumers in Great Britain.

Chapter six sets out the results from data collection and analysis in Denmark, as well as setting the context of the Danish energy system. Research in Denmark focussed on energy efficiency, as Danish energy efficiency standards are widely accepted to be very good (IEA, 2011). The governance structure in Denmark is characterised by a tradition of consensus-building and collaboration, both across Governmental parties, and between government and industry. This enables long-term policies to be put in place, supporting a high degree of investor confidence, enabling Danish firms in the energy efficiency sector to succeed on a national, and international level. There are stringent energy efficiency regulations in place for both new-build homes, and retrofitting, the latter of which is supported by detailed information for households regarding renovation opportunities, as well as structures to support access to affordable finance. The findings in this chapter suggest that much can be learned in Great Britain from the Danish approach to energy efficiency.

Chapter seven brings together the findings from the governance-focussed examination of the literature in chapters 2 and 3, with the findings from the research in Great Britain and Denmark. It sets out that there is much that may be altered in the governance structure to support affordability of energy in the domestic sector in Great Britain. Central to this is the development of a new policy

narrative, which would both support and be supported by the introduction of new building and rental regulations; reassignment of responsibility for energy efficiency to local authorities, fostering of a more powerful demand-side lobby, and stronger consumer representation. Tariffs reforms are also proposed to help ensure that all households to support access to basic amounts of energy by all consumers, and mechanisms to make energy efficiency measures more easily accessible are also included. The fostering of higher levels of institutional capacity among policy makers in proposed, along with transition away from current pro-market ideologies. Finally, a pathway to more stable policy regime is set out.

Chapter eight concludes the thesis by summarising the findings of the research, and answering each of the research questions in turn. Limitations of the research are then examined, followed by possible avenues for further research. Concluding remarks are also given.

1.9 - Conclusion

This chapter has laid the foundations for the thesis, establishing the context to the research, and what the terms 'affordability' and 'governance' may be taken to mean in the context of this thesis, and why each of thesis is important in Great Britain. The research questions that this thesis will address were also set out in order to guide the research. The structure of this thesis going forward will be based on the framing of affordability – breaking down the impact that governance has on the two primary facets of affordability of energy which relate to energy policy – bills and energy efficiency. The following chapter will then break the first of these down further, examining the impact of governance on wholesale costs, network costs, policy costs, VAT, supplier profits, retail markets, and tariff design. This will be followed by chapter three which examines the role of governance in standards of domestic energy efficiency.

Chapter 2 – Governance Behind Energy Bills in Britain: Costs, Prices and Markets

2.1 - Introduction

This thesis breaks affordability down into its constituent parts, and this chapter examines the first part – energy bills, tariffs, and the retail market and the impact that governance has on each of these. This chapter will examine existing information through the lens of governance, and will form and important contribution to the overall findings of the thesis. To this end, it will set out the role of governance in the range of drivers behind the different costs which come together to make the domestic energy bill, and the nature of the different tariffs which are available in the market - these are the different price offerings from suppliers which consumers are able to choose between. Finally, it will go on to examine the nature of the retail market, such as the level of competition, and consumers' switching behaviour.

2.2 - Energy Bills in Great Britain

2.2.1 - Makeup of Energy Bills

Before examining the various cost drivers within the bill, it is necessary to set out the nature of domestic energy consumption. Virtually every household in Great Britain is connected to the main electricity network to access power for devices and appliances, and approximately 85% of households make use of the gas grid to provide energy for space and water heating (CAB, 2014). Those households that rely on other fuels for space and water heating make use of electricity (9%), Heating Oil (4%), Solid Fuels (1%), District Heating (1%), and LPG/Bottled Gas (1%) (Baker, 2011)[3]. Due to limitations in time and resources, discussion of cost drivers will focus on electricity and gas. This captures the costs affecting 94% of households' heating fuel supply, and ~100% of households' electricity supply. It is worth noting however that those homes which rely on fuels other than mains gas generally face a much higher cost of warmth than those connected to the main gas network (Fuel Poverty Advisory Group, 2013), albeit some consumers experienced an uncharacteristic reversal in this trend in 2016 owing to a fall in the wholesale oil price (Energy Saving Trust, 2016b). Discussion in later chapters regarding levels of demand applies equally to all households - irrespective of their heating fuel. In Great Britain, the median household with access to gas consumes considerably more gas than it does electricity – at the time of writing in 2016, typical

[3] NB. These figures do not sum to 100% owing to rounding, and reliance upon a range of data sources.

consumption levels stand at 3100 kWh of electricity per year, and 12500 kWh of gas per year (OFGEM, 2015c), this is based on an average from the previous two years (OFGEM, 2013b) (although there is significant variation in consumption levels between households, see Figure 24).

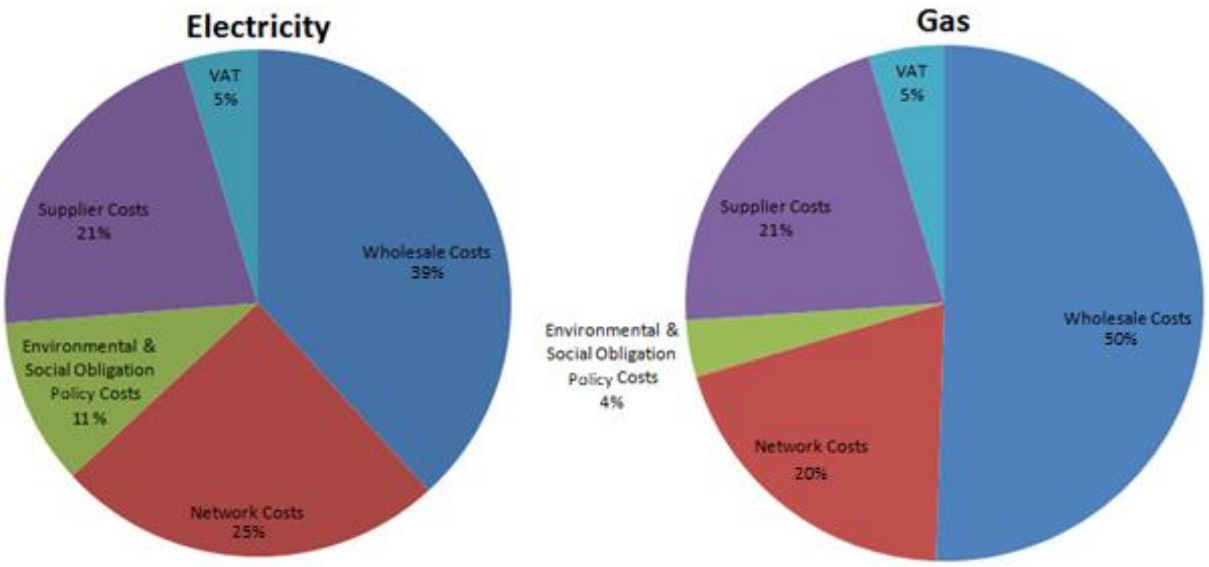


Figure 11 - Cost Breakdown by Bill Type, Source: Author's Own based on figures in OFGEM, 2015a[4]

Energy bills represent the sum of a number of different charges, primarily relating to the constituent costs of the energy supply chain. These may be divided into five categories:

- Wholesale cost of energy represent the costs faced by the supplier for purchasing the energy to be supplied to the customer - in the case of electricity this is the cost of purchasing electricity from the generator, or the electricity market. In the case of gas this is the cost of purchasing gas from the upstream operator or importer, or on the gas market. This charge includes any profits made by the firms selling the energy to suppliers. The level of these costs, and the way they are passed on to consumers are affected by the design and function of the wholesale market – a feature of the governance framework.
- Network Costs represent the costs faced, and profits made, by both the transmission and distribution companies for the transport of electricity and gas to the customer. The level of these costs is affected by the framework of regulation designed to keep these costs low – a feature of the governance framework.
- Environmental and Social Policy Costs pay for a range of schemes such as funding energy efficiency measures and subsidising low-carbon forms of electricity generation. The scale

[4] For a detailed breakdown of different charges in the average bill, see appendix J.

and design of these charges, and their place in the bill are a product of the governance structure.

- Supplier Costs are the costs faced, and profits made, by the company that purchases the gas and electricity, and carries out billing and metering services for customers. Suppliers' costs and profits, and the way they are passed through to consumers is a product of the governance structure.
- Value Added Tax (VAT) is set at 5% for the supply of domestic electricity and gas. This level, and the way it is charged is a product of the governance structure.

The constituent charges in bills are important to affordability for a number of reasons, beyond simply that their sum and magnitude affect costs for consumers – some of them, notably environmental and social policy charges, carry particular political significance. There is often a focus by some politicians and areas of the media on the impact of social and environmental policy costs on energy bills. For example, headlines such as "Green policies to add up to 40pc to cost of household electricity" (The Telegraph, 2014) are not uncommon. Also, reductions in subsidies for renewable generators, announced in 2015 were justified on the basis of reducing their impact on energy bills (DECC, 2015c), in spite of this cut only being expected to save £2 in the average domestic energy bill in 2017-2018 (HM Treasury, 2015b). This political focus on social and environmental charges comes in spite of their only being responsible for 7% of the average dual fuel bill (OFGEM, 2015m). This inevitably leads to less scrutiny of the remaining 93%, but all charges in the bill should be examined to ensure affordability of energy is supported.

Not all charges fall equally on each fuel. As can be seen in Figure 11 the proportions of the different charges vary considerably between electricity and gas, with some charges, such as those for environmental and social policy obligations, featuring considerably more prominently on the electricity bill. This has substantial negative implications for those consumers who rely on electricity to meet all of their energy needs (i.e. including space and water heating), who already have a high cost of warmth and therefore may be at greater risk of falling into fuel poverty.

2.2.2 - Comparing Energy Prices in Europe

Before examining the details of the charges behind electricity and gas bills, it beneficial to put the level of these costs in context with other countries. Figure 12 and Figure 13 below set out the average price (calculated to include standing charges) of electricity and gas per kilowatt hour (kWh) in a number of European countries (not taking into account purchasing power parity). As can be

seen, although the UK[5] is not entirely out of step with average for the EU-28[6], it is in the upper third of countries for electricity prices. For gas, it is approximately in the middle of the ranking, and is below the EU-28 average. It is important to note that the ranking of average prices is not equivalent to ranking of energy bills in different countries, this is affected by other factors such as levels of domestic energy efficiency - of which Great Britain is noted to have one of the worst in Europe, leading it to have some of the highest bills in Europe (ACE and Energy Bill Revolution, 2015). The ranking should also now be considered to give a rating of affordability, given issues such as household incomes and purchasing power parity should be considered, these account for the economic context facing the households in different countries (comparative analysis is carried out with regard to Denmark in chapter six). This ranking is included to demonstrate that the average cost of a unit of energy delivered to a household in Great Britain relative to elsewhere in Europe.

A striking difference between the UK and other countries is that the UK's position in the middle of the ranking appears dependent upon its low tax rate. This is highlighted by Lockwood (2015) who suggests that to meaningfully compare the efficiency of energy systems in different countries, taxes should be removed. This is a complex issue with regard to affordability of energy as broadly speaking it is the final retail price as experienced by the consumer which affects affordability of energy (this includes the level of taxation). Additionally, the level of taxation may be an important component of the energy policy landscape and so may have had an impact on other aspects of affordability, such as funding or encouraging investment in energy efficiency measures.

However, the fact that when tax is discounted, that the basic cost of energy in the UK is among the highest in Europe, implies that there may be fundamental underlying issues in the energy system which is causing the underlying cost of energy to be very high. If these issues were resolved, either lower costs could be delivered to consumers (or the level of tax could be increased in order to generate more revenue for the exchequer). This chapter demonstrates how the governance of the energy system is driving up costs in the bill for consumers.

[5] GB-specific data unavailable.

[6] This is calculated by weighting the prices for each EU Member State according to their consumption by the household sector.

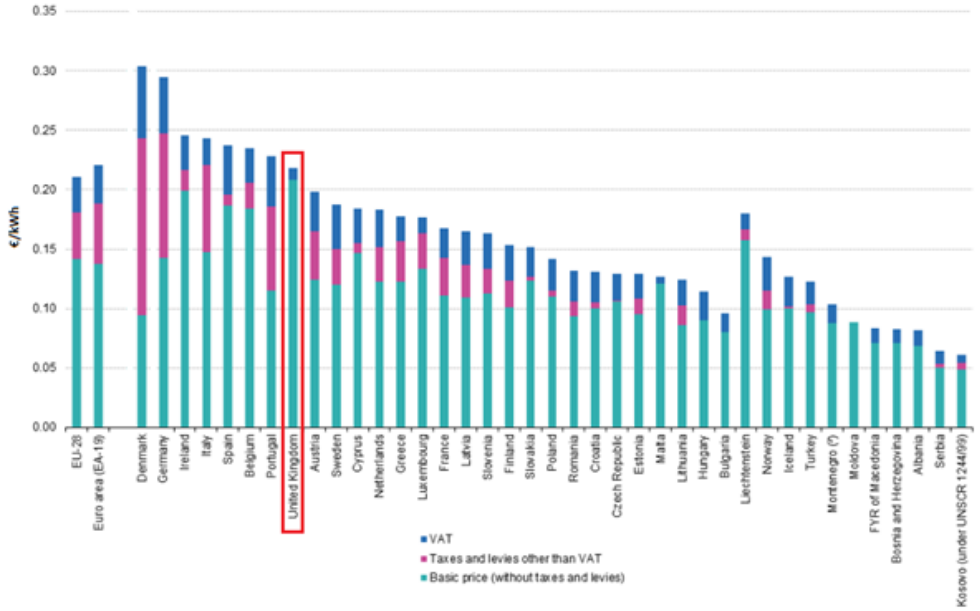


Figure 12 - Domestic Electricity Prices for European Household Consumers: Second Half 2015, Source: Eurostat, 2015a

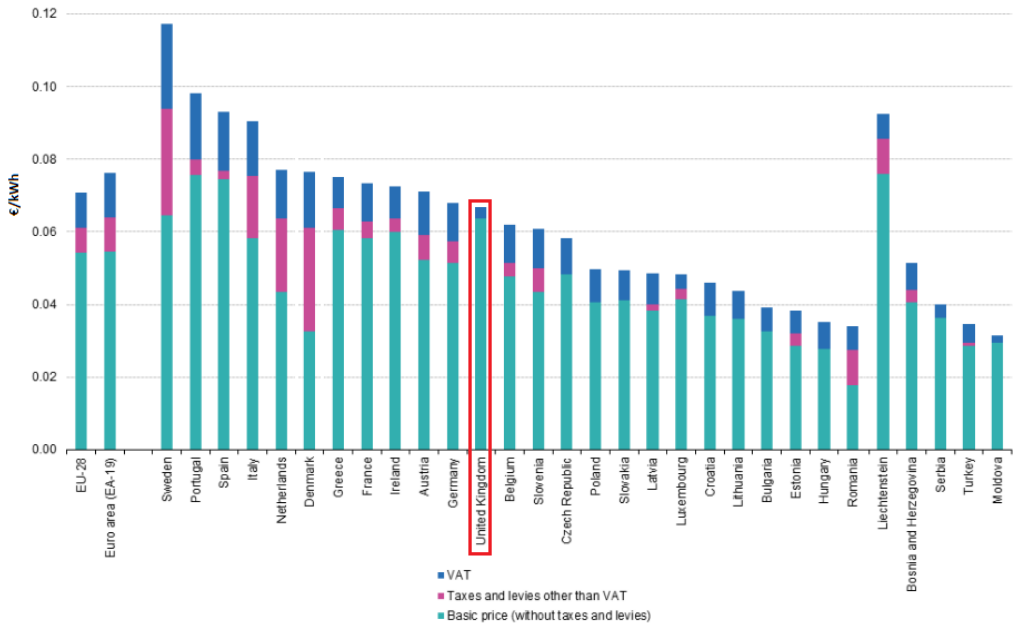


Figure 13 - Domestic Gas Prices for European Household Consumers: Second Half 2015, Source Eurostat, 2015b

2.2.3 - Energy Supply Chains

In order to set out the drivers behind different constituent costs that make up the domestic energy bill, it is beneficial to examine the roles of institutions in the supply chains that deliver electricity and gas to domestic consumers.

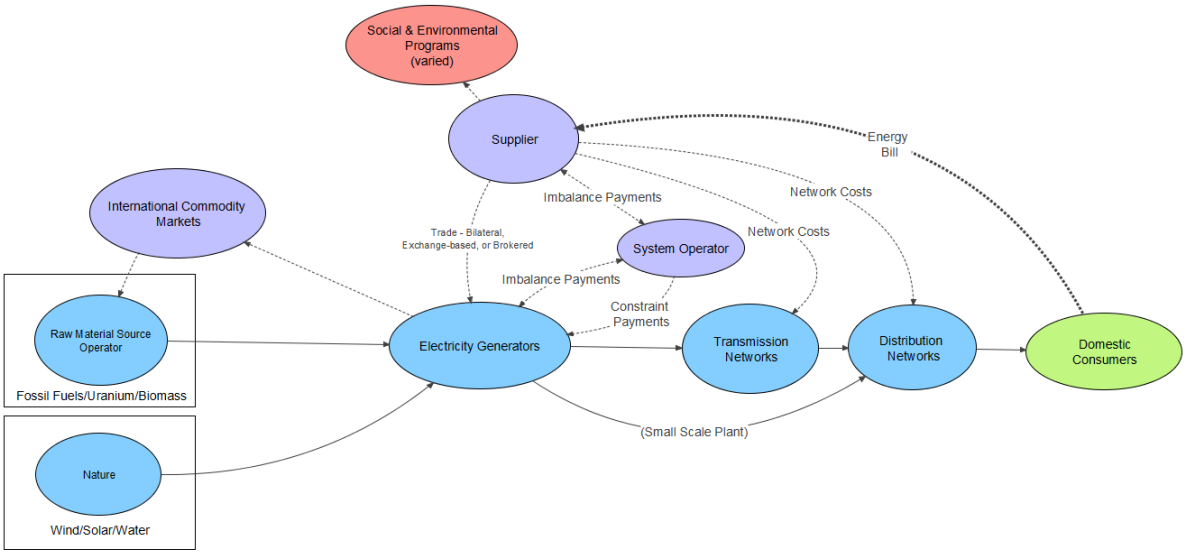


Figure 14 - Electricity System: Flows of Energy & Money, Source: Author's Own

Figure 14[7] shows a simplified conceptual explanation of the flows of energy (solid lines) and money (dashed lines) through the electricity system. The flow of money begins with the consumer, who pays their energy bill to the supplier. The energy market in Great Britain is arranged around the 'supplier-hub model' (OFGEM, 2013a) which means that the consumer pays the supplier and then the supplier passes these funds on to the relevant bodies to cover the costs associated with generating the electricity, and delivering it to the customer, as well as covering charges for various social programs. For simplicity, a number of connections are not shown. These include subsidy payments to generators, flows of 'green' certificates such as ROCs, REGOs and GoOs, and the flows of money and power relating to ancillary services such as balancing reserve. Bilateral trades between different suppliers are also not shown.

The supplier is responsible for buying sufficient volumes of electricity to meet the needs of its customers. It can do this either by buying from an electricity generator (which may be owned by the same parent company as the supply company), or from another market participant such as another supplier (not pictured). Trades can be carried out via a broker, over an exchange, or bilaterally.

It is the responsibility of the system operator to maintain levels of supply and demand on the electricity grid in real time, this is because electricity cannot be easily economically stored (National Grid, 2015c). The system operator also manages system constraints, under which generators may be asked to increase or decrease output to address 'bottle-necks' in the electricity system. Finally, those electricity generators that need to pay to buy fuel to run their plant such as gas and coal generators do so either directly from producers or via the commodity market.

[7] A larger version of this diagram is found in Appendix C.

The flow of energy is in the other direction: fuel (be it a fossil fuel like gas or coal, or be it a renewable source such as wind) is received by electricity generators who convert it into electricity. Large generation plants are connected to the high voltage transmission grid, to which a number of distribution grids are then connected, which in turn connect domestic and other smaller consumers. Generally, power flows from the generator onto the transmission system, then onto the distribution system, and into the customer's home. The exceptions to this arrangement are small scale generators, such as renewables, which are often connected to the distribution network, and some large industrial consumers that can be connected directly to the transmission network (Cornwall Energy, 2013).

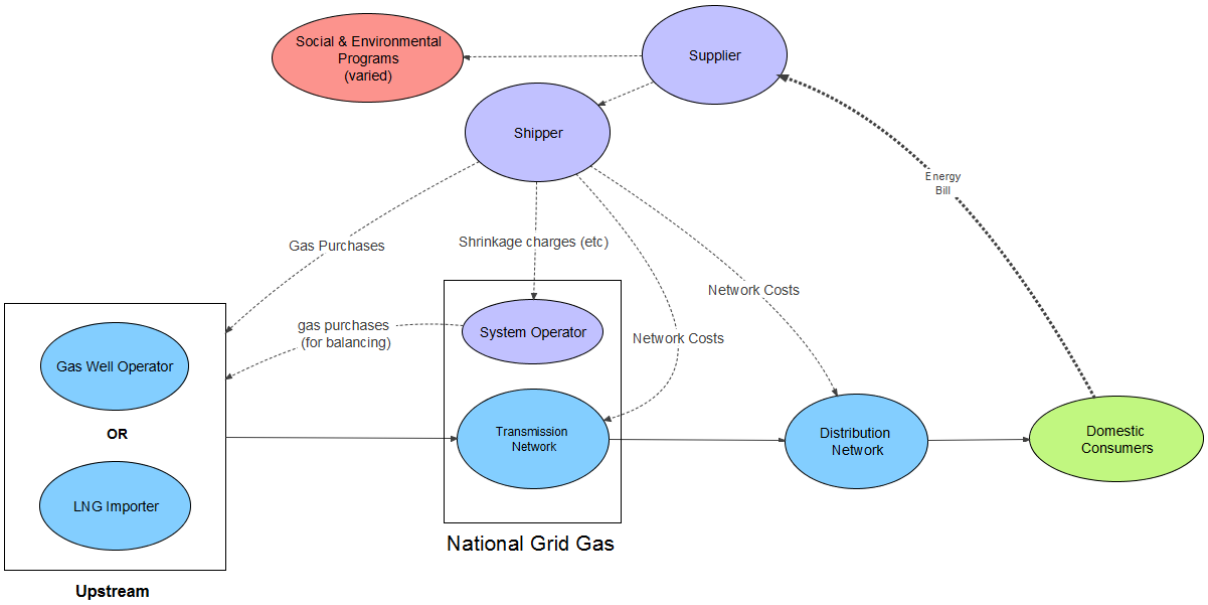


Figure 15 - Gas System: Flows of Energy & Money, Source: Author's Own

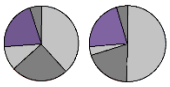
Figure 15[8] shows a simplified conceptual explanation of the flows of energy (solid lines) and money (dashed lines) through the gas system. The 'supplier-hub model' (OFGEM, 2013a) also exists in the gas industry meaning domestic consumers contract only with their supplier who then makes payments to other participants in the supply chain. The supplier pays a shipper to source gas and arrange its movement around the gas network (OFGEM, 2015l), often a supplier will operate its own shipper business. The system operator ensures that gas flows successfully through the transmission system to the distribution networks, and that the gas system remains balanced. Shrinkage and balancing charges are levied by the system operator from shippers as part of the cost of carrying out this duty (National Grid, 2015b, 2015a). Shrinkage costs are the costs associated with the system operator's need to purchase electricity and gas to cover compressor fuel usage, calorific value

[8] A larger version of this diagram is found in Appendix D.

shrinkage, and unallocated gas (National Grid, 2015a). Much in the same way as electricity, gas flows from the upstream producers onto the transmission network, then onto the distribution network, and finally into the consumer's home.

2.3 - Governance of Costs within the Domestic Energy Bill

2.3.1 – Governance of Supplier Costs and Profits



As set out in Figure 11, supplier costs and profits make up 21% of the average domestic electricity and gas bill. This section sets out the operations of the energy supply companies, and their impact on the bill. OFGEM (2015a) separates out supplier costs and profits in the supply market indicator, however these have been combined here because profit is contained within every section of the bill (i.e. wholesale costs include generator profits, network costs include network company profits etc.), and therefore separating out supplier profits would be inconsistent with other drivers of the energy bill.

2.3.1.1 - Vertical Integration

A number of energy supply firms (including all of the Big Six) are to a greater or lesser extent vertically integrated (VI). This means they operate within more than one part of the same supply chain. Although only two of the Big Six own upstream gas production (Kuzemko, 2015b), all six own and operate electricity generation assets as well as a supply firm.

There are a number of incentives for vertical integration (VI), many of which relate to the minimisation of risk as it guarantees the supplier access to generation, without having to go through the market (OFGEM et al., 2014). It also guarantees a buyer for the generator's power, giving a generator a sure route to market for its output (Kuzemko, 2015b). Vertical integration can also help to create a 'natural hedge', whereby if prices go up in the wholesale market, this will cost the supplier more, but could lead to the generator making increased profit - the extent to which this occurs will depend on the generation portfolio of the firm in question, and the reason for the change in wholesale price (CMA, 2015g). A VI firm may also choose to offer its own counterparty a preferential power purchase agreement (PPA), such as a longer term contract, than it might offer to other counterparties (CMA, 2014). There are also benefits relating to collateral - when making trades, either via exchanges or directly with other counterparties, collateral is posted to guard against default on payments (OFGEM et al., 2014). Large VI firms have substantial asset bases and strong credit ratings so are able to keep the costs of collateral low (OFGEM et al., 2014; Which?, 2013). Smaller parties are likely to face higher collateral costs as result of having smaller asset bases

against which to secure trades (Cornwall Energy, 2014), an arrangement which is likely to make it harder for them to compete. Finally there may be economies of scope from operating businesses across the market, such as having a broad range of personnel with understanding of all aspects of the market upon which it can draw (OFGEM et al., 2014; CMA, 2015g).

2.3.1.2 - Variation in Suppliers' Costs and Profits

Suppliers have varying levels of control over the costs they administer, with most ability to affect sales and marketing costs, metering costs, billing and customer service costs, and any value added services such as giving of advice (CMA, 2015g). Amongst these costs, metering and customer service costs are typically the largest proportion (CMA, 2015g). These costs are passed through to consumers in the energy bill.

Figure 16 shows the level of profits from the Big Six energy companies' supply and generation businesses. This is based on figures from the consolidated segmental statements (CSS) which are submitted to OFGEM by the Big Six suppliers each year. The variation of levels of profit between different areas of the business are clearly shown. It should be noted that the activities of non-Big Six suppliers are not included because the small and medium suppliers are not required to submit a consolidated segmental statement. The negative effect of this on transparency of industry activity is becoming increasingly important because, as noted above, the market share of small suppliers has grown considerably since 2010.

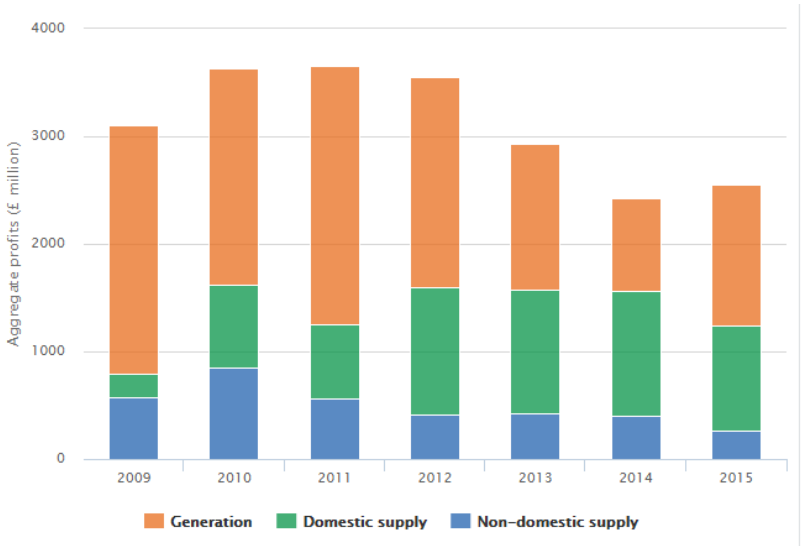


Figure 16 - Aggregate Profits of Big 6 Energy Companies, Source: OFGEM, 2016h

Figure 16 demonstrates both that the level of aggregate profit made by the Big Six can vary substantially over time, and that the balance between segments of the business can also shift. There are a number of possible reasons for this including variation in fuel prices (OFGEM, 2014g), changes

in short-term price volatility, upon which flexible generation can capitalise (OFGEM, 2015o), or a strategy to accrue profits in one arm of the business or another.

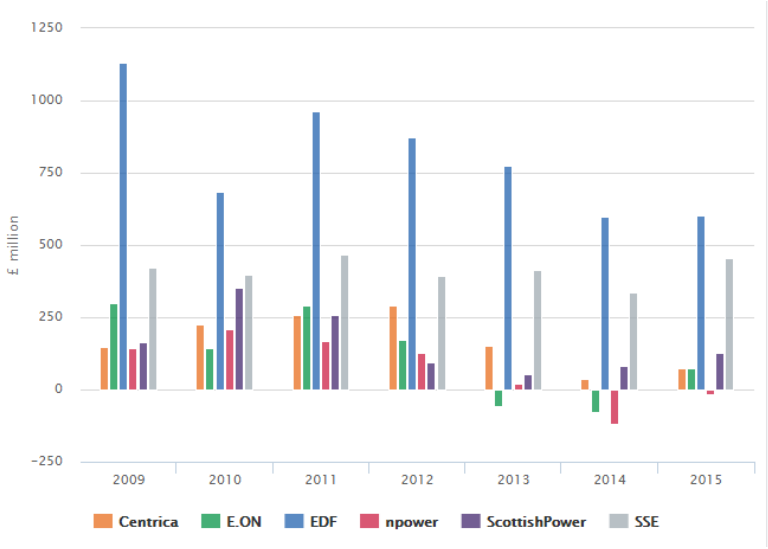


Figure 17 - Generation Profits in £Million by Supplier, Source: OFGEM, 2016h

There is considerable variation in the level of profit in the generation arms of the big suppliers, with EDF consistently producing generation revenues far above other Big Six generation arms (See Figure 17). This is likely to be at least in part due to EDF's generation portfolio which is considerably larger than each of the rest of the Big Six suppliers (DECC, 2015d). There is also wide variation in supply profit levels (See Figure 18), with a number of suppliers operating at a loss for some years – something they would be unlikely to be able to sustain if they were not vertically integrated. Centrica's high level of profit is concentrated in its gas supply business, founded on its supplying over a third of all domestic gas customers, which in 2013 led to Centrica's gas supply margins being approximately twice that of the next most profitable supplier (OFGEM, 2014b). Centrica's dominance in this sector is likely to be, at least in part, a result of its previously being the monopoly gas supplier in Great Britain. Centrica (which owns British Gas) also has the single largest domestic electricity supply market share (CMA, 2015g), which implies it has been successful in convincing gas customers to switch their electricity supply to British Gas.

Figure 18 - Domestic Supply Profits in £Million By Supplier, Source: OFGEM, 2016h

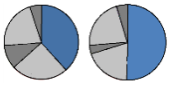
2.3.1.3 – Impact of Supplier Costs and Profits Governance on Affordability

Although it is possible to monitor the levels of profits that the Big Six are making, establishing what might be considered an 'excess level of profit' presents a significant challenge. In its investigation of the energy market, launched in 2014, the CMA states that 'a situation in which firms representing a substantial part of the market have persistently earned profits in excess of the cost of capital can indicate limitations in the competitive process, resulting in prices that have been too high' (CMA, 2015h, p.407). The CMA compared firms' return on capital employed (ROCE) with their weighted average cost of capital (WACC)[9], and found that of the Big Six suppliers, Centrica, SSE, Scottish Power and E.ON have earned profits substantially and persistently in excess of their WACC (CMA, 2015a), resulting in the average domestic dual fuel customer paying £36 per year more than might have been the case in a competitive market between 2009 and 2013 (CMA, 2015g). This alone is bad for affordability, but it is also symptomatic of a lack of competitive pressure in the retail market which is relied upon to force down prices (see below). This has a significant negative impact on affordability of energy for domestic consumers.

Kuzemko (2015b) highlights that energy suppliers use their profits to reward shareholders generously for their investment with substantial dividend pay-out ratios (5.2%-7.8% for the Big 6 in 2012), justified on the basis of maintaining shareholders' support for the firm reduces the cost of capital, and so supports future investment, and protects against corporate takeover. However this is money that these firms are choosing not to invest elsewhere, such as in delivering better customer service (Kuzemko, 2015b).

[9] A measure of a company's cost of capital which takes into account the relative proportions of debt finance and equity finance.

Although the CSS have been being produced since 2009, it took until the CMA carried out a full market investigation in between 2014 and 2016 to uncover excess profit-making (CMA, 2015g) – something which was an unusual event, rather than a regular review of the energy industry. This suggests both that the level of monitoring by OFGEM is insufficient to provide protection to consumers, and that suppliers are able to exploit the lack of competitive pressure in the retail market. Unless such CMA investigations are to become a regular feature of the energy system, or there is a significant upswing in the level of competitive pressure in the retail market, there appears to be a fundamental issue with the governance arrangements regarding costs and profits of the energy suppliers, which is leading to significant negative impacts for affordability of energy for domestic consumers.

2.3.2 – Governance of Wholesale Costs 

As set out in Figure 11, wholesale costs make up the largest single segment of the average domestic energy bill, and wholesale price increases have been a significant contributor to energy bill increases between 2007 and 2014 (DECC, 2014f)**.** Wholesale costs relate to all costs that the supplier faces in order to take out contracts to buy sufficient levels of electricity and gas to cover the demand of their customers. Often wholesale costs are discussed in a fatalistic fashion, as if there were a single market price against which energy consumed on each day could be assessed against. This section will set out why this is not the case, and the way governance affects the level of the wholesale costs to the consumer.

2.3.2.1 – What is the Wholesale Market?

The wholesale market may be taken as a non-actor institution, and the term refers to the various places from which an energy supplier may purchase the electricity and gas that its customers need. Suppliers are able to buy energy for delivery in the very short term, such as on the same day, or for delivery months or years in advance. For this reason, there is no single market price – but a different price for electricity and gas, depending on when the supplier is buying for. For example, purchasing a unit of gas for next winter is likely to cost more than a unit of gas for next summer, because there is generally less demand for gas in summer. In addition to the effects of demand, the wholesale market price of gas is also affected by the wholesale oil price because oil and gas are often extracted together, and pricing of gas is also sometimes contractually linked to the price of oil (OFGEM, 2015o).

There is a close relationship between the wholesale price of gas and the wholesale price of electricity. This is because much of the electricity generating capacity in Great Britain is powered by

gas, making the price of gas a significant cost driver for many generation plants. A gas power station is also often the 'marginal' plant, which is the most expensive plant operating on the system, meaning it sets the price for that period (OFGEM, 2015o). The marginal plant can swap between gas and coal generation, depending of the relative cost of running each plant. On days where there is a lot of sun or wind, or days when demand for electricity is low, the wholesale market price for delivery that day is considerably lower than on cold, dark, still days where demand is likely to be higher, and renewable generation likely to be lower (OFGEM, 2015o).

2.3.2.2 - Trading

The vast majority of supply firms, vertically integrated or otherwise, participate in wholesale market trading. Suppliers forecast how much electricity and gas their customers are going to use, and then buy sufficient amounts of each to meet that demand. However, a supplier does not know in advance exactly what the market price will be at the time that its customers use that energy, or exactly how much energy its customers will use. For this reason, a supplier will often choose to purchase some energy in advance, and as the delivery period approaches, then trade again to refine its position. How much and how far in advance they will buy depends on factors such as commercial strategy, market prices and actions of their competitors (CMA, 2014). This practice of forward trading to reduce risk is known as 'hedging'. The upshot of this practice is that as delivery date approaches, the same unit of energy may be bought and sold many times (CMA, 2014).This makes it almost impossible for an external party to identify with certainty what the cost associated with energy delivered to a consumer is on any particular day.

Varieties of Trading: OTC & Exchanges

When a supplier is looking to purchase electricity or gas to meet the demand of its customers, it can choose to do so in a number of ways. The first of its options is to carry out bilateral trading, either directly with a generator, or via an intermediary such as a broker (OFGEM et al., 2014). Bilateral trading, often referred to as 'Over-The-Counter' (OTC), can occur between independent companies like a generator and a supplier, or between generation and supply segments of the same vertically integrated company. These trades are completely customisable, with participants able to offer different prices and volumes, depending on the counterparty they are trading with (CMA, 2014). The vast majority of trades in Britain are carried out OTC (Which?, 2013; OFGEM et al., 2014).

The majority of OTC trades that occur in the GB electricity wholesale market are 'uncleared'. This means that they occur bilaterally between two parties which do not go via any sort of exchange or clearing house (OFGEM, 2009d; Which?, 2013) – thereby meaning that they cannot be tracked by either volume or price. Price reporting agencies such as ICIS Heren attempt to gather information on

these trades through directly contacting traders to get their view on the day's trading activities. This information is then compiled with information from known trades in order to produce pricing information (OFGEM, 2013e).

An alternative model of trading is carried out via an exchange such as N2EX or APX, this differs from OTC in that contracts are standardised, as opposed to the customisable contracts of OTC trading (PWC, 2008). Exchange trading accounts for approximately 13% of traded electricity volume (CMA, 2015j), and although they can be monitored, the counterparties to a trade are anonymous so it is still not possible to track a unit of energy's price from source to consumption.

Varieties of Trading: Power Purchase Agreements (PPAs)

Power purchase agreements (PPAs) are a means of a supplier purchasing the output from a generator. The PPA is a private contract which specifies the terms and conditions under which power will be purchased and generated, and require the generator to supply power at a specified price for the life of the agreement. PPAs vary, but commonly include: specification of the size and operating parameters of the generation facility; price mechanisms; service and performance obligations; dispatch options; and conditions of termination or default on the agreement (PWC, 2008). The pricing structure varies also, but typically falls into one of three categories – variable priced, variable with a floor price, or fixed-price (DECC, 2012a).

It is usual for a VI supply company to hold PPAs with its own generation assets. For example, it is apparent that EDF's supply arm holds a PPA which covers all of the generation arm's nuclear plants, which over the course of a year would generate more than enough electricity for all its domestic customers, and the majority of its business customers (for an explanation of the paper trail which demonstrates this, see Appendix E). Trading would likely then be used to fit the profile of EDF's customers' demand (CMA, 2014).

2.3.2.3 – Impact of Trading Governance on Affordability

It appears that VI suppliers are able to use these sorts of arrangements to select where in the business they wish to accrue profit. For example, OFGEM (2016h) shows EDF consistently making significant profits in the generation arm, and consistent losses in the supply arm across several years. Moving margins up and down the supply chain in this way means they are able to obfuscate their supply profits and construct arguments regarding low margins in energy supply, and therefore arguing that retail prices are not disproportionate to the costs of running supply companies (Kuzemko, 2015b).

Issues are not confined to VI trades however. As set out above, the private nature of the majority of trades, including PPAs, and the complex arrangement of buying and selling the same unit of energy multiple times prior to delivery mean it is almost impossible to identify the actual cost of electricity or gas for any particular supplier on any given day. This presents a challenge to the regulator OFGEM, in the absence of an empowered market monitor, in verifying that the prices that consumers are paying are fair and representative of the underlying costs. This does not automatically imply that they are not cost reflective, but the inability to verify them leaves opportunity for excess profit-making. This situation is exacerbated by a lack of competition in the retail market (considered below). As was set out above, suppliers appear to have been resulting in the average domestic dual fuel customer paying more than might have been the case in a competitive market between 2009 and 2013 (CMA, 2015g). Although it is unclear if this would have definitely been avoided with a greater level of wholesale transparency, greater transparency is consistent with more effective monitoring which would facilitate better protection of consumers. Therefore, a lack of transparency, a feature of the design of the wholesale market, may be said to risk undermining affordability of energy for domestic consumers. Other market designs, such as a pool design as used to be present in Great Britain (Helm, 2003), could be more transparent, albeit it has other drawbacks.

The location of trading arrangements may also be important. Electricity is traded on a national, rather than regional, level. Although there are benefits to suppliers of having contracts with generators and consumers in the same area (known as embedded benefits), by and large the generator or consumer themselves are unable to trade directly between themselves and so are unable to benefit from this proximity. The development of local energy markets is something which is becoming of increasing interest to suppliers (See: Centrica, 2016b**)**, and has the potential to improve affordability of energy for domestic consumers (OFGEM, 2015h)**.**

2.3.2.4 - Electricity Balancing

The wholesale cost segment of the bill also includes balancing costs. In electricity, there are two types of balancing action: one for ensuring supply and demand match in real time - 'energy balancing' actions, and those that ensure system constraints are managed effectively - 'system balancing' actions (Elexon, 2015). The rules governing balancing, and how imbalance prices are calculated, are set out in the Balancing and Settlement Code (BSC), one of the statutory codes that electricity suppliers and generators sign up to (CMA, 2015e).

System Balancing Actions

System balancing actions are in response to 'bottle-necks' in the system, whereby there may be insufficient transmission capacity to transport power from where it is being generated, to where it is needed to be consumed. This results in the system operator instructing generation plant to reduce output in one location, and a different plant to increase generation elsewhere. Plants will pay, and be paid, when providing this service, and the costs for this are recovered from energy suppliers through the balancing system use of system (BSUoS) charge, and then passed on to consumers.

Energy Balancing Actions

Energy balancing actions are taken in response to there being too much or too little electricity on the electricity transmission system at any one time. This is necessary because by and large, electricity cannot be economically stored (CMA, 2015d). If a supplier has purchased more, or less energy than its customers consume, it is deemed to be in imbalance, and therefore faces imbalance prices (known as 'cash-out'). These cover the costs of the system operator (National Grid) for carrying out balancing actions whereby it instructs generators (or consumers) to increase, or decrease their generation (or consumption) (Elexon, 2015). The greater the level of imbalance, and the greater the cost of actions, the higher the imbalance price. Settlement takes place every half hour, but the vast majority of domestic customers do not have half hourly meters and so are assigned a usage profile class. This is used to estimate the profile of consumption over time and allocate energy used in any half hour period (CMA, 2015j), reconciliation runs are carried out over the months that follow as meters are read. Approximately 2% of electricity demand is contracted for through the balancing mechanism (National Audit Office, 2014).

Impact of Electricity Balancing Governance on Affordability

It appears that the regulations dictating how imbalance prices are calculated are not designed to minimise costs to the consumer. Imbalance prices going to be made intentionally more expensive from 2018. Since 2015, imbalance prices are set on the basis of the average price of the last 50MW of capacity that the system operator contracts for in each half hour, however from 2018, this will move to the last 1MW, which will make cash-out prices higher. The value of lost load (VoLL), which can also feature in imbalance price calculation is also being increased from 2018, from the current level of £3000/MW to £6000/MW (Elexon, 2015) - both of these will lead to more penal imbalance prices. The rationale behind this sharper imbalance pricing is to act as a greater incentive for market participants to balance their position accurately, however it is not clear that all market participants necessarily have the ability to respond to these sharper prices – that they are not already balancing their position as accurately as possible. It is likely however that more punitive imbalance prices will

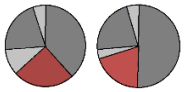
push up prices for consumers, whilst also making operating conditions more difficult for small suppliers, both of which have a negative effect on affordability.

2.3.2.5 – Impact of Gas Trading Governance on Affordability

Much of this section has focussed on issues relating to the electricity market. Some of the same issues such as a lack of transparency owing to trading and hedging strategies, also apply to gas, however high levels of churn (European Commission, 2014b), and low levels of vertical integration (OFGEM et al., 2014; CMA, 2015g), give some reassurance that competition is stronger in the gas wholesale market. The CMA (2015j) supported this view, and set out that few stakeholders raised concerns regarding the functioning wholesale gas market, therefore elected not to investigate it closely.

In spite of CMA assertions that the gas wholesale market is well-functioning, the private nature of trades, and hedging strategies makes it almost impossible to state the wholesale price paid for gas delivered on any individual day. This means that when wholesale gas prices fall, it is almost impossible for OFGEM to monitor if the full value of this fall is being passed through to consumers. It also implies that there should be a lag in price reductions, so drops being seen in retail prices now are likely to be related to drops in the wholesale price some months, or possibly even years previously, and current drops in wholesale price would only be expected to appear in retail prices in some months or years in the future (Dutton, 2015). If by that time, media and governmental focus on gas prices has relaxed, and in absence of OFGEM being able to effectively monitor the market, there will be weakened pressure on suppliers to pass these savings through to the end consumer, with negative implications for affordability of energy. This is particularly true in light of weak retail market competition (discussed below).

2.3.3 – Governance of Network Costs



Network charges have a significant impact on affordability, making up 25% of the average annual domestic electricity bill, and 20% of the average annual domestic gas bill (See Figure 11). The structure of both the electricity network, and the gas network is similar, in that it consists of a small number of large pipes/wires which transport energy over large distances (similar to the trunk of a tree), this is called the transmission network. From this come many smaller sections which deliver energy to homes and businesses (much like branches), these are the distribution networks.

2.3.3.1 - Electricity Networks

In Great Britain, there are three electricity transmission companies - National Grid in England and Wales, Scottish Power Energy Networks in Southern Scotland, and SSE Power Distribution in

Northern Scotland. Each of these has responsibility for maintaining the transmission system in their area. National Grid also has the role of System Operator (SO) across all three networks, and is responsible for ensuring that supply and demand are balanced across the entire transmission network in real time (albeit this function is ring-fenced from the transmission-owner function). The distribution networks are more sub-divided, with eight distribution network operators (DNOs) with responsibility for ensuring continual running and maintaining the distribution networks in different areas of Great Britain (See Figure 19). Electricity network costs have increased significantly in recent years, which DECC attributed to increasing requirement for the connection and management of significant volumes of new, particularly distributed, generation capacity (DECC, 2014f).

Figure 19 - Electricity Transmission (Left) and Distribution Network (Right) Ownership, Source: ENA, 2014b, 2014a

2.3.3.2 - Gas Networks

The whole of Britain's gas transmission network is owned and operated by National Grid, whereas the distribution networks are owned and operated by one of four regional gas distribution network operators (known as transporters) - Wales and West Utilities, Scotia Gas Networks, Northern Gas Networks and National Grid (see Figure 20).

Figure 20 - Gas Transmission (Left) and Distribution Network (Right) Ownership, Source: ENA, 2014d, 2014c

Both the electricity and the gas networks are operated as regulated monopolies. This means that although they are owned and operated by private companies, it would be inefficient to open them up to competition because this would imply multiple companies constructing pipes and pylons that served the same geographic area. As private profit-making entities, these firms need to be able make profit from their activities, however they are regulated to ensure that they do not take undue advantage of their monopoly position. This has resulted in a complex system of revenue control which is administrated and enforced by OFGEM. Although the specific details of the regulation vary between transmission and distribution in electricity and gas, the basic foundations of the regulation remain the same. The structure of this regulation is relevant to debates around affordability because the costs of the network systems are passed through to suppliers, and so feed through to consumers' bills.

2.3.3.3 - Price Control Regulation

The revenues of the network companies are regulated through a range of price control mechanisms. Previously, the income of networks was regulated through a process called RPI-X. This involved a series of price control periods each lasting five years. Ahead of the start of each period, OFGEM agreed with each network company an allowable level of revenue based upon the value of assets possessed by the network company, the operational and capital expenditure that the company expects to make over that period, the cost of capital that OFGEM believes the network company should be able to achieve, and the costs of depreciation. The allowed revenue was then spread across the price control period, with allowances for inflation (RPI) minus a certain reduction in order to stimulate efficiency improvement (-X) (OFGEM, 2009e).

The RPI-X system is no longer in place however. In 2008, OFGEM launched a review of this framework under the title RPI-X@20 in order to assess if the RPI-X framework was fit for meeting future challenges of supporting moves to tackle climate change, maintaining security of supply, and to supporting ongoing maintenance and upgrade of the network (OFGEM, 2009e). This review was also partly in response to a perceived need to foster greater levels of innovation from network companies (OFGEM, 2009f). This led to the eventual replacement of RPI-X with a new price control mechanism called RIIO (Revenue = Incentives + Innovation + Outputs).

A key element of RIIO is the combining of the capital expenditure (Capex) and operational expenditure (Opex) categories into total expenditure (Totex). The RPI-X control had the effect of offering greater incentive to capital expenditure than operational expenditure. The change to RIIO was designed to support 'smarter' and more efficient network solutions such as fostering demand side response, in place of simply expanding physical network capacity (Lockwood, 2014). Although RIIO does differ in a number of ways from RPI-X including requirements for innovation and customer engagement (OFGEM, 2012b), the change was an evolution, not a revolution - the principal of allowed revenues remains at root the same as that of RPI-X. It is calculated in relation to the regulated asset value and the anticipated expenditure over the period. Once the level of allowed revenue is set, charges are passed from the network company to the supplier, so it may then be passed onto consumers through bills. These charges are revised annually, and any discrepancy between allowed revenue and actual revenue collected is adjusted for the following year (OFGEM, 2012b).

The RIIO framework also includes a benefit-sharing mechanism. Following the price control being set, a network company then works to carry out its operations at a cost below that which was agreed in the business plan. If it is able to do this, the benefits are shared between the network company and consumers. This is achieved by means of the 'efficiency incentive rate'. A rate is set individually for each network operator which sets out the distribution of benefits as shared between the network company and consumers following an over/under spend. Although this varies between companies it is on average expected to be a 50/50 split between networks and consumers (OFGEM, 2012b). In practice this is achieved by altering the future level of year-by-year allowed revenues. There is a two-year lag between performance and that performance being reflected in allowances, e.g. an underspend in 2014-15 will be reflected in allowed revenues in 2016-17 to reflect the under-spend two years previously (OFGEM, 2016g). A similar process is applied if network companies exceed their allowed revenues – meaning on average they are required to bear 50% of any cost overrun.

2.3.3.4 - Impact of Network Regulation Governance on Affordability

There are issues with the RIIO framework however, the central of which stems from institutional capacity. Although the upfront nature of the price control gives network companies a strong incentive to 'beat' the expected costs and so deliver at lower cost, it also gives them an incentive to attempt to inflate the costs of the business plan, so they are able to appear to deliver greater savings and so receive greater profits. There is significant potential for problems of asymmetry of knowledge given that arguably network companies are in a better position to fully understand their expected costs over the price control period than OFGEM (Lockwood, 2014), particularly given the process of privatisation led to the hollowing out of expertise from state actors (Kuzemko et al., 2016). As network companies have a role in the price control setting process, this gives them opportunity to inflate the level of the price control making it easy for them to recover substantial returns.

OFGEM is not unaware of these issues however. In an attempt to combat these issues of asymmetry when setting the initial price control, the Information Quality Incentive (IQI) was introduced. This is a mechanism which offers greater financial reward the closer a network company's initial expenditure proposal is to the final allowed revenue figure. However OFGEM (2010b) concede that there are limitations to this mechanism, and that indeed it is reliant upon input from network companies in order to function. Introducing a mechanism which financially rewards network companies for not over-inflating the value of business plans in search of greater financial reward, could be viewed as counter-intuitive.

In spite of the IQI mechanism, The Energy & Climate Change Committee (2015) and the CAB (See: Moore & Hall, 2015) share Lockwood's (2014) concerns that OFGEM may lack the capacity to effectively judge the appropriate level of returns in the price control. The Energy & Climate Change Committee (2015) highlighted that OFGEM has agreed targets with network companies which were too easily met, meaning they achieved the majority of their objectives (38/40) within the first year of the eight-year price control period. This allowed them to go on to make higher than expected profits (Energy & Climate Change Committee, 2015). The CEO of OFGEM, Dermot Nolan proposed waiting until the end of the eight year period to establish if the price controls had been under-ambitious, however The Energy and Climate Change Committee has proposed that this will not deliver value to consumers, and so called for mid-term review of targets to be carried out (Energy & Climate Change Committee, 2015). The Energy and Climate Change Committee also raised concerns around OFGEM's ability to set the price control levels accurately owing to lack of comparable industries against which to benchmark levels of return (Energy & Climate Change Committee, 2015). The CAB has demonstrated that OFGEM has made significant errors in its assessment of key variables such as risk-free rate of return, and the debt premium faced by investors – this has the effect of making

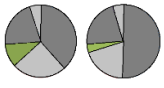
investment in network companies more attractive for investors but driving up charges for consumers (Moore and Hall, 2015).

Indeed, it appears this range of concerns may be justified. Some network companies are able to make very substantial profits. For example, Western Power Distribution Group made a £556 million profit in the financial year ending 2016, this is equivalent to 38% of its total revenue (Western Power Distribution, 2016). Also, in 2014, a greater proportion of SSE's operating profits came from network operations than from its supply and generation operations combined (SSE, 2014a). Owing to costs being met through energy bill, high returns to network companies can have a considerable negative impact on affordability of energy for domestic consumers.

The process of setting price controls in advance in this way also undermines affordability in that it locks network costs in for periods of up to eight years at a time, based on forecast levels of demand, and forecast technology costs. Any reductions in demand in excess of those forecast, or technological developments, which may be in no way related to the practices of the network company, are only partially passed onto consumers through the benefit sharing mechanism (discussed above). Any significant developments cannot be fully accounted for until the following price control period, potentially up to eight years later.

Mitchell (2016) argues that the RIIO is fundamentally limiting for other reasons, in that it does not truly foster innovations, which could support better outcomes, such as improved affordability of energy. Mitchell (2016) sets out that in comparison to the New York Reforming the Energy Vision program (REV), the RIIO is narrow, and simply supports the current arrangements in which large transmission-connect generators generate electricity to be consumed by passive end consumers. In contrast, the REV is fundamentally redesigning the New York state energy system to place customers at the centre of the energy system by allowing them to access locally generated energy without having to go via the transmission system, or the wholesale market – thus helping to reduce costs (Mitchell, 2016). This would imply that the transition from RPI-X to RIIO was not sufficiently radical to deliver meaningful long-term benefits to consumers, and so RIIO represents an institutional framework which, in part owed to a lack of institutional capacity within OFGEM, is negative for affordability.

2.3.4 – Governance of Environmental and Social Policy Costs



Environmental and social policy costs make up 11% of the average electricity bill, and 4% of the average gas bill (See Figure 11). These pay for a range of schemes such as funding energy efficiency measures for low income households and subsidising low-carbon electricity generation. The costs for

these schemes are primarily levied from electricity bills (CMA, 2015e), and a number of these schemes are contained under the Levy Control Framework (LCF).

The Levy Control Framework (LCF) was created in 2011, and is a Treasury-controlled cap on the spending that can be undertaken on certain governmental energy schemes. The LCF covers the Feed-In-Tariff (FiT), the Renewables Obligation (RO), and Contracts for Difference (CfD) (DECC, 2011a)[10]. The budget is divided up annually into cost envelopes to give the year's budget for each policy scheme (National Audit Office, 2013). The cap in Great Britain was set at £2 billion in 2011/2012, rising to £7.6 billion for the period 2020/2021 (National Audit Office, 2013).

Not all environmental and social policies fall under the LCF however, for example the carbon price support, a charge imposed upon fossil fuel electricity generators to discourage fossil fuel burning manifests in the wholesale electricity price (CMA, 2015e). Additionally, costs of the Energy Company Obligation (ECO) (examined in detail in chapter 3), which is designed to deliver energy efficiency measures to fuel poor and hard-to-treat households (DECC, 2014m), and the capacity mechanism which is paying generators (often existing large fossil-plant) to be available to generate electricity at times of system stress (DECC, 2015h), are levied outside the LCF.

2.3.4.1 - The Impacts of Social and Environmental Policy Cost Governance on Affordability

Lockwood (2016) sets out that the levy control framework was introduced without a clear objective, however two possible objectives are identified. Firstly that it is to protect the welfare of consumers, and secondly that it is to avoid increasing policy costs which could undermine public support in renewable energy support schemes, which could in turn undermine investor confidence (Energy and Climate Change Committee, 2016). Lockwood (2016) sets out that the latter of these reasons is the more compelling, given the context of a government which appears to offer limited customer protection in other areas, having imposed a range of tax and welfare policy changes which have generally fallen most heavily on those towards the bottom of the income distribution (Browne and Elming, 2015). However the National Audit Office suggests the LCF may not offer as much support to investor confidence as could be achieved, owing to poor transparency, poor forecasting of the current level against the cap, and limited reporting (National Audit Office, 2016a). It is also apparent that as the number of CfD projects increases, the number of projects that can be supported under

[10] Although the Warm Home Discount is similarly considered under annual spending reviews, and therefore is often described as being part of the LCF (See: DECC, 2011a), it is not included under the £7.6 billion cap (DECC, 2013a).

the cap will become increasingly uncertain – owing to the variable nature of CfD payments (Brandmayr, 2016).

It appears that the LCF was also designed to '…ensure that spending is subject to appropriate oversight by HM Treasury equivalent to spending from general taxation' (National Audit Office, 2013, p.6). This was particularly relevant in the context of the 2010-2015 Coalition government under which the LCF was implemented, owing to the fact that DECC (now BEIS) was headed by a Liberal-Democrat minister, whereas the Treasury was a Conservative-led department. The LCF gave the Conservative-controlled Treasury oversight over a large part of DECC spending.

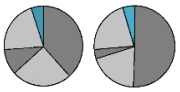
The LCF was later used to justify cuts to environmental policies such as the FiT for small-scale solar generation. Following the introduction if the FiT in 2010 (OFGEM, 2017a), costs fell faster than expected leading to high levels of deployment of solar PV. The filling up of the LCF was then used as justification for cutting the solar PV FiT by 63.5% from February 2016 (OFGEM, 2016d; DECC, 2015b).

Although the LCF does act as a cap on some policy costs, the framework's design means it is paid for in large part by domestic consumers – with a clear negative impact for affordability of energy. This is because Energy Intensive Industries (EIIs) have been exempted from paying for the majority of costs under the LCF on ground of preserving industrial competitiveness (HM Treasury, 2015b). This means that other bill payers such as domestic and smaller business customers face higher energy bills. Given that it is likely that small businesses will pass on these costs in the same way as any other production cost, ultimately it is domestic consumers which will, either directly or indirectly, pay the cost of the LCF (Lockwood, 2016).

Environmental and social policy costs have increased significantly in recent years (CMA, 2015g), and in spite of only currently making up 11% of the average electricity bill, and 4% of the average gas bill (OFGEM, 2015a), they have received a high level of political and media attention (Lockwood, 2016). There are often calls, particularly from the Big Six firms, that some policies such as the ECO should be removed, or placed under general taxation (Business Green, 2013).

The removal of policy costs from bills would reduce bills, and therefore benefit consumers, particularly those who rely upon electricity to heat their homes, owing to the concentration of social and environmental costs in the electricity bill (CMA, 2015j; CSE, 2013). However, any policy decisions that lead to cuts to renewable generators, or a reduction in funding to energy efficiency, such as via cuts to the ECO, although could be beneficial in the short term through reduced prices, would undermine long-term affordability of energy for domestic consumers - this is set out in detail in the following chapter. In addition to policy costs in the bill driving up costs for consumers, as energy bills

become increasingly politicised, these charges are more likely to become the target of further cuts. This risks undermining investor confidence in the energy industry as a whole, which could have significant negative impacts on the long-term affordability of energy. For example, a transition to a more flexible energy system has been estimated to lead to potential savings of between £2.9-8.1 billion per year by 2030 (National Infrastructure Commission, 2016) - equating the average household energy bill of £30-90 per year (Howard and Bengherbi, 2016). However, such a transition is less likely to come about if investor confidence is severely undermined, and innovative business models unable to develop.

2.3.5 – Governance of VAT 

VAT on domestic energy is currently charged at 5%, which is very low by international standards (DECC, 2015e) – see Figure 12 and Figure 13. Domestic energy was free of VAT until 1994, when it was introduced at 8%, with the intention to raise it to the normal rate (17.5%) the following year. However following a governmental defeat on a budget resolution vote, it was never raised (Seely and Twigger, 1997). In 1997 the new Labour government took the opportunity in its first budget to cut VAT on energy to 5% where it has remained since (Pearson and Watson, 2010).

2.8.1 – Impact of VAT Governance on Affordability

The low level of VAT charged on energy bills is crucial for affordability of energy for domestic consumers in Great Britain. As set out above, if levels of VAT were more in line with elsewhere, Great Britain would likely face one of the highest unit prices of energy in Europe. This stated, it could still be argued that energy should not attract any VAT at all. Many items such as unprocessed foods have a zero-rate of VAT charged to them, this because they are considered essential staple items. Therefore, the inclusion of VAT on domestic energy frames it as a non-staple item. It could be argued that there is a level above which consumption of energy becomes a luxury good (e.g. if demand is associated with heating a hot tub or swimming pool), but basic levels of heating are essential to maintain a good level of health (Harrington et al., 2005). This suggests that charging VAT on low levels of energy use is both inappropriate, and inconsistent with other staple products. Bringing energy in line with other staple products in this way would be highly beneficial to affordability of energy, both directly (in that it effectively cuts all energy bills by 5%) but also indirectly in that beginning to frame energy as an essential staple item could lead to a more progressive understanding of energy going forward. The removal of VAT from energy bills could however have implications outside energy policy as it would lead to a reduction of income to the treasury from energy, which in 2012 was worth in the order of £1.3 billion (Advani et al., 2013; Utility Week, 2013).

Currently, there is EU regulation which prevents VAT in energy being cut (The Council of the European Union, 2006), however it is not clear if this will continue to be the case after the UK leaves the European Union.

2.4 – Governance of the Energy Retail Market

Having examined the costs in the bill, it is important to look at how consumers engaged with those costs through the retail market. The retail market in its current form has existed since 1998 (CMA, 2015e). It is based on the premise that consumers will shop around in the market and then choose a supplier and a tariff which is right for them. In such a scenario, suppliers would compete to win customers from one another on the basis of price, customer service and environmental credentials etc. This section sets out the governance affecting the offerings that suppliers make, the impact of meter type, and the way that consumers respond to these offerings in the market. The impacts that this has on affordability of energy is then examined.

2.4.1 – Governance of Tariffs

Tariffs are the pricing structure that the energy suppliers use for charging customers for their energy consumption. In Great Britain, the basic structure of a tariff typically consists of a daily standing charge, and a per-unit charge. This means an annual bill is calculated as below:

(Daily Standing Charge x 365) + (Energy Unit Charge x Number of Units Consumed)

= Annual Energy Bill

This 'standing charge + unit charge' structure, along with rules around discounts and number of tariffs offerings, was a requirement as a result of OFGEM's retail market review (RMR), launched in 2010 (OFGEM, 2013i). However this aspect of the RMR policies is due to be lifted, and in 2016 OFGEM advised that it will no longer be enforcing a number of the regulations which resulted from the RMR (OFGEM, 2016a). The majority of tariffs in the market still fit the basic 'standing charge + unit charge' structure, likely because it reflects suppliers 'fixed cost + variable cost' cost structure, however some new tariffs are beginning to emerge, such as British Gas offering tariffs with free electricity on a Saturday or Sunday (British Gas, 2016).

Despite these sorts of tariff innovations emerging, the retail market is largely made up of two types of tariff. The majority of consumers are on standard variable tariffs (SVTs), and this is particularly true of Big Six's customer base (CMA, 2015j), which have between 50% and 90% of their customers on SVTs (depending on the supplier in question) (CMA, 2015j). These do not have an expiry period and so are sometimes referred to as 'evergreen' tariffs (OFGEM, 2009c). Suppliers are free to change

SVT prices frequently, subject to giving required notice of price changes. In practice however, most suppliers generally adjust prices only once or twice a year (See Figure 21).

Fixed-price tariffs are the other common alternative to SVTs. These offer a fixed price, for a set period of time. Although these cannot be increased during the tariff period, they can be withdrawn and replaced quickly. At the end of the fixed period, the consumer is free to choose a new tariff, or will automatically be switched to the supplier's SVT. Fixed price tariffs are on the whole cheaper than their SVT counterparts, but this is generally not a product of their being cheaper to administer, SVTs typically attract a higher level of margin than their fixed-price counterparts (CMA, 2015j, p.27).

The different tariffs are priced and targeted for commercially significant reasons (CMA, 2015k), with decisions around SVTs predominantly based on costs, volume forecasts, strategic objectives, and expectations of rivals' strategies and financial positions (CMA, 2015k). Whereas, fixed tariffs are more focussed on establishing a competitive position relative to rivals' offerings in the market, acquisition targets and retention targets (CMA, 2015k). Fixed price tariffs are set in reference to how many customers it is expected will move onto variable tariffs at the end of a fixed-tariff period (CMA, 2015i). New fixed price tariffs may be launched to coincide with the ending of a rival's offering in an attempt to win customers. This indicates that fixed tariffs are inherently designed to be more competitive than suppliers' SVT offerings (CMA, 2015i). The majority of consumers are on SVTs, and therefore paying a premium in comparison to the cheapest tariffs available. This means that most the population are paying prices which are often far above the cheapest available in the market – with significant negative implications for affordability of energy. This is discussed in more detail below

2.4.2 – Governance of Switching

It is apparent that the retail market is not functioning effectively for all consumers. In spite of over a decade of retail market competition, over half of all customers are considered either disengaged[11] - (20%) or severely disengaged[12] (37%) with the energy market (OFGEM, 2015k), and switching rates fell from their peak in 2008, remaining generally consistent in the order of ~30,000 electricity and gas switches per month (OFGEM, 2016f) - equivalent to approximately 0.1% of the domestic market. This is a long-standing issue, and was one of the principle drivers for OFGEM's 2010 RMR (OFGEM, 2013i), as well as also being the focus of some of the remedies from OFGEM's 2008 supply probe

[11] 'Aware that there is an option to switch, but are unlikely to have actually done so in the last year, or indeed ever'(CSE, 2015, p.19)

[12] 'May have glanced at their bills but are unlikely to understand their energy consumption or whether switching could actually save them money' (CSE, 2015, p.19)

before it (OFGEM, 2009c). OFGEM's decision to repeal a number of the RMR rules relating to the number and structure of tariffs (OFGEM, 2016a) is likely to lead to an increase in the number of tariffs in the market, including tariffs exclusively for new customers. This means not only will consumers be required to change tariff frequently, they may in future also have to frequently change supplier.

The decision to remove the RMR rules is in pursuit of greater levels of competition, (in spite of their being originally introduced for the same reason) however it is not clear this is necessarily something which customers are calling for: OFGEM (2015j) notes that in a survey monitoring the effectiveness of the RMR policies, 44% of consumers said the amount of choice in the market was now about right, however nearly a third stated that there is still too much choice in the energy market. In spite of the majority of customers being confident in their ability to switch (OFGEM, 2015k).

The significant savings available in the market suggest that this confidence does not translate to action - each of the Big Six suppliers has a number of unengaged, 'legacy' customers which remain from before liberalisation, or who have switched only once or twice and have now become unengaged (TNS BMRB and OFGEM, 2016). Between 40-70% of each of the Big Six's customer base has been with the same supplier for four or more years (CMA, 2015c). This is in spite of significant savings that could be made from switching:

- £44-£144 savings annually from switching to a different tariff with the same supplier (e.g. SVT to fixed) - these savings were found available to 56-82% of the dual fuel customer base of each Big Six supplier
- £46-£153 saved annually from switching to a similar design of tariff with a different supplier (e.g. SVT to SVT or fixed to fixed) - these savings were found to be available to 58-94% of the dual fuel customer base of each Big Six supplier
- £158-£234 annually saved by switching to a different design of tariff with a different supplier (e.g. SVT to fixed with a different supplier) - these savings were found to be available to 94-99% of the dual fuel customer base of each Big Six supplier

(CMA, 2015b, pp.3–4)

This means that nearly all of the Big Six domestic dual-fuel customers could benefit from switching, and given that single-fuel customers often face some of the highest prices (OFGEM, 2015k), it is reasonable to suggest that many of them may also make significant savings by switching supplier. This supports OFGEM's (2015j) analysis that consumer engagement is low in the domestic retail market, which is leading to unengaged consumers paying some of the highest prices. This means that engagement in the retail market by switching has become a prerequisite to accessing the lowest

prices. This has led to the creation of a two-tier market; split between engaged consumers who access the lowest prices on the market by actively choosing their energy supplier by switching, and unengaged consumers who do not switch, and as a consequence pay more. This is likely to be having a particularly negative effect on fuel poverty because those on SVTs are more likely to be on low incomes, or otherwise vulnerable (OFGEM, 2015k).

It is evident from the statements that the Big Six energy suppliers made to the CMA that they use the higher margins from SVT customers to subsidise those on fixed tariffs. However, the CMA did not highlight this as a significant issue. One supplier explained that it priced its fixed tariffs on the assumption that some customers would then move onto the higher priced SVT (CMA, 2015g), meaning that the low revenues in early years (from the low-priced fixed tariff) would be offset in later years (from the high-priced SVT). This means (1) that the supplier is making pricing decisions based on the assumption (or hope) that customers will become unengaged in the future, and (2) that in any given year, the suppliers' cash flow is reliant upon high revenues from SVT customers offsetting the low revenues of those customers on low-priced fixed tariffs. In short, this means that suppliers business models are reliant upon unengaged SVT consumers subsidising those engaged consumers paying a fixed rate.

Not only do SVTs generate higher margins (see CMA, 2015g), but they can be increased to offset any rises in the underlying costs in the bill as/when it is beneficial to the supplier to do so (CMA, 2015j; Rutledge, 2010). Given that being on an SVT is associated with being unengaged from the energy market, prices can be increased with limited risk that this will prompt consumers to switch supplier. This gives the Big Six firms access to a large reliable revenue streams which can be used to levy competitive advantage against new entrants (Which?, 2013; OVO, 2014) who are reliant upon attracting engaged consumers in order to generate revenue. This is an issue because, in addition to the challenges of being a new small company, their customer base by definition is made up of customers that are engaged in the market, and so therefore may be willing to switch again away from the new supplier. Even upon attracting new customers, there is no guarantee that they will be profitable - campaigns to gain new customers represent considerable cost, which may only be recouped if that customer remains with the supplier for 3-5 years (Kuzemko, 2015b). This allows the large suppliers to continue to prosper, and for them to make it difficult for small innovative firms to challenge them and grow.

2.4.3 – Governance and Meters

The type of energy meter a household has affects which tariffs are open to them. The majority of households in Great Britain make use of standard credit meters, which log consumption, and are

then read weeks or months later. Consumption levels are then used to calculate consumers' bills. Consumers with standard credit meters are able to access the vast majority of tariffs in the market.

A common alternative to standard credit meters is the prepayment meter (PPM), which is present in 15% of households (CMA, 2015g). These require topping up with credit in advance, and when the credit on the meter is exhausted, the supply of electricity or gas is cut off. This is called 'self-disconnection', and enables energy suppliers to state that they no longer disconnect customers for non-payment (Energy and Climate Change Committee, 2013b). It is common practice to install prepayment meters in the instance of a customer accumulating a debt on their account (CMA, 2015g). In addition to the risk of having their energy supply cut off if they do not top up the meter, there are also fewer tariff options available to PPM customers, owing to most suppliers offering fewer PPM tariffs than standard credit meter tariffs, and to the fact that not all suppliers in the market offer PPM tariffs. This latter factor is connected to rules in the supply licence - suppliers with less than 50,000 customers are not required to offer prepayment as a payment option (GEMA, 2015).This means that PPM customers are often unable to access some of the lowest prices in the market.

There may also be barriers for some consumers from moving from a prepayment meter to a standard credit meter. Although in 2014, 95% of PPM removals were carried out for free, there are often requirements for large upfront security deposits, these are typically in the order of £200, and in some instances can be as high as £5000 (OFGEM, 2015i). This means that not only are PPM customers unable to access the lowest prices in the market, but they also may not be able to afford to take the necessary steps to gain access to the lowest prices. Given PPM meters are often used by those on low incomes, is likely to harm the fuel poor in particular. The CMA has proposed the introduction of a transitional price cap for PPM customers, benchmarked against expected costs. In 2015, had this cap been present it would have saved the average PPM customer £75 a year (CMA, 2016c). Although this is likely to produce some benefits to PPM consumers, it fails to address issues such as lack of choice of tariffs in the PPM market, or the issue of security deposits associated with having a PPM removed. It also is predicated on OFGEM having the institutional capacity to set a tariff reflective of underlying market conditions and hedging patterns. Given the lack of transparency in trading in the wholesale market, this is likely to be highly challenging.

2.4.4 – Governance of Price Comparison Websites

Price comparison websites (PCWs) allow consumers to compare the prices of different tariffs in the market, and are often paid a commission by suppliers for facilitating a customer switching to their supply (CMA, 2016a). Currently they are required to give customers the option to see all tariffs from

all suppliers, rather than just those that the PCW can facilitate a switch to (which are usually operated by suppliers which pay commission to the PCW) (OFGEM, 2015b). However, following the CMA's energy market investigation, this requirement is being removed, allowing PCWs to show only a subset of the tariffs available. This is in addition to their being permitted to offer exclusive tariffs, not available elsewhere (CMA, 2016c). This is both to prevent suppliers that do not pay commission 'free-riding' (CMA, 2016c), and is also designed to promote competition between PCWs. However, this means that in future consumers will have to shop around not only between suppliers, but also between price comparison websites. This means that customers will have to work harder to guarantee they are accessing the lowest prices, further necessitating a high level of engagement with the energy market, and the exclusive nature of some tariffs further damages affordability for some vulnerable consumers. This is because PCWs are less widely used by those with less education, or lower income (CMA, 2015g). Given that over seven million UK adults have never used the internet at all (OFGEM, 2013c), a significant number of people, particularly the vulnerable, do not have access to the exclusive tariffs on offer.

The benefits to the rise of PCWs is however that not only are there are new avenues for some consumers to engage in the market through switching, but PCWs represent a new group of institutions who are marketing to consumers to encourage them to engage through switching. This is in stark contrast to suppliers, in whose interests it is for unengaged consumers to remain unengaged.

2.4.5 – Governance of Price Announcements

Competition in the retail market may also be undermined by the coordination of price announcements by the energy suppliers. It is important to note that coordination differs from collusion in that it occurs without formal agreements to act together. Collusion is illegal, whereas coordination may signal weak competition, and lead prices to be higher than they would otherwise be (OFGEM et al., 2014).

Figure 21 sets out the average gas and electricity price change announcements of the Big Six firms between January 2004 and January 2014. The location of the circle demonstrates the point in time the price announcement was made, and the size of the circle reflects the size of the change. Red circles reflect price increases, and white circles represent price cuts. There appears to be a high degree of synergy to the price-change announcements, both in timing and in scale, which implies

some level of coordination.

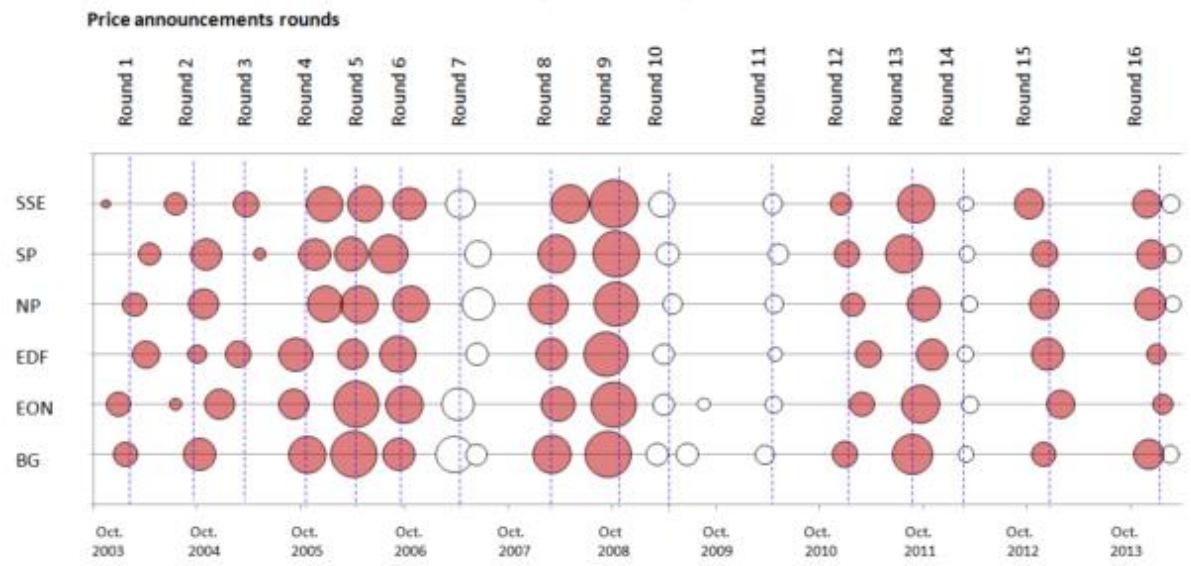


Figure 21 - Gas and Electricity SVT Price Change Announcements: January 2004 - January 2014, Source:(OFGEM et al., 2014)

CMA (2015c) sets out three criteria that need to exist to enable coordination to persist:

1. Coordinating firms are be sufficiently aware of one another to be able to predict one another's behaviour, and identify which behaviours would bring about a mutually beneficial outcome.
2. Coordinating firms find it individually beneficial to seek the coordinated outcome, and lack incentive or have a disincentive to compete.
3. Coordination can only continue to function if it is unlikely to be undermined by outside challengers.

Each of these criteria appear to be fulfilled:

1 - Rutledge (2010) states that the Big Six have had sufficient time and experience to learn each other's behaviours in the face of one raising prices, and the regularity of price changes is also likely to allow suppliers predict the future behaviour of competitors.

2 - These price announcements relate to the SVT of each of the Big Six companies. Although as set out above, these are generally occupied by unengaged consumers, these highly publicised, and coordinated price announcements would help to foster the notion that suppliers are 'all the same', and therefore limit the perceived benefits to switching (CMA, 2015c). This both discourages those on SVTs from becoming engaged, as well as encouraging those customers that are currently engaged to become less so. It also helps to create an image in the eyes of policy makers of an industry operating

with prices which accurately reflect underlying costs, in spite of there being little transparency over whether this is in fact the case. As set out above, the Big Six make pricing decision in the hope that customers will stop engaging in the market.

3 - It could be suggested that the independent suppliers are outside challengers to this coordination, indeed the CMA (2015c) suggests the recent growth of independent suppliers is further evidence for lack of coordination. However, although together they hold a meaningful market share, each individual firm carries a much smaller market share, making it difficult for any one challenger to threaten this coordination.

In spite of these criteria seeming to be fulfilled, the CMA (2015c) is of the opinion that coordination is not taking place; stating that it found a number of differences in suppliers' business strategies and purchasing behaviours, and that these differences would make it difficult to coordinate behaviour. However, it is not clear why, if business strategies and purchasing behaviours are indeed so varied, it is that the price rises occur together with such regularity. Given the need for consumers to engage in the market, and that this behaviour from suppliers may discourage that engagement, coordinated price announcements may be said to undermine affordability of energy for domestic consumers.

2.4.6 - Impact of Retail Market Governance on Affordability

Since the repeal of the RMR rules (OFGEM, 2016a) suppliers are free to offer any number or structure of tariffs they wish, although this allows them to trial innovative tariff designs, which is likely to support pricing structures which could support affordability in future, this complete freedom of tariff design is not necessarily an entirely positive thing. The ubiquitous ‘unit + standing charge’ pricing structure appears to be designed around suppliers’ cost structure, rather than a new serving the needs of consumers. It is understandable that if given complete freedom, suppliers may choose such a structure to reduce risk, but the fact that this structure was codified in the RMR, which was put in place by OFGEM, demonstrates how the current governance structure may not consistently place consumer needs as the central consideration.

Suppliers’ freedom to derive greater revenues from those customers that are on SVTs has a negative impact on both general affordability, and particularly the fuel poor. The Big 6 suppliers who have a large incumbent customer bases are able to charge their unengaged, often vulnerable, SVT customers a higher price in order to subsidise low-priced fixed tariffs to entice engaged consumers. This harms those consumers who are charged more, and in turn enables the large market participants to stifle the growth of smaller players who may be looking to offer innovative solutions to the benefit of consumers.

The higher-priced SVTs are generally occupied by those consumers who are unengaged from the market. This means that suppliers generate more revenue from an unengaged customer, than an engaged one. This creates a fundamental conflict in the market – the retail energy market functions on the principle of high levels of consumer engagement in order for consumers to access the best prices, however the biggest players in that market make their largest revenues from unengaged consumers. This means it is in the interests of the large incumbent suppliers for levels of engagement to be low. This leads them to make pricing decisions in the hope that consumers will stop engaging, and take steps to discourage engagement (such as through coordinated price announcements). The growth of price comparison websites has helped to support engagement, however regulations regarding allowing exclusive offers and no longer having to display a complete view of the market are likely to erode the value of PCWs.

In spite of all this, competition is still relied upon to deliver the best outcomes for consumers. This heavy reliance on competition is likely to be, at least in part, as a consequence of OFGEM's primary duty, which is in turn a product of a pro-market ideology. However, this is serving to undermine affordability of energy for domestic consumers. The government and OFGEM have been aware of a number of issues in the energy market for some time, and so in June 2014 OFGEM referred the energy market to the CMA for investigation. Although such a review is inarguably beneficial, the review and subsequent proposals are fundamentally limited by the nature and role of the CMA – which is inherently tied to this reliance on competition. The main purpose of the CMA is '…to promote competition for the benefit of consumers, both within and outside the UK' (CMA, 2016b). This constrains its framing of the issues, and limits the solutions it is likely to offer – as a competition-focussed body, all issues and solutions will relate to competition. This is problematic because the complexity of issues of affordability of energy calls for an extensive understanding and consideration of a diverse range of solutions. Competition was introduced with the objective of delivering lower prices and better service for consumers, however it appears now that this objective has been superseded by simply promoting competition for its own sake. This strong dedication to a pro-market ideology again limits the focus on taking whichever steps deliver best outcomes for consumers.

2.5 - Conclusion

Although there is a limited amount in the literature focussing on the relationship between governance and the makeup of energy bills in Great Britain, this section has shed light on some significant issues in the governance structure relating to prices, tariffs, and market arrangements which undermine affordability of energy for domestic consumers.

It has been shown that there are a number of opportunities to reform the governance structure in order to reduce the different costs in the domestic energy bill, and therefore improve affordability of energy. Firstly, a lack of institutional capacity to critique the business models of network companies appears to be responsible for the network companies being often able to achieve very high profits, paid for by consumers. A different price control framework, or a higher degree of institutional capacity within OFGEM could improve this situation.

The design of non-actor institutions, such as the electricity and gas wholesale markets are having a negative effect on affordability. Both markets are characterised by a lack of transparency which makes it almost impossible for an outside observer, including OFGEM, to verify that prices charged to end consumers are reflective of the underlying costs. In other supply chains, it would be the competitive pressure of the retail market that would help to ensure this happens, however a lack of competition from the electricity and gas retail markets means this pressure is weak. Although this does not *prove* that savings are not passed on, there is little incentive for a profit-motivated company to do so. Less opaque market arrangements, or greater powers for OFGEM to examine trades, would however allow OFGEM a better view of trading activities in order to ensure that the prices paid to consumers where reflective of the charges suppliers faced. This may also require a tightening of rules around transfer pricing, which currently require trades between separate parts of the same company to be only loosely connected to any sort of external market price. This would be necessary in order to ensure that VI firms do not simply accrue large profits in their generation arms.

The dominant ideology in the design of industry structures appears to be one of support for non-interventionist, pro-market mechanisms. This is particularly visible in the retail market where consumers must engage to receive the lowest prices. There are issues however, a two-tier retail market has developed, where one group of customers are engaged and switch often to receive the best prices, and a second tier where customers remain on standard variable tariffs, often with the Big Six suppliers, paying significantly higher prices – meaning this has negative consequences for general affordability. Poor and vulnerable households are among those least likely to engage in the market (OFGEM et al., 2014), so likely to be predominantly found in the second tier – meaning the effects are particularly acute on the fuel poor. The situation is particularly poor for those with PPMs who are often unable to access the lowest price tariffs, and can face significant barriers to changing their meter. What is more, there is an inherent paradox in this market design. The high margins which unengaged customers on SVTs bring (CMA, 2015j, p.27) mean it is in the interests for large suppliers to keep their existing customer base unengaged from the market.

Finally, it appears that there are other areas of the bill, such as environmental and social policy costs, and VAT, which although only make up a small percentage of the average domestic energy bill could be reduced further to better support affordability. However, if this led to the reduction of funding for social and environmental policies, this could have significant negative effects on investor confidence.

This chapter has demonstrated how the governance in the energy system fails to push down each of the costs within the energy bill, leading prices to be higher than they could be – resulting in the underlying cost of energy (before tax) to be among the highest in Europe. Although the final prices faced by consumers are on average not significantly higher than some other countries in Europe, this is owed in large part to low levels of taxation on energy. It is also the case that there is a large disparity between those predominantly engaged consumers on the lowest priced tariffs, and those predominantly unengaged consumers on the highest priced tariffs – suggesting that an average price does not tell the whole story.

The following chapter will go on to discuss the role of governance in affecting energy efficiency standards, which have a significant impact on affordability of energy for domestic consumers. Energy efficiency standards in Great Britain are poor in comparison to some other countries in Europe (ACE and Energy Bill Revolution, 2015). This means that although final unit prices are between average and the slightly higher end of levels in Europe, energy bills (as a product of prices and demand) are high. The following chapter will focus on the relationship between governance and domestic energy efficiency standards in Great Britain, which will inform and be added to, the primary research.

Chapter 3 - Energy Demand & Energy Efficiency in Great Britain

3.1 - Introduction

As was set out in previous chapters, energy bills are the combination of prices, and levels of energy demand. Having applied a governance lens to the examination of costs in the bill, tariffs, and the operation of the retail market, the impact of governance on energy demand and energy efficiency should also be examined. This forms the second important factor of affordability of energy for domestic consumers. This chapter will begin by briefly setting out drivers of energy demand, and barriers to its reduction, before examining the role that governance plays in supporting, or hindering, improved energy efficiency standards in Great Britain. The relative scale of spending on energy efficiency and income support policies is then reviewed, and what this implies for energy governance. The analysis in this chapter will then be combined with primary research to give a strong overall picture of the impact of governance on energy efficiency in the domestic sector – a key driver for affordability.

3.2 - Levels of Energy Demand

3.2.1 - Drivers of Demand

Before examining the impact of governance on energy efficiency, it is first beneficial to examine drivers of final energy demand, and the barriers to demand reduction. These are important because their understanding informs the design of an appropriate governance structure to support the reductions in the amount of energy that consumers need.

3.2.1.1 – Behavioural Drivers

Behavioural drivers are complex and multi-faceted (Socolow, 1978; Hole, 2014), and affect 'short-term energy service demand ' such as setting of indoor temperatures, choosing to turn off lamps when leaving a room etc. (Haas, 1997)**.** Individuals' decisions are not taken in isolation, but are influenced by the social context in which they occur (Lorek and Spangenberg, 2014; Alexander, 2012; CORPUS, 2013; Hole, 2012). They are also made with reference to past decisions, both as a product of habit, (Lorek and Spangenberg, 2014; Alexander, 2012; DECC, 2014p), and simple 'rules-of-thumb' (Brown, 2001). Crucially for affordability, the financial pressure of high energy prices can alter behaviour to reduce energy demand (Gillingham et al., 2009), as vulnerable and fuel poor groups will often cut back on consumption to create an immediate saving on energy bills in response to rising

prices (DECC, 2014p). For example, fuel poor parents often ration heat to when children are in the home in order to protect them from health impacts of living in a cold environment (Tod et al., 2016).

3.2.1.2 - Structural Drivers

Structural drivers such as social trends affect 'long-term energy service demand' (Haas, 1997). Examples which all increase demand include that people today prefer to keep homes significantly warmer than 40 years ago (Palmer and Cooper, 2013), increasing ownership of consumer electronics (Energy Saving Trust, 2007), and an aging population who often choose to remain in the large family home (Hamza and Gilroy, 2011).

3.2.1.3 - Technical Drivers

Technical drivers relate to energy efficiency of properties and associated energy infrastructure such as boilers, and have a significant effect on levels of both actual demand, and the amount of energy consumers need for a good standard of living (Haas, 1997). Great Britain generally has a low standard of domestic energy efficiency (Pyrko and Darby, 2011). In 2014, seventy-three percent of the English[13] housing stock had an energy performance rating of grade D or below (See Figure 22), this in part relates to Great Britain's aging housing stock and history of poor building standards (Hamza and Gilroy, 2011; Hoggett et al., 2011; CAB, 2014). This is in spite of the fact that the importance of thermal insulation in housing was identified as early as 1947 (Parker, 1947 in Wicks, 1978). This does however highlight the considerable opportunity to improve affordability of energy by means of improving the efficiency of the housing stock. This is particularly true in the private rental sector which has a greater proportion of some of the least efficient properties than other tenure types (although the average value of private rental energy efficiency is improving owing to an increasing number of modern purpose-built flats in the rental sector) (DCLG and ONS, 2015). Improvements in energy efficiency do not always lead to the technically expected levels of demand reduction. This is because the money saved on energy bills can be spent either on consuming more energy directly, or indirectly on other appliances or hobbies that lead to increased energy demand. This is known as the 'rebound effect' (OECD and IEA, 2014; Sorrell et al., 2009). The level of rebound, and so the effect efficiency improvements have on final demand varies between different households (Kelly, 2011; Pett, 2009), and different end uses (Chitnis and Sorrell, 2015; Greening et al., 2000). Although this leads to less reduction in demand than would otherwise be expected it can in fact be a desirable effect in some households. This is because those in fuel poverty are most likely to be significantly under-heating their homes (Stockton and Campbell, 2011; Chitnis et al., 2014).

[13] NB. Aggregated figures are not available, however proportions are broadly similar for Scotland (Scottish Government, 2012), and in Wales there is a greater proportion of E-rated properties (Welsh Assembly Government, 2010), although this latter difference may be at least partially explained by the age of the data.

When energy efficiency standards are improved, rather than reducing expenditure, they are likely to continue with similar levels of expenditure but instead choose to benefit from greater levels of warmth. This is known as 'comfort-taking' (CSE, 2011; Sorrell et al., 2009). Energy efficiency standards, and the governance to support their improvement, is a core focus of this thesis.

3.2.1.4 - Other Explanatory Variables

Other explanatory variables can affect energy demand. In the short term, weather can affect demand (DECC, 2015i). Also, Haas (1997) highlights that income is important, but acts only as secondary drivers to energy demand, in that it has an effect on the primary behavioural and structural drivers. For example, those with a higher income are likely to own a larger house, which can increase levels of energy demand.

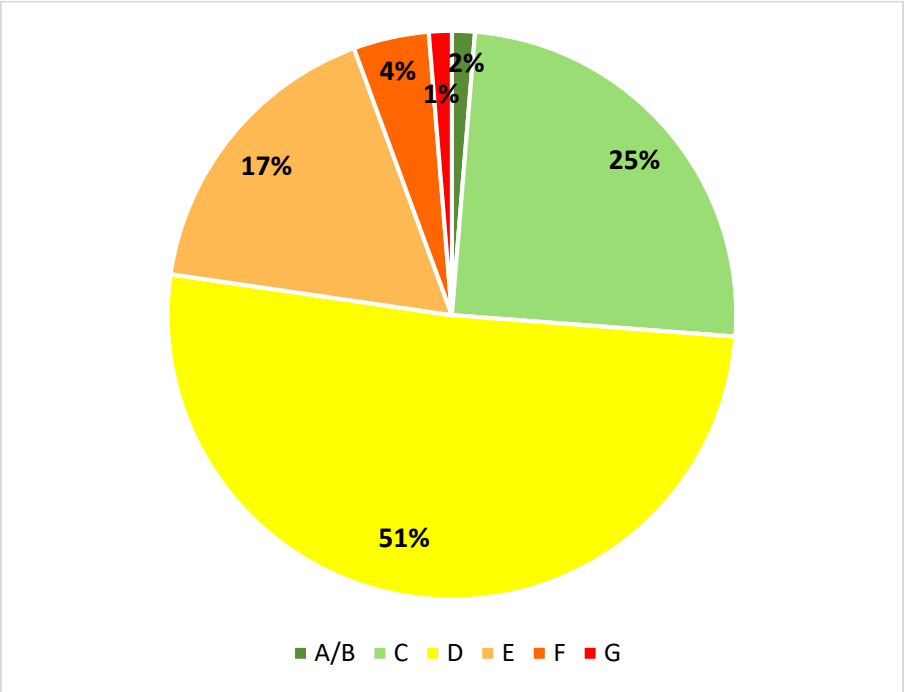
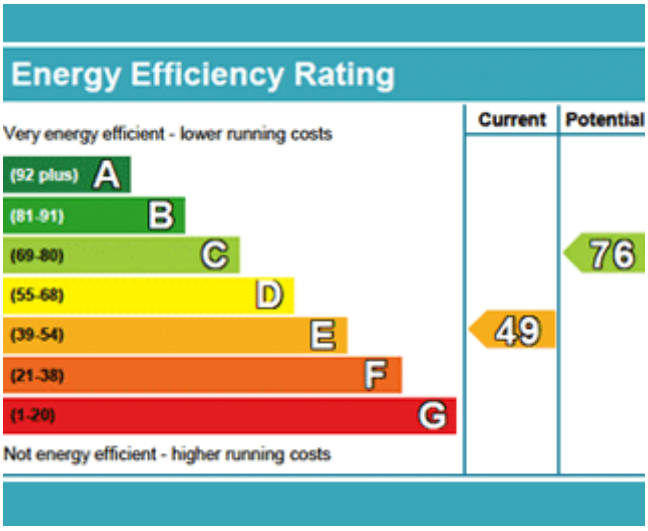


Figure 22 - EPC Distribution of English Housing Stock, Source: Author's Own From Data in DCLG, 2014

Box 3 - Energy Performance Certificates (EPCs) Explained

EPCs were introduced in Great Britain in 2008 as part of adherence to the European Energy Performance of Buildings Directive (EU, 2002). They show the level of efficiency of a domestic property, presented both as a score out of 100 (known as the SAP rating), and as a letter A-G, with A representing the most efficient properties, and G the least efficient. These ratings take into account factors such as thermal efficiency of the building including double glazing, the efficiency of the heating system, and installed lighting etc. Energy consumption in other appliances is not considered however.



3.2.2 – Energy demand over time

Figure 23 shows the total level of final domestic energy demand over time, from 1970 to 2014. Reductions in recent years coincide with increased deployment of energy efficiency measures and condensing boilers (DECC, 2015j), as well as increasing energy prices (DECC, 2014b) leading to deprivation (DECC, 2014p). The 2008 economic recession is also likely to have had an impact (DECC, 2015k).

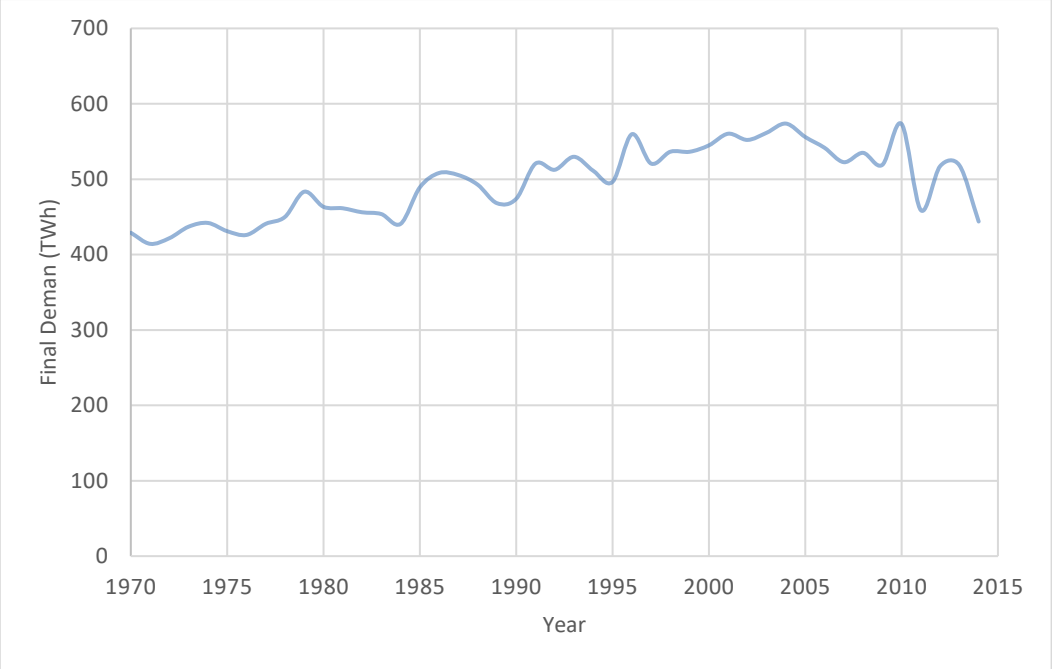


Figure 23 - Total GB Final Domestic Energy Demand 1970-2014, Source: Author's Own from data in DECC, 2015j

There is considerable variation in different households' energy demand. In 2016, the estimated typical domestic consumption volume (TDCV) for a household connected to the gas network was 3100 kWh for electricity and 12500 kWh for gas (OFGEM, 2015c). These figures are used as the basis for discussions around average energy bills, and in communications with consumers. As can be seen in , the range of different levels of consumption means that the TDCV (marked in red) is not wholly representative of a significant proportion of the population. This means that often in policy discussions, the figures used differ significantly for large proportions of the population. OFGEM does also publish typical consumption value figures for high and low demand users, but these are seldom used in policy discussions regarding the average bill. There is also no requirement for suppliers to inform consumers if they are a low, medium, or high user of energy.

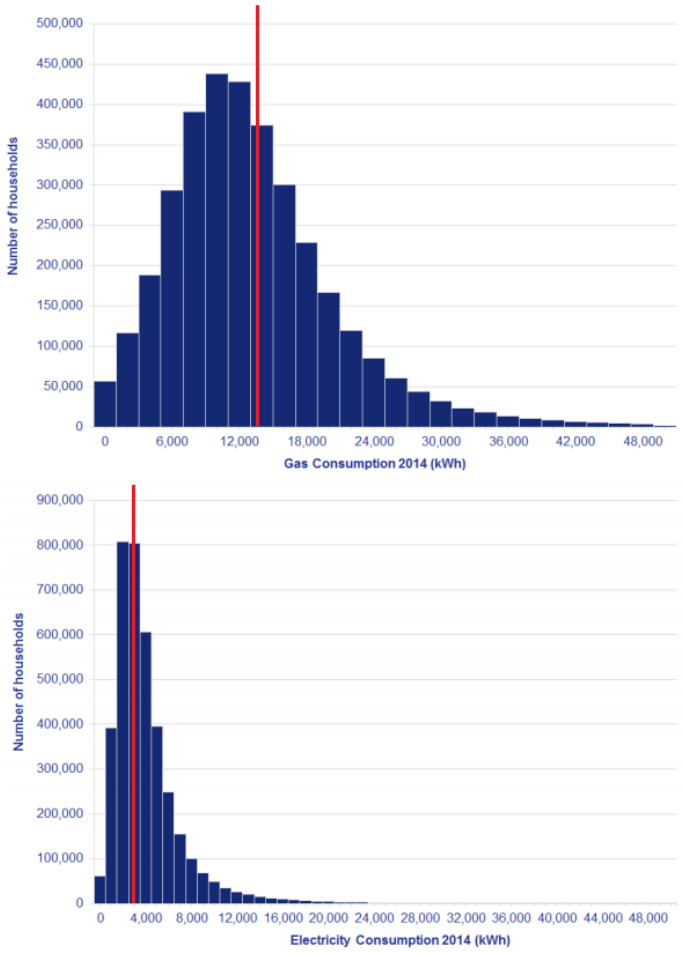


Figure 24 - Distribution of GB Domestic Gas and Electricity Consumption with Typical Consumption Values (2014), Source: Author's Own from data in DECC, 2016d and OFGEM, 2015c

3.3 – Governance and Established Barriers to Energy Efficiency

In spite of the considerable benefits of high levels of energy efficiency, and a number of policies (both past and present) designed to improve the standard of the housing stock, Great Britain still has generally low levels of energy efficiency in the domestic sector (ACE and Energy Bill Revolution, 2015; Pyrko and Darby, 2011). Nearly three quarters of homes in Great Britain are rated EPC grade D or below (see Figure 22). The academic and policy literature offers a number of explanatory factors for this sub-optimal take-up of energy efficiency, often termed as the 'efficiency gap' (Brown, 2001). This section however examines these established barriers through a governance lens.

3.3.1 - Cost

One of the most significant barriers to energy efficiency deployment is cost, owing to the upfront nature of the investment (IPPR, 2013b). This is a particular issue in older properties which cost more

to improve; 36% of the UK housing stock is incompatible with the most cost-effective energy efficiency measures - loft and cavity wall insulation (Morris, 2010). Although there are technical solutions to improving the efficiency of older properties such as solid wall insulation, the costs associated with some such measures can be high (Golubchikov and Deda, 2012). The technically challenging nature of some parts of the building stock is routed in the history of building regulations, with effective regulations for energy efficiency slower to develop in Great Britain than a number of other countries. This has created a form of technological lock-in (Unruh, 2000), making a number of those properties that are most in need of renovation, among the most expensive to renovate - currently only 4% of solid wall properties have solid wall insulation (DECC, 2015f).

Whilst it is true that the high up front cost of measures can form a barrier to an individual investing in improved standards of energy efficiency. This barrier may also be viewed as a lack of access to appropriate finance necessary to support improvement (See: European Bank, 2003; Brown, 2001; Hirst and Brown, 1990). If banks, or some other institution, were able to offer straightforward competitively priced financing for energy efficiency measures, this barrier would be significantly reduced.

3.3.2 - Principal-Agent Problem

Another barrier to energy efficiency deployment is known as the principal-agent problem (Druckman and Jackson, 2008; Brown, 2001; Gillingham et al., 2009). This is the situation where the energy consuming party is not the party who makes decisions around efficiency investment. This exists most notably in the private rental sector (Golubchikov and Deda, 2012) where generally the landlord is responsible for bearing the cost and organisational burden of installing efficiency improvements, but it is the tenant who accrues the benefits. The same issue may also arise in design and construction of new properties. Builders or architects who are responsible for selecting the energy technologies may seek to minimise upfront costs, and it is the residents of the properties which then bear the ongoing cost of such decisions (Gillingham et al., 2009; Brown, 2001).

Through a governance lens, this may be viewed as a failure to put in place the appropriate policy or regulatory regime to ensure that the interests of the 'principal and the agent were more in line with one another, such as through the introduction of regulations requiring a minimum energy efficiency standard, or incentives to encourage higher standards such as combining heating bills with rent.

3.3.3 – Behaviours and Attitudes

The views and attitudes of households, which relate to a number of varied drivers (Mallaburn and Eyre, 2013), can also form a barrier to deployment of energy efficiency. A survey in Great Britain showed that in spite of high levels of concern for energy bills, there is limited support for the idea

that individuals should install insulation measures in reaction to these high bills (Change Behaviour, 2013).

The 'hassle-factor' is another behavioural barrier, this is where the time and effort relating to installing energy efficiency measures, such as finding a reputable and well-priced installer, or clearing possessions out of a loft, can lead consumers to choose not to invest in energy efficiency (Consumer Focus, 2012; Oikonomou et al., 2009; Rosenow and Eyre, 2012; Oxera, 2006). Therefore in spite of the future benefits of lower costs following energy efficiency improvements (Steward, 2014), many consumers do not invest in energy efficiency, even in the face of rising energy prices. This implies that suitable structures have not been put in place to make energy efficiency improvements straight-forward and accessible for households. Although it is impossible to entirely remove the 'hassle-factor', institutions which are able to provide information and support services such as loft-clearance (as was trialled by three South London local authorities in 2013 (DECC, 2013e)) may also facilitate deployment of energy efficiency.

3.3.4 - Information

Finally, consumers often do not have the right information to make informed decisions around which energy efficiency measures are appropriate for them (Consumer Focus, 2012; Gillingham et al., 2009; Rosenow and Eyre, 2012; IPPR, 2013b; OFGEM, 2012a), the pricing of such products (Consumer Focus, 2012), or the savings that they can provide (Gillingham et al., 2009), and Consumer Focus (2012) highlight research showing 15% and 9% of people respectively have never thought of having cavity or loft insulation installed. This is closely linked to issues of the hassle-factor, indicating that either the right institutions are not currently in place, or that they do not have the necessary capacity, to effectively communicate the benefits and opportunities of energy efficiency to domestic consumers.

This section has demonstrated how although there is much that is already understood in terms of barriers to energy efficiency improvements, that reviewing challenges through a governance lens can offer new insight, and possibly pave the way for new solutions to be developed. The following section will examine the governance surrounding some of the policies which have been put in place in Great Britain.

3.4 – Governance of Energy Efficiency and How Energy Efficiency Has Been Delivered

This section will set out the governance relating to a range of energy efficiency policies in Great Britain. The Green Deal and the ECO are two of the most significant features of domestic energy

efficiency policy in recent years, and therefore will be examined in some detail. A range of other policies also exist however - these will be reviewed later in the chapter.

3.4.1 - The Green Deal – A Failure of Governance

The Green Deal is being examined as a case study of a policy which has failed to deliver, in large part owed to the surrounding governance structure.

3.4.1.1 - Background to the Green Deal

The Green Deal was the 2010-2015 Coalition government's flagship energy efficiency policy, and was designed to address a number of barriers to installation of energy efficiency measures. However, specifically which barriers it was designed to address was not consistent between documents. Although principally it was designed to address issues of upfront costs (DECC, 2011e, 2010), a lack of trust in the work of energy efficiency installers (DECC, 2011e), lengthy payback periods of measures (DECC, 2010), and lack of awareness of what options are available (DECC, 2011d, 2010) were also all cited. It appears that the design of the Green Deal lacked a clear objective.

The Green Deal was launched early in 2013 (DECC, 2013g). It was a market-based mechanism relying on the private sector for its delivery (Mallaburn and Eyre, 2013), and represented a considerable change in direction from previous policies based on government/bill-payer funding. Under the Green Deal, the role of government was limited to capacity building, accreditation and compliance monitoring (Mallaburn and Eyre, 2013). The Green Deal offered participants the opportunity to take out a loan to cover the up-front cost of the improvement works, which was then paid back through their electricity bill. The loan was offered by the Green Deal Finance Company, which was funded by the Green Investment Bank (Green Investment Bank, 2015). The loan was attached to the property, not the owner, so future tenants/owners would be required to continue the payments. The basic interest rates for Green Deal loans was 6.96% (this is the rate at which providers were loaned funds by the Green Deal Finance Company). However after set-up costs, and depending on the measures taken out and the timescale of the loan, the effective interest rate could reach in the order of 10% (IPPR, 2013b).

The central pillar of the policy was the 'Golden Rule' whereby the loan repayments should never be more than the projected saving on the energy bill brought about by the energy efficiency measures. The measures that were available under the 'Golden Rule' was established by means of an initial inspection of the property called the Green Deal Assessment (DECC, 2012c). Where the Golden Rule might not be achievable, households would be able to top-up the Green Deal loan with finance from the ECO (DECC, 2011b). Following the inspection, households then arranged with a Green Deal provider to have the measures installed, and the finance schemes set up. The repayment charge

would then begin to appear on the household electricity bill (DECC, 2011e).

Funding for the Green Deal was designed to attract long term investment from a range of institutions including pension and insurance funds. Consultation with potential Green Deal providers demonstrated an interest in off-balance sheet finance, and the opportunity to access financial markets, potentially through the onward sale of Green Deal payments (e.g. through the securitisation of Green Deal receivables) (DECC, 2011e).

The Green Deal was based on a highly complex customer journey, and supporting institutional arrangements (see Figure 25). First, customers arrange for a Green Deal Assessment, which involved a home visit from a Green Deal assessor. This set out what measures were appropriate for install under the Green Deal. The customer then chooses a Green Deal Provider (which was not necessarily the same company that provided the Green Deal Assessment). The Green Deal provider then discusses options available, and any other useful information. The provider gives a quote for various options and calculates a repayment plan when the quote is accepted. The provider then arranges finance, validates data against EPC database, and draws up the Green Deal plan which is signed by the customer, and then triggers the notification to supplier. The provider then engages an installer to come and install the measure, and follows up afterwards to ensure the customer is happy with the installation. The EPC is updated to reflect the new measures, and through the Green Deal Central Charge database (GDCC) suppliers are notified and the customer begins repayments through their bill (GDORB, 2012).

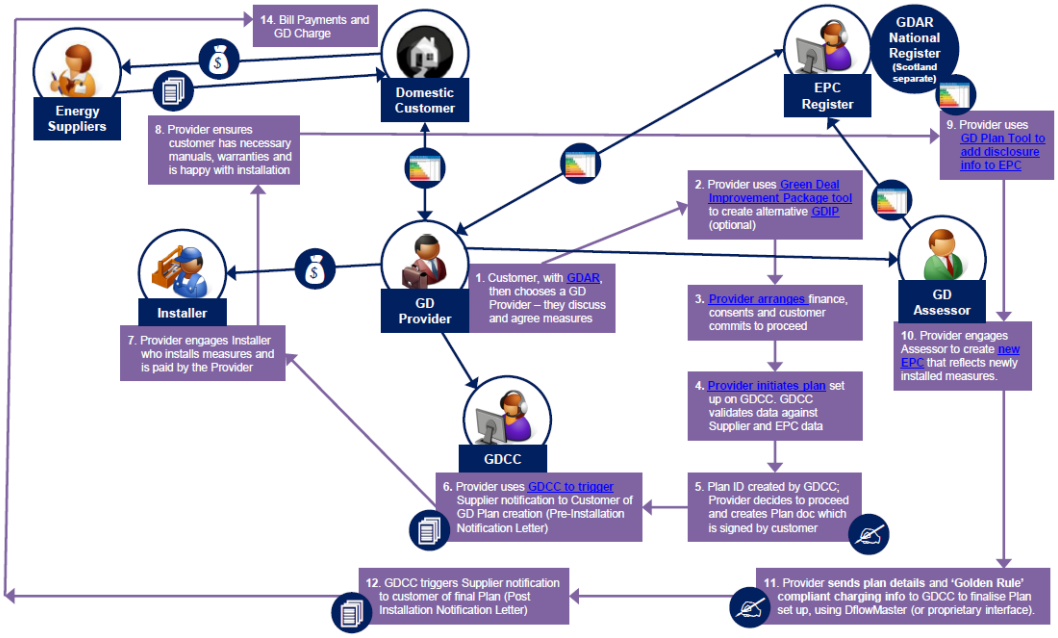


Figure 25 - Green Deal Institutional Arrangements, Source: GDORB, 2012[14]

3.4.1.2 - Drivers of Design

The limited role for government, and the desire to bring private financial providers into the domestic energy efficiency market appears to be a product of adherence to a pro-market ideology. This can be seen in the language of the original Green Deal & ECO consultation document: 'Rather than another government expenditure programme placing a drag on the economy by crowding out an efficient and competitive private sector, Green Deal is designed to draw in greater investment' (DECC, 2011e, p.16). This design is likely to have contributed to the failure of the policy, as Mallaburn and Eyre (2013) note, stating that although energy efficiency schemes are unlikely to be successful without market forces, they will fail if market forces are overly relied upon.

It is evident also that consumer protection was a high priority in the design of the scheme. It is discussed throughout the consultation document (DECC, 2011e) and subsequent impact assessments (DECC, 2012c, 2011d), citing an Australian insulation program which resulted in fires and injuries owing to inadequate certification or monitoring of installations (DECC, 2011e, 2012c). Of the fourteen components to the Green Deal & ECO framework, five of these related to consumer protection (DECC, 2011e). Principally consumer protection was to be achieved through accreditation schemes for different actors in the Green Deal supply chain, overseen by a bespoke institution, created to oversee accreditation and conduct of Green Deal authorised actors. Although consumer protection is an important consideration, the institutional arrangements to designed to ensure it may have served as a barrier to entry for prospective Green Deal providers, limiting opportunities

[14] Larger version of this diagram is available in Appendix F.

for consumers to access energy efficiency measures. This prevented a market in provision of energy efficiency measures developing. Initially it was envisioned that high street brands would be involved with, and promote, the Green Deal. However, this was not forthcoming.

3.4.1.3 - Failure of the Green Deal

Even before The Green Deal's introduction, expectations for success were low. A considerable drop in installations of energy efficiency measures was anticipated in the Green Deal impact assessment (DECC, 2012c), and this was indeed forthcoming (Rosenow and Sagar, 2015). Funding to the Green Deal Finance Company was stopped in July 2015, which put a stop to any new applicants to the scheme (DECC, 2015l). At the end of May 2016, there were 13,146 households with 'live' Green Deal plans, 612 which had fully paid off their Green Deal plans (including those paid off early) and 271 awaited installation. If measures are installed in all those awaiting properties, the total will come to 14,029 households in over two years of the policy running (BEIS and ONS, 2016). This is in comparison 1.9 million households through the Green Deal's sister policy, the Energy Company Obligation (ECO) (BEIS and ONS, 2016), and far behind the then Junior Energy Minister Greg Barker's hope of reaching fourteen million homes with the Green Deal by 2020 (Barker, 2011).

A number of critiques and explanations for the Green Deal's failure have been offered. IPPR (2013b) highlights that the first point of contact for the Green Deal, the Green Deal assessment, often carried a charge in the order of £100. This appears to work against one of the main aims of the Green Deal to overcome the upfront cost of energy efficiency. IPPR (2013b) also demonstrated that the fundamental basis of the Green Deal works to cancel out the financial incentive for investing in energy efficiency (see Figure 26).

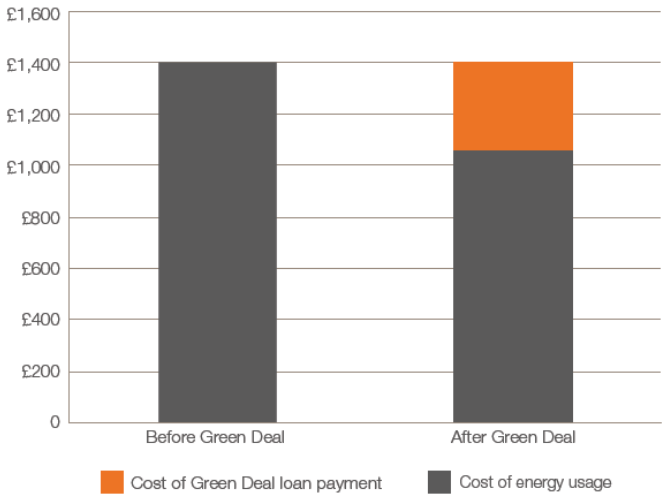


Figure 26 - Impact of a Green Deal Loan on an Average Energy Bill for Properties with Viable Packages of Measures at an 8% interest rate over 20 years, Source: IPPR, 2013b

Theoretically, if prices were to rise over the payback period, then the financial benefit of the energy efficiency measures would slowly increase, because the repayments would not increase in the way the bill would have done without the measures - effectively freezing a section of the bill. However, this potential benefit was eroded with Green Deal providers given the option to increase loan repayments by 2% per year (DECC, 2012c). This also meant that if energy prices fell, consumers could face higher bills as a result of taking a Green Deal plan. This had the effect of making the Green Deal a carbon-saving measure rather than a cost-saving one, which consumers undertook at risk of falling prices.

Another significant issue with the Green Deal the level of the interest rate - the ~7% interest rate was put in place to make sure loans were attractive to investors, however it appears this interest rate was too high to be attractive to consumers (Rosenow et al., 2013). Although it may be competitive with other sources of unsecured finance (DECC, 2011d), a number of households would be able to secure cheaper finance elsewhere (Rosenow et al., 2013). Those unable to secure cheaper finance elsewhere due to poor credit ratings (often associated with poor debt history or low incomes) face little option but to take out the Green Deal loans, in spite of likely being among those households least able to afford such a high interest rate. The Green Deal's interest rate was considerably higher than a comparable loan scheme available from the KfW in Germany (Rosenow, 2013) and is in stark contrast to the interest-free loans available to public bodies in Great Britain such as local authorities, from the government-backed company Salix (Steward, 2015).

In addition to these issues of take-up, when making payments there is a clear disconnect between the payment mechanism and savings achieved. The Green Deal was paid through the electricity bill, however most savings were likely to accrue in the gas bill (or other heating fuel) (Rosenow and Eyre, 2012). This had the potential to cause cash-flow issues to any households who had different suppliers for their gas and electricity.

The design of the Green Deal appears to have been heavily influenced by a pro-market ideology, and the high interest rate, possible 2% increase on repayments, upfront cost for the assessment, significant anticipated drop in deployment of energy efficiency measures, and complex customer journey imply that the design of the scheme was focussed on delivering best outcomes for investors, rather than best outcomes for consumers. Rosenow and Eyre (2012) set out that although the Green Deal may have, at least in part, addressed the barrier of upfront cost to consumers, there are a number of issues that it did not address. These include the hassle and disruption of building work, the low priority that many consumers give to issues of energy, the lack of advice at the point of installation, or the poor integration of the supply chains of various energy efficiency measures. They cite evidence from previous energy efficiency schemes where suppliers had to offer significant levels

of subsidy in order to entice customers to take up measures. The complexity of the customer journey creates a significant 'hassle-factor' to engagement with the policy. Finally, Mallaburn and Eyre (2013) and IPPR (2013b) both highlight that the novel approach of financing, whereby debt is attached to the property, may carry significant risk with regard to future sale of the property.

The Green Deal also had the negative impact of limiting the switching options of consumers (and future residents of the homes to which the loans are attached). Only suppliers with over 250,000 customers are obliged to collect Green Deal payments (GEMA, 2015), this is likely to cause an issue for any consumer with a Green Deal contract who wishes to switch to a number of the smaller suppliers. Given government's support for switching, this is surprising, however it is possible that DECC was not aware of this implication, as the issue was not commented upon by DECC. Had the Green Deal met Greg Barker's aims for 14 million households by 2020, this would have resulted in over 50% of the market being unable to switch to smaller suppliers, many of which offer some of the most competitive or innovative tariffs in the market. This implies a lack of institutional capacity to connect policies relating to retail markets, with energy efficiency.

The design of the Green Deal represented a departure from a long history of the primary route to energy-efficiency deployment being through a supplier obligation model. Although policy experimentation can support innovation, there was little put in place to ensure an effective transition from the previous supplier obligations, to the Green Deal and the ECO (discussed below), indeed the collapse in installations was fully anticipated. This implies that BEIS (then DECC) lacks either the institutional capacity, or the understanding of the value of energy efficiency to support all aspects of the trilemma, to create a new and effective policy for deployment of energy efficiency measures, When the Green Deal was effectively cancelled in July 2015, no new policy was introduced to replace it. This may be a strong demonstration of current low levels of government commitment to energy efficiency in the domestic sector. Given the poor energy efficiency standard of the British housing stock, such limited commitment to energy efficiency serves to significantly undermine long-term affordability of energy for domestic consumers. The Green Deal serves as an excellent demonstration of poor governance – how a policy constructed around a pro-market paradigm, designed to support the interests of investors rather than consumers, which did not learn from previous policies, can have long-term negative impacts on deployment of energy efficiency,

3.4.1.4 - Green Deal Cash-Back & Green Deal Home Improvement Fund

The low level of uptake in the Green Deal led to attempts being made to improve the situation through the introduction of the Green Deal Home Improvement Fund (GDHIF), and Green Deal Cash back scheme. These both offered cash back for installing measures, but carried no requirement to

actually set up payments through the Green Deal payment mechanism. The GDHIF opened and closed a number of times, originally staying open for just 6 weeks (closing early due to strong uptake). It reopened in December 2014 with an additional £30 million of funding, £24 million of which was earmarked for solid wall insulation, this section of the fund was exhausted within one day of the fund opening (DECC, 2014g) – suggesting there may be some appetite to install such measures when they are well-funded, and not dependent upon a complex institutional arrangement.

3.4.2 - Energy Company Obligation (ECO)

The ECO is included as a case-study for a policy which although more successful than its counterpart, the Green Deal, has faced repeated scaling back and alteration. The governance around the ECO is particularly worthy of study, and in spite of the cuts, at the time of writing in 2016, the ECO represents the largest energy efficiency policy in place.

3.4.2.1 - Background to the ECO

The Energy Company Obligation (ECO) was launched in January 2013[15], and in conjunction with the Green Deal formed the replacement for the Carbon Emissions Reduction Target (CERT) and the Community Energy Saving Programme (CESP) (DECC, 2011e). It also effectively replaced Warm Front (Rosenow and Eyre, 2012). It represented the next stage in a long history of supplier obligations that began in Great Britain in 1994[16] (Rosenow, 2012b). Obligations were originally given to suppliers on the basis that they had a pre-existing relationship with customers, and because competitive firms would aim to deliver their obligations at least cost (CSE, 2014a), because the cost of delivering the scheme is levied from a suppliers' own customer base. This continues, in spite of acknowledgement by OFGEM, and the CMA that there are issues with lack of competition in the retail market (OFGEM et al., 2014) (see chapter two). The continued reliance upon supplier obligations paints a picture of 'energy efficiency policy' and 'supplier obligation' having become synonymous with one another for policy-makers. It is not clear that BEIS has sufficient institutional capacity to design an effective alternative model, and following the failure of the Green Deal there is a risk they will be reluctant to experiment with alternative delivery models in future.

The ECO was originally designed to support installation of efficiency measures in the homes of the fuel poor, and in hard-to-treat homes such as solid-walled properties. The latter was later relaxed to include some 'easy-to-treat' measures, such as loft insulation, but was originally put in place because some measures, such as solid-wall insulation, were likely to be too expensive to meet the Green Deal's 'Golden Rule'. ECO puts an obligation on large domestic energy suppliers (those with more

[15] Although energy companies have been able to count against their target measures delivered since 1 October 2012.
[16] For a timeline of previous supplier obligations, see Appendix G.

than 250,000 domestic electric or gas customers and supplying over 400 GWh of electricity and/or 2,000 GWh of gas to domestic customers) to support carbon and bill reductions. The ECO is scheduled to close in 2018. Owing to the growth of some small suppliers, there are now 11 companies with an ECO obligation - these are British Gas, E.On, Npower, EDF Energy, SSE, Scottish Power, First Utility, Co-operative Energy, Utilita, Ovo and Utility Warehouse (OFGEM, 2015e).

The ECO consists of three primary obligations:

- **Carbon Emissions Reduction Obligation (CERO)** - Initially designed to deliver efficiency measures to hard-to-treat homes, however this has been extended to any properties which require loft or cavity wall insulation. This is measured in tonnes of carbon saved.
- **Carbon Saving Communities Obligation (CSCO)** - Delivering insulation measures to low-income areas[17]. With an additional requirement for 15% of each supplier's CSCO to be met in households in deprived rural areas (This is known as the 'Rural Sub-Obligation'). The CSCO is measured in tonnes of carbon saved.
- **Home Heating Cost Reduction Obligation/Affordable Warmth Obligation (HHCRO) -** Delivering insulation and heating measures to those (or those living with someone) in the Affordable Warmth Group (primarily connected to receipt of government benefit, and the nature of that benefit - sometimes connected to their income and if they have dependents) - those deemed likely to be in fuel poverty.[18] This is measured in pounds of bill savings.

(DECC, 2014m, 2014n)

Each of these obligations has an individual target which is then divided up among obligated suppliers based on their energy volume market share. For a full explanation of how each supplier's ECO target is calculated, see Appendix H. The targets for ECO2 are below:

CERO	12.4 $MTCO_2$
CSCO	6 $MTCO_2$
CSCO (Rural Sub-obligation)	0.9 $MTCO_2$
HHCRO	£3.7 billion

(DECC, 2014l)

ECO has had three periods - ECO1 which ran from 1st January 2013 to December 2014, ECO1.2 which ran from December to 31st 2014 to March 2015 (this featured revised targets following changes to the ECO, see below) (OFGEM, 2014a), and ECO2 which runs from 1st April 2015 to 31st

[17] Defined using the bottom 25% of Lower Super Output Areas from the Indices of Multiple Deprivation in England, Wales and Scotland. Rural households are considered to be those in settlements with a population size under 10,000.
[18] Only those in private tenure and in receipt of a qualifying benefit will be eligible for support under Affordable Warmth

March 2017 (OFGEM, 2015d). Following ECO2, the ECO 'Help to Heat' program will be put in place (BEIS, 2016a).

Suppliers have a number of avenues through which they can fulfil their ECO obligation. Either they can carry out works, contract directly with energy efficiency firms, work in partnership with a local authority, or they are able to go through the ECO brokerage mechanism which works as a blind auction for efficiency measures (OFGEM, 2014a). Consistently suppliers have preferred to contract bilaterally, rather than through the brokerage scheme (DECC, 2014m), with levels of brokerage becoming particularly low following the announcements of cuts to the ECO in December 2013 (DECC, 2015e; HM Treasury, 2013).

3.4.2.2 - Cutting the ECO

As set out in earlier chapters, energy bills in Great Britain have become a political topic, and in spite of being a small portion of the average bill, environmental and social policy costs often attract particular political attention. This was born out in the events that followed the 2013 Labour Party conference. At the conference, then Labour leader Ed Miliband announced that if the Labour Party won the 2015 election, that they would impose a twenty month price freeze upon energy supply companies (Miliband, 2013). The 2010-2015 Coalition government sought to respond to this by reducing costs within the bill, and it was decided that these cost reductions would come from, what David Cameron was quoted in The Sun as referring to as 'Green Crap' (The Sun, 2013). In December 2013, it was announced that the ECO would be the target of cuts which, along with other measures such as direct bill support from the Government, would reduce the average domestic energy bill by £50 (HM Treasury, 2013). This represented a 3.7% saving on the average £1316 dual fuel energy bill (OFGEM, 2015a). Such a small figure appears to suggest the government places greater importance on *being seen* to reduce bills in the short term for political reasons, than to actually deliver significant long term bill reductions. This demonstrates the political nature of energy bills – although energy efficiency measures deliver the best opportunities for long-term reduction of energy bills, the government instead chose to cut energy efficiency policy for short term political gain.

There were issues regarding the level of cuts because there were differing views on the costs the ECO imposed on bills. DECC's central estimate was not dissimilar to the costs of meeting CERT and CESP (approximately £50 per bill). However, as Platt et al. (2012) highlight, there was a high level of uncertainty attached to this prediction. A consultation on changes to the ECO was run from March - April 2014, citing that although the costs of delivery of the ECO appeared to be broadly in line with DECC projections, however this was disputed by the large suppliers (NERA, 2012), which were apparently also concerned that costs would increase in the approach to the initial 2015 deadline.

This was seen in the approach to the 2012 CERT deadline. Eventually, this led to a number of policy changes being imposed, including:

- The reduction of the CERO target by 33%.
- The extension of the obligation to 2017 at the same post-consultation pro-rata levels as the new, lower 2015 target.
- Uplift to reward those that had met their CERO obligations early (see below).
- The inclusion of some low-cost measures such as loft and cavity wall insulation as primary measures under CERO.
- The introduction of a target for solid-wall insulations, (as focus for CERO is likely to move to lower-cost measures).
- The extension of the CSCO rural sub-target area to include 25% of the most deprived rural areas (up from 15%).

(DECC, 2014m)

The effect of these changes was principally to make it easier for the suppliers to meet their obligations. The justification for this was a £30-£35 saving on the average annual domestic energy bill, however this is a very small reduction on an average annual dual fuel bill of £1316 (OFGEM, 2015a). In addition, it was proposed by a number of stakeholders that owing to a lack of clarity around the levels of costs of the ECO, that the level of saving to suppliers may actually be considerably higher than savings passed on - leading to substantial windfalls for suppliers in the order of £245million (ACE, 2014; INCA et al., 2014; CSE, 2014b). Any such windfall was paid for by domestic consumers, with a clear negative impact on affordability of energy. This highlights both a lack of transparency in the costs that some social and environmental policies add to energy bills, but also suggests that BEIS may lack the capacity to accurately assess the cost-saving implications of their policy changes. In addition, neither BEIS nor OFGEM is empowered to *force* suppliers to pass through cost savings through accurately, instead relying on competitive pressure from the retail market to ensure that happens. However as set out in chapter two this pressure is weak at best. The government and OFGEM are able only to place political pressure on the suppliers to pass through the savings that they *believe* to be appropriate, through such measures of threat of intervention in the market.

During the process of the cuts, it was suggested that the move to a reduced target and simplified delivery disadvantaged suppliers that had delivered measures early when costs of delivery would have been higher. This led the government to give suppliers an uplift on measures that had already been delivered against the CERO obligation – making any measures above a 35% baseline worth 1.75

times their previous value (DECC, 2014m). A number of respondents to the consultation where this was proposed highlighted the risk that this could 'lead to lower carbon savings, and greater cost savings to the companies in aggregate, than originally expected' (DECC, 2014n, p.49). However, the government stated that it was happy to accept this risk in pursuit of being fair to suppliers, and so introduced the uplift as proposed. This brought a number of suppliers close to 100% compliance under the new reduced target. The government noted that it expected suppliers to pass on any additional cost savings to consumers, but (as above) put in place no mechanisms to ensure this occurred. The choice to uplift measures in this way once again shows the government to prioritise the needs of some firms, over the needs of consumers – with clear negative impacts on affordability.

Following the cuts, the total estimated annual cost of the ECO fell from £1.35 billion before the cut, to £0.77 billion afterwards (National Audit Office, 2016b), representing a significant drop in funding for energy efficiency.

3.4.2.3 - Targets & Ambition

Figure 27 shows the average level of compliance across all suppliers for ECO2 in November 2016. This includes measures that were carried over from excess compliance during previous ECO periods. Since the start of ECO, over 1.5 million measures have been installed (DECC, 2015g), the majority of which have been either cavity wall insulation, loft insulation, or replacement boilers (in that order) (DECC, 2015g).

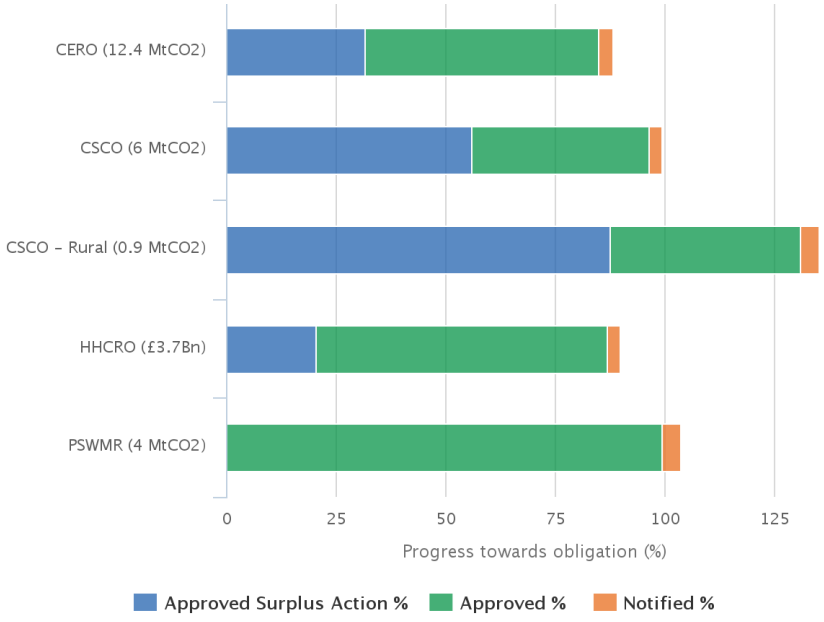


Figure 27 - Total Progress Towards ECO2 Obligations (Surplus, Approved, and Notified) in November 2016, Source: OFGEM, 2016e

The level of compliance exceeds that which is required for the ECO2 period because BEIS has stated that it intends to allow surplus actions from ECO2 to count towards targets under the future 'ECO: Help to Heat' scheme (BEIS, 2016a). Although current progress is good relative to the ECO2 targets, it is evident that these are poor by historical standards. In the switch from CERT and CESP to ECO and the Green Deal, the number of installations fell considerably (See Figure 28).

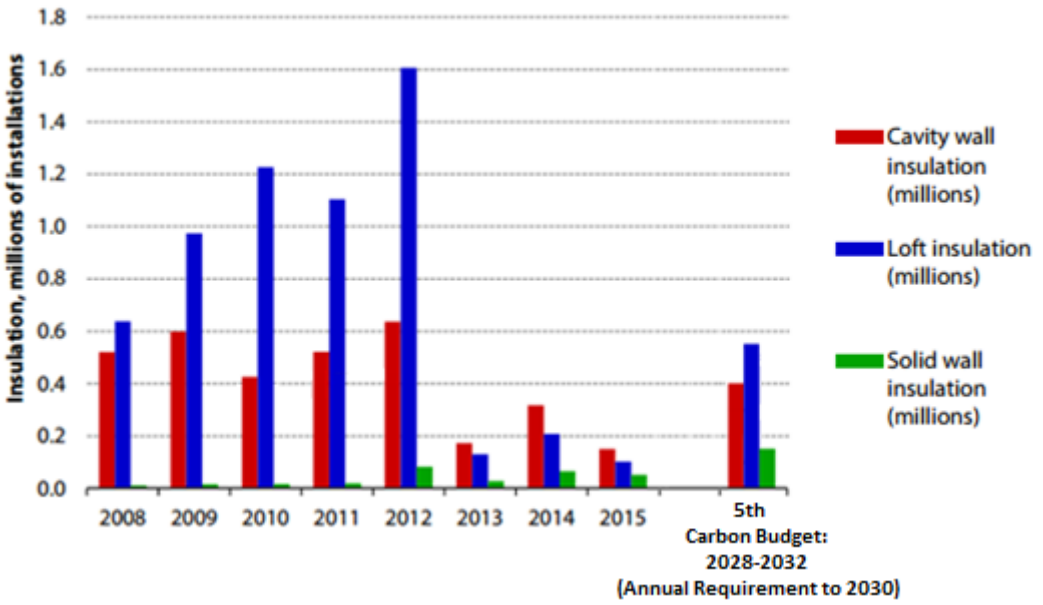


Figure 28 - Delivery Rates of Key Insulation Measures, Source: After Committee on Climate Change, 2016a and Committee on Climate Change, 2016b

The ECO does not appear to be delivering sufficient measures to meet the needs for the 5th carbon budget. This includes the insulation of 2 million solid wall homes, and the insulation of the majority of remaining cavity walls and lofts in homes by 2030 (Committee on Climate Change, 2016a). Figure 28 shows the necessary annual delivery rate necessary every year to insulate 2 million solid wall homes, and all of the remaining cavity walls and lofts by 2030. Although the fifth carbon budget does not specify the treatment of *all* lofts and cavities, this demonstrates the scale of the task. Even if only half of the remaining lofts and cavities were insulated, this would still require annual delivery rates above those being achieved by the ECO. Given the ECO's replacement policy has a significantly reduced budget of £640 million per year (HM Treasury, 2015b), down from the original ECO budget of £1.3 billion per year (DECC, 2012c), current energy efficiency policy does not appear consistent with delivering at sufficient levels to meet the needs of the fifth carbon budget. The cuts to the ECO also may have created long-term challenges with improving the efficiency of hard-to-treat homes. Prior to the cut, 37% of measures installed addressed hard to treat properties, this fell to 9% after the cut (National Audit Office, 2016b). This limits the potential for growing the supply chain for measures to improve hard to treat properties, which is likely to prove essential in meeting the needs

of the fifth carbon budget (National Audit Office, 2016b), and treating at least 36% of homes (Morris, 2010).

In spite of the levels of energy efficiency deployment being far below what is necessary to best support significantly improved affordability, or carbon targets, the government has not expressed any interest in expanding its energy efficiency policies. This demonstrates a fundamental governance challenge for energy efficiency, that even the CCC as a statutory body is unable to force the government to take action on the issue, and there appears to be limited call from the electorate for improved energy efficiency policy, likely in part as a result of a lack of information or interest regarding the significant value in improving the energy efficiency of homes.

The government has taken steps to protect the interests of *some* firms such as the investors in the Green Deal, and the large supply companies, but has not protected the interests of the energy efficiency supply chains, which is largely made up of SMEs whilst failing to protect the interests of consumers through delivery of fit-for-purpose energy efficiency policy.

The changes to the ECO demonstrate the role that politics can play in affecting energy policy. The political pressure to be seen to be cutting bills in the short term led to the significant weakening of one of the few policies which can help to deliver long term bill reductions. The possible windfall that suppliers may have received at the same time further undermines affordability of energy for domestic consumers. Platt et al. (2012) set out that even if ECO were to meet its targets, it would still only be addressing 10% of all households in fuel poverty (based on the 10% measure).

3.4.3 - Other Energy Efficiency Policies

A number of other policies in Great Britain are designed to support deployment of energy efficiency measures. The impact of governance on each of these is reviewed below.

3.4.3.1 - Local Authority Central Heating Fund

This is a £25million central budget which local authorities are able to compete for in order to fund the installation of first-time central heating systems to fuel poor homes that do not currently use mains gas as a primary heating fuel (DECC, 2015p)

3.4.3.2 - Green Deal Communities Scheme

Although this features the Green Deal name, it has little connection with the Green Deal itself. This fund has awarded £88 million to local authorities to promote the roll-out of energy efficiency measures on a street-by-street basis in their areas. Twenty-four local authorities were successful and are able to deploy funding in way best-suited to their areas (for a full list see DECC, 2014k). This,

along with the Local Authority Central Heating Fund create opportunities for engaging local institutions, which creates opportunities for better targeting of measures to those whom need them most, based on local knowledge. This is consistent with learning lessons from Warm Front (see below), however such policy learning seems to be the exception, rather than the rule. The development of capacity within BEIS for greater policy learning would be supportive of improved affordability.

3.4.3.3 - Energy Performance Certificates

As set out above, the energy performance of buildings directive (EU, 2002) introduced a requirement for the vast majority of properties in Great Britain to have an EPC issued when being rented or sold (with the exception of listed properties and holiday homes) - this is designed to create a market value for greater levels of energy efficiency. There is conflicting information as to whether this level of energy efficiency is reflected in the value of the property. Fuerst et al. (2015) show that in some areas of the country, more efficient properties can attract higher market values in the UK, however an EU report suggests that EPC ratings contribute little to the purchase decisions of UK house-buyers (European Comission, 2013). It is not clear that the appropriate structures are in place to explain to house-buyers the potential impact of different EPC ratings, and what options are available to improve them.

3.4.3.4 - Minimum Standards - Private Rented Sector

From 2018, all private rental sector landlords will be required to bring their properties up to a minimum standard of EPC grade E (DECC, 2015n). However, this is only under the condition that works can be carried out at no upfront or net cost to the landlord (DECC, 2015n), and so can only be financed through either the Green Deal (now closed), a supplier obligation, or a similar financial arrangement (HMG, 2015b, 2011). There is also regulation in place meaning that from April 2016 landlords were not able to reject reasonable requests by tenants for improved energy efficiency up to grade E, again providing they can be carried out at no upfront or net cost to the landlord (DECC, 2015n). Grade E is an unambitious target in that it represents bringing properties to a standard which is both below the average standard for properties in Great Britain today (See Figure 22), and below Grade C which is set out as appropriate for limiting fuel poverty in England (HMG, 2014).This may be a fairly moot point however, as the requirement for the landlord to incur no cost once again represents a policy which better supports private interests of the interests of consumers. The closure of the Green Deal, and reductions to the ECO severely limit the opportunities for funding of such measures, meaning in practice there may be very little improvement to the private rental stock.

This again suggests a lack of capacity for policy-making which joins up two areas of energy efficiency policy.

3.4.3.5 - Product Policy

The European Eco-Design policies create minimum efficiency standards for appliances and apply to a wide range of consumer products including refrigerators, freezers, tumble driers, washing machines, dish-washers, televisions, computers, light bulbs, boilers, cookers, and vacuum cleaners (European Commission, 2014a). This has been highly effective in reducing in energy consumption of the respective appliances, most notable in lighting and refrigeration (DECC, 2015j), helping to deliver bill savings for all consumers who use such appliances produced since the rules came into effect. It is not clear what impact the 2016 vote to leave the European Union will have on product standards in Great Britain. Although any appliances produced for sale in the European Union will still abide by these standards, levels of efficiency may decline if there are increased imports from other countries with less stringent efficiency standards. This demonstrates the capacity of the European Union to introduce large-scale regulation, this is likely to be in part owed to the EU being insulated from national-level politics or changes in national government, as well as being in a position to introduce policies which can alter entire markets, spanning across national borders.

3.4.3.6 - Smart Meters

Domestic smart meters are due to be installed in all UK homes by the end of 2020 (DECC, 2013f). These will carry a number of features which do not currently exist in traditional 'dumb meters'. These include the ability for energy companies to read them remotely putting an end to estimated billing (DECC, 2012d), the monitoring of real-time consumption by DNOs (Electricity North West, 2014), the introduction of dynamic tariffs (Owen and Ward, 2010), and the ability for meters to be switched from prepayment to standard-credit meters (OFGEM, 2014f). The feature which is most likely to support reduction in demand however is the combination of the smart meter with an in-home display (IHD). This will allow consumers to monitor their own consumption in real time (Darby, 2012), and is expected to lead to greater awareness of consumption habits. This should help consumers to make more informed choices about how and when they use energy, and so lower their cost of comfort (Darby, 2012, 2006; Wilhite and Ling, 1995), as well as potentially reducing the informational barrier to energy efficiency by allowing consumers to understand more about their energy consumption. There is evidence to suggest that the institution chosen to deploy smart meters, energy suppliers, was a poor choice, and has significantly driven up the cost of deployment (Zhang and Nuttall, 2011), which in turn pushes up energy prices – with negative impacts on affordability of energy.

3.4.3.7 - Building Standards

Building regulations were first introduced in Great Britain in 1965 (Elsharkawy et al., 2011). Today, Part L of the building codes relates to the conservation of fuel and power in new and existing dwellings. For new dwellings, these give a target CO_2 emission rate (TER), expressed as kilograms per square metre of floor area per year; and a target fabric energy efficiency (TFEE) rate expressed as level of energy demand in kilowatt-hours per square metre per year. These together form a minimum energy performance standard for new dwellings, and are currently assessed using SAP 2012 (HMG, 2013a). Part L also covers extensions to existing properties (HMG, 2010), however stops short of requiring additional upgrades to the existing property when homes are extended, as was proposed under the consequential improvements policy (Pickles, 2012) which was quickly abandoned after a strong media campaign by the Daily Mail in which the policy was labelled the 'conservatory tax' (See: Mail Online, 2012).

Previously there were additional requirements on developers of new properties to meet a particular standard of the code for sustainable homes (DCLG, 2010), as well as a requirement that from 2016 new homes would have to be 'zero-carbon' (DECC, 2014o). Initially exemptions were introduced to the zero-carbon homes standard for smaller developments (DCLG, 2015). However now both the code for sustainable homes and the commitment to zero-carbon homes have been repealed. This was justified on the basis of reducing regulatory burden on the building industry (HM Treasury, 2015a; DCLG, 2015).

Although new-build properties will make up only a small percentage of the total housing stock going forward, reducing energy efficiency standards in this way undermines affordability of energy for domestic consumers (in addition to benefits to other aspects of the trilemma), and could lead to additional retrofitting being required at a later date. This would require overcoming the range of barriers to energy efficiency deployment discussed earlier in this chapter. This implies that the decision was based on an anti-regulatory ideology, which is demonstrative of the views set out in chapter one, that ideology can override evidence in policy-making (Metcalfe, 1993).

3.4.3.8 – The Energy Performance of Buildings Directive

The energy performance of buildings directive (EU, 2002) sets out a number of requirements on member states. The principal objective of the directive is to drive improvement of the energy performance of buildings within the EU through deployment of cost-effective measures. The most significant aspects of the directive are a requirement for EPCs to be included in all advertisements for the sale or rental of properties; setting of minimum energy performance requirements for new buildings and major renovation works; a requirement to draw up lists of national financial measures

to improve the energy efficiency of buildings and all new homes must be nearly zero energy buildings from 2021; (EU, 2002).

This once again demonstrates the opportunities that exist at the European level for the introduction of more ambitious policies which are able to effect large-scale change over long periods of time, insulated from national-level politics, or changes in national government. It also implies that the reduction in building regulations set out above may prove to be temporary, as they will be effectively replaced with the nearly-zero energy building standards in 2021. This would imply that the removal of the zero-carbon requirement will lead to a number of lower-standard buildings being constructed, in exchange for only short term reductions in regulatory burdens to developers. This once again suggests that being seen to be doing something maybe more important to government than delivering lasting change, and this comes at the cost of giving those in the building trade time to develop expertise in low-carbon building practices ahead of 2021. This said, since the ruling to remove the code for sustainable homes and the zero-carbon homes, the UK voted to leave the European Union. This means that the future impact of the energy performance of buildings directive in Great Britain, and so future building standards, is uncertain.

3.4.3.9 - Nest (Wales Only)

Nest is a Welsh government scheme designed to address fuel poverty in Wales. The scheme offers free energy efficiency measures to owner-occupier and private rental households who are in receipt of a means tested benefit and who live in a home with an energy rating of F or G. Nest also features an advice service covering energy efficiency, money management, energy tariffs, benefit entitlement checks, and referral to other available schemes (Marrin et al., 2015). This is done through direct marketing, and partnerships with local authorities and a wide range of third sector organisations including Save the Children, CAB, Job Centre Plus, and Disability Wales. These partnerships are designed to support delivery to the wide range of different communities of vulnerable people (Welsh Government, 2014). The Nest scheme has delivered significant benefits to a large number of households - between 2011 and 2014, advice and support was offered to over 61,000 households (4.7% of all Welsh Households (ONS, 2013)), 15,000 of which received energy efficiency improvements at no cost to themselves (Marrin et al., 2015).

3.4.3.10 - ARBED (Wales Only)

This was a two-phase area-based scheme in Wales, which ran from 2010 to 2015, with the aim of improving the energy efficiency of homes in project areas. This was achieved by helping to deliver high cost measures such as solid wall insulation and heat pumps (Merlin Homes and Welsh Government, 2014; Woosey, 2012). ARBED was a small scheme reaching only 0.8% of the homes in

Wales - phase one delivered measures to 6000 homes, and phase two was targeted to reach approximately 4800 homes by the end of 2015, upgrading the majority from an F-grade to a C-grade property (National Energy Action et al., 2014). Arbed drew on a range of funding sources including the Welsh government Social Housing providers, local authorities, energy suppliers through CERT & CESP, and the European Regional Development Fund (National Energy Action et al., 2014).

3.4.3.11 - HEEPS (Scotland Only)

HEEPS describes a raft of measures from the Scottish government aimed at reducing fuel poverty through energy efficiency measures. The largest of these is the area-based scheme, which opened in 2013, and offers funding for local authorities to address fuel poverty in their area (Scottish Government, 2016c). The HEEPS Area Based Scheme has a budget of approximately £66 million per year (2016/17 figure) (Scottish Government, 2015a). The scheme helps deliver solid wall insulation (Scottish Government, 2014) and in 2014/15 alone delivered solid wall insulation to 12,000 households (Scottish Government, 2016b), representing 2.1% of the 566 thousand solid wall homes in Scotland (ChangeWorks, 2012).

The HEEPS also includes the Warmer Homes Scotland programme, which opened in September 2015 and has a budget of £16 million per year, currently set for seven years. Like Nest in Wales, it is targeted at vulnerable households who are either tenants or owner-occupiers. It offers energy efficiency improvements such as insulation, and new heating systems to houses that are not on the gas network (Scottish Government, 2016b).

The HEEPS loan scheme opened in April 2015, and offers zero-interest rate loans to owner-occupiers and private landlords to cover the cost of both energy efficiency measures, and connections to the gas network. Loan amounts vary depending on the measures being installed, but can be up to £10,000 for the installation of solid wall insulation, and a maximum of £15,000 if multiple measures are being installed in the same house. Landlords with multiple properties can borrow up to £100,000 with a maximum of £15,000 per house. Repayment terms vary depending on the value borrowed, but can be up to 10 years (Scottish Government, 2016a; Energy Saving Trust, 2015). There is also a pilot equity-release scheme due to open late in 2016 whereby home owners and landlords will be able to finance energy efficiency measures with a loan which will be repaid when the house is sold (Energy Saving Trust, 2016a).

The position of NEST, ARBED, and HEEPS policies as in place in the devolved administrations is significant. This is because fuel poverty is a devolved issue, and therefore the devolved governments have the power to introduce their own policies to address fuel poverty. The Scottish government in particular appears to be attempting to address some of the well-documented barriers to energy

efficiency deployment, such as the upfront cost barrier and principle-agent problem. It appears that the policy design has taken lessons from the failing of the Green Deal by offering loans for retro-fit on an interest-free basis, and from Warm Front in offering area-based solutions (see below). This implies that the devolved administrations may have a stronger capacity for policy learning; taking lessons from previous policies.

3.4.4 - Previous Supplier Obligations

Prior to the ECO and the Green Deal, there were a number of other obligations on suppliers to improve the energy efficiency of the domestic sector, these are briefly set out below.

3.4.4.1 - Carbon Emissions Reduction Target (CERT)

CERT delivered a range of low-cost energy efficiency measures to domestic households in Great Britain. Although there was a priority target group (based on receipt of particular benefits), it was a generalist policy. CERT brought considerable benefits in terms of bill reductions to the domestic sector. However this was, as the name suggests, principally designed as an environmental policy (Ipsos MORI et al., 2014). This is an important difference because although it did feature a priority and a super-priority group of vulnerable consumers, it was principally a desire for environmental action, rather than affordability, that led to the design of the CERT. The CERT ran from the 1st of April 2008 to the 31st of December 2012 with a target to reduce domestic carbon emissions by 293 million tonnes by means of supporting improved energy efficiency in domestic properties, achieving 73.4 million tonnes of CO_2 savings were secured via professionally installed insulation, 51.2 million tonnes of CO_2 saving through lighting, and 24.3 million tonnes of CO_2 saving through alterations to heating systems (OFGEM, 2013g). 122.5 million tonnes of CO_2 were saved in the priority group (this includes 16.6 million tonnes of CO_2 in the super priority group).

The obligation was placed on any supplier which had in excess of 250,000 customers (this was raised from 50,000 in December 2011). Carryover was permitted from EEC 2 (discussed below). In total, 101.3% of the target was met, however British Gas did not meet its commitments and was financially penalised by OFGEM in 2014 (OFGEM, 2014e). Those suppliers who exceeded their obligation were able to carry over excess measures to the ECO (OFGEM, 2013g).

In the first three years of CERT, large portions of obligations were met through the distribution of low-cost compact florescent light bulbs (CFLs), however it became clear that more bulbs had been distributed than could ever realistically be used (~304 million) - and this, along with the phasing out of incandescent bulbs by the EU meaning that savings from CFLs were no longer deemed additional. This led in the fourth year to a rule change which excluded CFLs (Rosenow, 2012a). In year five, levels of insulation increased in a surge of activity to meet the obligation (OFGEM, 2013g). In

addition to the design of CERT allowing over-deployment of CFLs, the method of accounting for carbon savings incentivised suppliers to insulate lofts to a partial depth (OFGEM, 2010a), rather than the full recommendation of 270mm (Energy Saving Trust, 2016c) i.e. more credit was earned for insulating two lofts to 50% depth, than one loft to 100% depth. Although this is consistent with actual carbon savings, it means that homes may need to be visited again, requiring the numerous barriers to energy efficiency take-up (set out above) to be overcome a second time. This implies a lack of effective policymaking capacity for energy efficiency within BEIS, as it is anticipated that a profit-maximising organisation is likely to take advantage of the cheapest route to delivering energy efficiency – indeed the policy was specifically designed on that basis. This means that a number of suppliers will have received credit for measures such as CFLs that provided little additional carbon saving.

It is evident that towards the end of the CERT scheme, it was becoming more difficult for suppliers to deliver additional carbon savings, with the average cost of carbon reductions increasing significantly towards the end of the scheme (Ipsos MORI et al., 2014). This is likely owed in part to the lowest hanging fruit already having been taken, as well as installers increasing their charges to suppliers in part as a response to the uncertainty relating to the forthcoming change to the ECO and Green Deal (Ipsos MORI et al., 2014). This demonstrates the importance of policy certainty for ensuring measures are delivered at lowest cost. The transition between the CERT and ECO does not appear to have been well managed, with the number of installations experiencing a cliff-edge reduction, as policy was redirected from a simple policy focussing on delivery of low-cost measures, to a complex multi-targeted policy focussing on delivering high cost measures, accompanied by a new loan scheme (see Figure 28).

Although the CERT was not without its short-comings, it led to the delivery of loft insulation to 6.8 million homes (both DIY and professionally installed), and cavity wall insulation to 2.8 million homes (OFGEM, 2013g). There were significant challenges gathering data relating to the bill-savings households experienced as a product of these measures (Ipsos MORI et al., 2014), however these measures will continue to support affordability of energy in millions of households for a number of years.

3.4.4.2 - Community Energy Saving Programme (CESP)

CESP ran alongside CERT, from October 2009 to December 2012, and aimed to deliver 19.25 million tonnes of CO_2 reductions through measures to the domestic sector in low-income areas of Great Britain, identified as being Lower Super Output Areas (LSOAs) in England and Wales, and Data Zones in Scotland. CESP was an obligation for suppliers with over 50,000 domestic customers, and

generators who generated more than 10 TWh/year (OFGEM, 2009b). CESP led to ~75000 external solid wall insulation installations, ~60,000 new heating controls being installed, ~43,000 replaced boilers and ~23,500 lofts insulated, however still only realised 84.7% of its obligation (OFGEM, 2013h).

CESP had a number of innovative design features. The first of these is a 'whole house bonus' - which meant greater accreditation was given where more than one measure was installed in the same house. This led to two or more measures being installed in 60% of houses, although only 20% had three or more (OFGEM, 2013h). Although not entirely effective, this bonus shows an acknowledgement of the benefits of attempting to maximise deployment of measures within a household, once barriers had been overcome. The other bonus was area based - when 25% or more of the dwellings in one area were treated by the same generator or supplier, however this faced challenges in implementation because the boundaries of low income areas (as measured by the LSOA) did not necessarily follow the boundaries of communities/estates. This again, although not without challenges, encouraged the leveraging of localised advertising, and information spreading by word of mouth (Ipsos MORI et al., 2014).

Although CESP was considerably smaller in scale than CERT, it still delivered significant benefits. In addition to the improvements in thousands of homes, CESP is credited with helping the development of institutions in the solid wall insulation industry – in January 2013, 39% of all installations of solid wall insulation installations in Great Britain were attributed to the CESP (Ipsos MORI et al., 2014).

3.4.4.3 - Energy Efficiency Commitment (EEC) - Periods 1 & 2

The EEC was the precursor to CERT and CESP, and ran from 2002-2008. This was imposed upon energy supply firms with more than 15,000 customers for EEC1, and 50,000 customers for EEC2. It aimed to deliver 130 TWh of energy savings from the domestic sector in order to reduce carbon emissions, with the target divided based on number of customers, with at least 50% of reductions to be from priority group. Excess measures were carried over from EEC1 to EEC2, and then on to CERT, which led to EEC2 achieving 144% of its target reductions (OFGEM, 2005, 2008).

3.4.4.4 - Energy Efficiency Standards of Performance (EESoP) - Periods 1-4

These were the first supplier obligations of this type in Great Britain, delivering a range of measures including condensing boilers, with the four periods of EESoP running from 1994 to 2002. Initially it applied only to electricity suppliers, but gas suppliers were introduced from EESoP 3 (Rosenow, 2012a). Compared to later obligations, these early EESoP targets were very limited (Staniaszek and Lees, 2012), however they laid the groundwork for the supplier obligation model.

3.4.4.5 - Warm Front

Although not a supplier obligation, another significant past policy was the Warm Front scheme. This was introduced in 2000 and was a government-funded scheme delivering energy efficiency measures to households in receipt of particular benefits (Boardman, 2009). Vulnerable consumers entered the scheme through a network of local referral organisations, often cited as a strength of the scheme (DECC, 2014j). The exact design of the scheme shifted throughout its life, with a National Audit Office report in 2009 triggering an increase in the maximum per-household spend (National Audit Office, 2009). In 2011, criteria for eligibility was changed, with the range of qualifying benefits being reduced, alongside the introduction of an energy efficiency standard assessment (DECC, 2014j), something some have suggested made the targeting of warm front too narrow (DECC, 2014j). The narrowing of the criteria coincided with budgetary cuts (DECC and Carillion, 2013). From 2005 to 2013, the scheme was managed by Carillion Energy Services (formerly EAGA) (DECC, 2014j). Over 1.5 million homes were supported by Warm Front between 2005 and 2013, 922,000 of which received major measures such as new heating systems and cavity wall insulation (DECC, 2014j). The total cost over this eight year period was £2.1 billion, with spending ramping down towards the end of the period (DECC, 2014i). The scheme eventually closed in 2013 (DECC and Carillion, 2013).

3.4.5 – Impact of Energy Efficiency Governance on Affordability

This section has demonstrated some significant shortcomings with the governance structure in Great Britain which holds back deployment of energy efficiency measures.

Previous policies have predominantly been designed around the supplier obligation principle, each iteration of which have had some design issues, but have also yielded some successes (albeit from a fairly low baseline) - millions of homes have now been insulated, and the CESP supported significant growth in the supply chain for solid wall insulation. The design of the Green Deal suggests that BEIS (then DECC) lacks institutional capacity for policy learning, as it was based not on the successes of the past, but on a pro-market, anti-interventionist ideology. This appears to be what Metcalfe (1993) eluded to in suggesting that often in policymaking ideology can override evidence. The pro-market ideology (an ideology also reflected in the reduction of energy efficiency requirements for new buildings) in part led to the complex institutional structure which appears to have contributed to the policy's failure. A lack of institutional capacity to join up different policy areas is also apparent – had the Green Deal been successful, it had the potential to fundamentally undermine the energy retail market. BEIS' institutional capacity regarding effective design of energy efficiency policy is further called into question by the shortcomings in the CERT regarding CFLs, and the accreditation of loft insulation under the ECO not supporting a right-first-time approach.

The ECO demonstrated the political nature of energy bills. Cuts were made that appeared to have little impact on domestic consumers' bills, but undermined long-term affordability through reduced funding for energy efficiency and further undermining the energy efficiency supply chain. Cuts were such that deployment rates do not appear to be sufficient to meet the fifth carbon budget, which will require even greater action in other areas. Given energy efficiency measures can be some of the most cost-effective ways to reduce carbon, this is likely to inflate the costs of meeting the target. A lack of transparency in policy costs meant that it was possible that suppliers realised significant windfall savings from the cuts, and there was no mechanism put in place by the government to ensure that cost savings were fully passed through. The way the cuts were managed, with an uplift to suppliers that had delivered a portion of their obligations already, appears to prioritise the interests of suppliers over the interests of either consumers, or those firms in the energy efficiency industry. This is reflective of a supply-side bias in policymaking.

The introduction of minimum energy efficiency standards for private rental properties had the potential to significantly improve an important part of the building stock. However, the weak design that was eventually introduced appears to prioritise the interests of landlords – an issue that was further exacerbated by the removal of the Green Deal, without announcement of a replacement policy.

Finally, the EU has been shown to be a particularly important institution in delivery of energy efficiency policy through standards for new products. The EU is able to enforce regulation which spans across borders, which can alter entire markets for goods. It is not clear however, following the 2016 vote for the UK to leave the EU, what the enduring impact of European policy will be on affordability of energy for domestic consumers.

3.5 - Addressing Fuel Poverty

3.5.1 - Fuel Poverty Strategies

As noted above, improving energy efficiency is now a key part of addressing issues of fuel poverty because this reduces energy needs and so means a fuel poor household is more easily able to meet its energy needs. A number of strategies have been developed which take this approach. As set out above, fuel poverty is a devolved issue, and therefore there are separate fuel poverty strategies for England, Scotland and Wales. This is in contrast to the ECO, the largest policy for energy efficiency deployment, which is a national policy.

3.5.1.1 - England

The English fuel poverty strategy was launched in 2015 (HMG, 2015a), and was the first for over a decade. It was based on the LIHC indicator of fuel poverty (see chapter 1), and set out a new target: '…to ensure that as many fuel poor homes as is reasonably practicable achieve a minimum energy efficiency rating of Band C by 2030' (HMG, 2015a, p.12). This target replaces the previous target, repealed in 2013 (HMG, 2013c), to as far as was reasonably practicable, eradicate fuel poverty completely by 2016. The repeat of the wording 'reasonably practicable' is an important feature of both targets, because it was this wording that led to the failure of a judicial review in 2008 launched by Friends of the Earth and Help the Aged, based on concerns that the government was not doing enough to address fuel poverty. The judge ruled that 'everything reasonably practicable' does not imply an unlimited level of funding to achieve the objective, that by formulating a strategy the government had complied with its legal obligation, and accepted that the government had made sufficient effort to comply with its target (Boardman, 2009).

Although the focus on energy efficiency as a path to addressing fuel poverty is consistent with fuel poverty literature (See: Boardman, 2009; Ekins & Lockwood, 2011; Fuel Poverty Advisory Group, 2013; Stockton & Campbell, 2011; CSE, 2014), the strategy offers very little in terms of new measures, other than £3 million of funding for pilot projects for energy efficiency deployment (HMG, 2015a). The other policies that are referenced in the strategy are the ECO, the Green Deal, and low energy building regulations. All of these have been either reduced in scale, or cut completely in recent years. This implies that fuel poverty is not a high priority for the government. This may be linked to the fact that people who are less well off financially are less likely to vote than their more well-off counterpart (JRF, 2015; IPPR, 2013a).

Little consideration has been paid to the significant barriers to energy efficiency measures. Rather than taking a 'right-first-time' approach, the strategy contains interim targets of all fuel poor homes to be upgraded to EPC grade E by 2020, and then EPC grade D by 2025, ahead of grade C by 2030 (HMG, 2014), meaning that the same property could potentially be revisited three times on the path to 2030, therefore requiring barriers to energy efficiency to be overcome on three separate occasions. This supports the notion that BEIS does not have a high degree of institutional capacity for energy efficiency policy making, in that lessons have not been learned from incentives for loft-insulation under CERT and ECO which encouraged installers to only partially insulate properties. Instead, designing the fuel poverty strategy to require all grade E fuel poor properties to be upgraded to grade C where technically possible by 2020 would be consistent with a right-first-time approach. This approach was not taken however.

The commitments that the government makes in the strategy are largely connected to considering what actions are required to meet the fuel poverty target, making better use of information, focus energy efficiency where it can make the most impact, monitoring delivery of measures, and supporting other bodies attempting to deliver fuel poverty measures (HMG, 2015a). Arguably, these are all things that the government should be already doing to meet the challenges of fuel poverty. This, alongside a target which appears to have little legal force, results in a fuel poverty strategy for England which appears to offer little additional value in the aims of reducing fuel poverty beyond existing energy efficiency policies.

3.5.1.2 - Wales

The Welsh fuel poverty strategy was published in 2010 and features a target to, as far as is reasonably practicable, eradicate fuel poverty in Wales by 2018 (Welsh Assembly Government, 2010), again with no clear criteria defining 'as far as is reasonably practicable'. The strategy does however include some practical steps that would be taken to ensure the targets were met such as building a referral network to ensure policies had maximum reach, and outlines a new scheme to improve access to, and offer funding for, energy efficiency measures for households in the worst depths of fuel poverty. The Older People's Commissioner for Wales has however raised concerns that, in spite of progress in energy efficiency, the 2018 target is not likely to be met (Older People's Commissioner For Wales, 2014).

3.5.1.3 - Scotland

The Scottish government has a target to eradicate fuel poverty by 2016 (Scottish Executive, 2002), and in 2011 the Scottish Fuel Poverty forum was commissioned to carry out a review of the Scottish Government's approach to tackling fuel poverty. This recommended that a national retrofit programme to improve energy efficiency was developed, and this led to the creation of the Home Energy Efficiency Programs for Scotland (HEEPS). Although rising levels of fuel poverty in Scotland (Scottish Fuel Poverty Forum, 2014) mean it has now missed its November 2016 deadline, the Scottish government is continuing to focus on fuel poverty - in June 2015 announced that it was making energy efficiency a national infrastructure priority, promising to provide an offer of support to all buildings in Scotland, both domestic and non-domestic, to improve their energy efficiency rating (Scottish Government, 2015b).

3.5.2 – Targeting of Relief to the Fuel Poor

One of the greatest challenges in addressing fuel poverty is effective targeting. This is essential to ensure that funds that are allocated to address fuel poverty reach the right households. The challenges in identifying exactly which houses are and are not fuel poor has given rise to the use of

proxies, which can vary depending on the exact objectives of the policy (See Appendix B). Although these proxies allow targeting to be carried out, they are notoriously inaccurate (See Table 2), and this leads to potentially large amounts of funding going to non-fuel poor households. Policies can broadly be split into those that cast the net wide and so cover a significant percentage of the fuel poor, whilst also capturing a large number of people that are not fuel poor (such as CERT priority group) and those policies that are very tightly targeted, but were not available to large percentages of fuel poor households (such as the post-2011 Warm Front). Although wherever funds or measures are received by non-fuel poor households, this will still have supported affordability, accurate targeting of priority groups is essential to provide the most relief to where it is most needed (Stockton and Campbell, 2011). Table 2 from NatCen Social Research and CSE (2014) shows how a number of current and previous policies fit in this balance,albeit this is not comprehensive as winter fuel payments are not included.

Table 2- Fuel poverty targeting efficiencies of current policies (10% Measure),
Source: NatCen Social Research and CSE, 2014

Policy	Percentage that are Fuel Poor	Percentage of the Fuel Poor Covered/Eligible
CERT Priority Group	25.2%	75.0%
CERT Super Priority Group	27.4%	41.1%
CESP	22.4%	-
Warm Front Pre-2011	30.3%	35.1%
Warm Front Post-2011	68.8%	16.4%
Cold Weather Payments	20.0%	-
Warm Home Discount	28.0%	-
ECO HHCRO	37.2%	51.8%
ECO CSCO	26.9%	12.4%

Improved capacity for data sharing between different departments of government, and executors of energy efficiency policies is often set out as a potential solution to some of the challenges of targeting (Fuel Poverty Advisory Group, 2013). This can help policy-makers to understand the makeup of society at large and so design better policies, as well as reducing the burden of data-collection, and allow for proactive marketing of measures to specific households (NatCen Social Research and CSE, 2014). The potential of data-sharing has been demonstrated through reforms to the pension act which allowed data-sharing to occur for better delivery of the Warm Home Discount (DECC, 2016d). Calls for data-sharing such as this assume a continuation of the current top-down

method of deployment, whereby strict criteria may be specified by central government for the deployment of energy efficiency measures. This overlooks the possibility that an alternative set of institutions, with local knowledge, could be well-placed to support better targeting of measures.

Through whichever means it is achieved, accurate targeting is necessary to ensure measures are delivered to those households that are most in need. Given the close relationship between fuel poverty and energy efficiency of a property, property efficiency should form a key part of the targeting process (Boardman, 2009). To this end, Durham Country Council and The Commission for Rural Communities have put together a guidance document for local authorities for how to construct a database of housing standards in their area for the provision of accurate fuel poverty relief (Commission for Rural Communities and Durham County Council, 2011). This demonstrates the potential for local institutions to support energy efficiency deployment.

3.6 – Governance of Income Policies

This section sets out policies which are designed to increase income expressly for expenditure on energy bills, and such policies are considered in scope for this investigation.

3.6.1 - Winter Fuel Payments

Winter Fuel Payments, otherwise known as the Winter Fuel Allowance, makes a single annual payment from the government to people of pension age to contribute to the cost of heating in winter. Payments are of between £100 and £300, depending on age and living arrangements. The cost of this policy amounts to approximately £2.08billion per year (Kennedy and Parkin, 2016b). Beatty et al. (2014) carried out behavioural analysis on recipients of the payment and demonstrated that the average household in receipt of payments only spend approximately 47% of the payment on fuel. This may suggest that the payments are higher than is necessary, and funds could be more effective if directed differently. Alternatively, funds could be added directly to recipients' energy bills in the same way as the Warm Home Discount (discussed below). If winter fuel payments are to be considered a measure to combat fuel poverty, then questions may also be raised about the efficacy of targeting, as only ~26% of fuel poor households in England have at least one occupant over 60, (based on the LIHC measure) (DECC, 2016b), meaning a significant amount of money goes to non-fuel poor households.

3.6.2 - The Warm Home Discount

The Warm Home Discount gives £140 off the electricity bill of eligible households, placed as credit directly onto the accounts of targeted households, or claimable as a voucher for those households with prepayment meters. The 'core' group is defined as pensioner households on low-incomes who

are in receipt of the guarantee element of pension credit. The 'Broader Group' is defined by the energy suppliers, based on an OFGEM-set framework (Hough, 2015). In 2014/15, suppliers paid a total of £306 million in direct bill support (OFGEM, 2015n). The cost of the Warm Home Discount is met by suppliers through a levy on energy bills. It is estimated that in 2014/15 the payments lifted 172,000 households out of fuel poverty, but the costs levied on bills pushed an additional 74,000 households into fuel poverty (based on the 10% measure of fuel poverty) (Hough, 2015). An alternative arrangement could be to place eligible consumers on the cheapest priced tariff, as often those on low incomes are on standard variable tariffs (OFGEM et al., 2014), which can be as much as £300 more expensive than the cheapest fixed price deal available (CMA, 2015g).

3.6.3 - Cold Weather Payments

Cold Weather Payments are made to eligible households who are in receipt of particular benefits (see appendix B) during periods of very cold weather. This is classified as when the average temperature at a specified regional weather station is recorded, or forecast to be, 0°C or below for seven consecutive days between 1st November 31st March. Payments are fixed at £25/week. The total cost of the scheme varies significantly from year to year - over winter 2012/2013 payments totalled £146 million, whereas in winter 2013/14 they totalled £27,500 (Kennedy, 2014). Payments are made out of the government social fund. Cold Weather payments are usually paid within three working days of being triggered, and if recipients have internet access, they can monitor if payments have been triggered in their postcode area (Kennedy and Parkin, 2016a).

3.6.4 - Impact of Governance of Income Policy on Affordability

Income policies set out above provide support specifically for expenditure on energy to over eight million households (DWP and ONS, 2016). However, there is evidence to suggest that the winter fuel payment, by far the most expensive of the policies, is poorly targeted and that nearly half of the funds are not spent on fuel (Beatty et al., 2014). Given that between 50% and 90% of Big Six customers (depending on the firm) are on high-priced SVTs (CMA, 2015j), and this is closely associated with vulnerable consumers (Kuzemko, 2015b), it is also possible that simply by offering a suppliers' cheapest tariff to those customers who receive a Warm Home Discount, much of the cost burden on other consumers could be relieved (although there is a risk this could drive suppliers to increase average prices). The scale of these policies is far larger than Britain's energy efficiency policies. In England there is the £25 million tax-payer funded Local Authority Central Heating fund (DECC, 2015p), the £88 million Green Deal Communities scheme DECC, 2014g), the £16 million NEST scheme in Wales (Welsh Government, 2014), and £74 million HEEPS scheme in Scotland (Scottish

Government, 2014). When combined with the bill-payer funded £770 million post-cut ECO budget (National Audit Office, 2016b) gives a total of £973 million on energy efficiency – less than half of that spent directly funding energy expenditure by bill-payers, and the vast majority of the energy efficiency budget is funded through bills, rather than taxation.

It is also important to note that while these policies provide short term relief from high bills, payments are kept up perpetually – this is in stark contrast to the lasting relief offered by a one-off installation of energy efficiency measures. Assuming that public expenditure is a good indicator of what is considered important by a government, energy efficiency policy appears to be the poor cousin to policies boosting income (particularly focussed on a core voter demographic of the Conservative party (Ipsos MORI, 2015c)) - this demonstrates both the political nature of energy policy, and how demand-side measures are often receive less support from policymakers.

This imbalance of funding between direct bill or income support, and energy efficiency measures, drivers up energy bills whilst doing focussing less resources on long-term bill reductions. This therefore undermines long-term affordability. If funds for direct bills support were redirected, or matched, towards energy efficiency measures, then lasting affordability of energy could be delivered. The impact on affordability of this weak support for energy efficiency measures is exacerbated by the lack of connectedness in policy-making of different areas of energy policy. If those on receipt of bill support that are not already on the cheapest tariffs were moved onto them large sums of money could be saved and redirected to energy efficiency projects. Under the current regime however, energy suppliers receive significant windfalls, paid for by the tax-payer, through income/bill support delivered via consumers who are on high-price energy tariffs. It is therefore clear that more joined-up policy making in this area could yield significant befits for the affordability of energy, particularly for vulnerable consumers. However, there is evidence that government may not have the institutional capacity to deliver such joined-up policymaking such as this.

The payment of income policies specifically for expenditure on energy is the least-interventionist, most ‘status-quo’ means to supporting affordability of energy in that it requires no changes to any aspect of the governance framework. However, as set out above, it does not necessarily represent good value for consumers, and delivers large taxpayer-funded windfalls to energy suppliers. However, it is likely that in absence of reform to support a more affordable energy system, that a number of consumers are likely to be reliant upon these income policies. This means in order to remove them; other steps must be taken to ensure that issues of fuel poverty are not worsened.

3.7 – Conclusion

Following the setting out the literature pertaining to the amount of energy domestic consumers use and drivers for the amount of energy they need, this chapter has taken a fresh look at energy efficiency policy through a governance lens. This demonstrated that the governance structure in Great Britain is not supportive of delivering energy efficiency measures, and this has negative implications both for general affordability, and for fuel poverty.

Institutions involved in the policymaking process appear to lack institutional capacity to ensure that policies are successful. There are limited signs of policy learning, and in some areas they display a significant lack of connectedness in policymaking – both with regard to the Green Deal having the potential to undermine the retail market, and how the large payments made via the warm home discount, and winter fuel payment could be reduced if suppliers were required to place these consumers on their cheapest tariff. At present these policies appear to lead to significant windfalls for suppliers.

The choice of policy measure seems to be led by ideology, as opposed to outcomes. Policymakers have chosen to repeatedly scale back the supplier obligation, while neglecting to introduce ambitious regulation in its place; with reduced standards in the new-build sector, and only weak standards in the private rental sector – this is in spite of the evidence from the eco-design directive of the benefits that regulation can bring to delivering high standards of energy efficiency. All the while, billions of pounds are spent supporting the bills of some groups of domestic consumers.

Existing and previous policies to deliver improved energy efficiency are consistent with a top-down, supply-focussed model of governance, whereby the focus of policy-making is to ensure consumers' energy needs are met through increasing levels of supply of energy. Policies to improve energy efficiency are very much an after-thought in this system. An alternative governance structure would allow energy efficiency to become a central pillar of energy policy, with additional supply of energy as a last resort, as opposed to the first port-of-call.

This chapter has taken a fresh look at energy efficiency policy through a governance lens. Currently, there is little in the literature which specifically examines the impact of governance on energy efficiency, and nothing which examines it in conjunction with governance affecting prices and tariffs. This thesis will go on to add to the analysis in chapters one and two by means of primary research, in order to establish what might be altered in future to improve the successes of energy efficiency policy-making. The following chapter will set out the methodology which will be used to carryout primary research, before the results of that research are combined with the information contained in this, and previous chapters.

Chapter 4 - Methods

4.1 - Introduction

Having examined the policy and academic literature, this chapter describes the methodology that underlies the primary research which was undertaken for this thesis. It begins by setting out where the thesis is situated in the literature, and the establishment of research questions that are investigated. The methods of primary data-collection are then reviewed, including the selection of interviewees, the use of semi-structured interviews, and the steps gone through in carrying out the data collection. The ethical and methodological risks are also considered, followed by how the data was analysed, how interview transcripts were coded, and how that information was then used.

4.2 - Literature

The first three chapters of the thesis have set out the body of academic and policy literature in the context of governance and affordability of energy. Previously, few links have been drawn between governance of the energy system in Great Britain, and the levels of affordability of energy for domestic consumers, so literature on prices, tariffs, the retail market, and energy efficiency was reviewed through a governance lens. This analysis will then be combined with primary research from Great Britain and Denmark to form recommendations for reform of the governance structure. This thesis is firstly able to expand the body of literature regarding affordability of energy by offering additional explanations for progress, or lack thereof, in pursuit of an affordable energy system. This thesis also expands the governance literature – offering a case study of the impacts that governance can have on outcomes and practices with respect to affordability. There is also limited research which takes a holistic approach to affordability – combining an examination of pricing and tariff policy with consideration of the role of energy efficiency.

4.3 - Research Questions

The research questions generated by the literature review are as follows:

1. Are current governance arrangements regarding pricing and tariffs supportive of affordability of energy for domestic consumers in Great Britain?

2. Are current governance arrangements regarding domestic energy-efficiency supportive of affordability of energy for domestic consumers in Great Britain?

3. What lessons may be learned from the Danish system of energy governance which may be beneficial to affordability of energy for domestic consumers in Great Britain?

4. How might the governance structure in Great Britain be reformed to improve affordability of energy for domestic consumers?

4.4 - Data Collection

4.4.1 - Interviews

In order to answer the above research questions, primary research was combined with knowledge already available in policy and academic literatures. Primary data was collected by means of semi-structured, one-to-one interviews (Longhurst, 2016). An interview is described by Gray (2004) as 'a conversation between people in which one person has the role of researcher' (Gray, 2004, p.213). This technique was chosen because it allows access to information from individuals with privileged knowledge (Mason, 2002; Denscombe, 2010). A semi-structured (as opposed to structured or unstructured) style of interview was chosen in order to ensure that research questions could be addressed effectively, whilst still allowing the freedom to ask additional question to probe more deeply into areas of interest. The chosen methodology for data collection has implications for other aspects of the methodology – for example, semi-structured interviews on a broad topic are unlikely to produce data suitable for quantitative data analysis. This was considered when carrying out analysis of the collected data (see below).

4.4.2 - Identifying Interviewees

Interviews were taken from across the spectrum of stakeholders in the energy systems in Great Britain and Denmark. Selection of interviewees focussed on those institutions with formal policy-setting roles, with supply of energy to domestic consumers, and with interests in energy efficiency, or consumer welfare. Academics and other knowledgeable industry commentators were also selected. A broad range of interviewees were chosen in order to limit any sampling error whereby any one particular group of actors might be disproportionately represented (See Figure 29 and Figure 30). Once an initial list of intended interviewees was established, contact was made to request/arrange interview. Where possible, this was carried out through chains of existing connections - i.e. those who were already known to the researcher were contacted directly, and those whom were not known personally by the researcher were either 'cold-contacted' or contacted by means of an introduction from a mutually-known party. Generally, approaches elicited positive responses, or recommendations of others within the same organisation to contact. Wherever this did not occur however, an alternative representative from the same type of institution was sought in order to maintain the balance of interviewees – i.e. to ensure that one type of institution was not disproportionately represented (see Figure 29 and Figure 30). Initially, all prospective interviewees

were contacted by means of email. An explanation of the project, and an outline of the sorts of questions that would be in the interview was included in this first contact email.

Table 3 shows a list of the interviewees (they are not identified by name in order to comply with requirements for anonymity). Figure 29 and Figure 30 show a breakdown in graphical form of the broad range of different types of interviewee to show the relative balance of different categories of respondent. The smaller sample size in Denmark is owed to budgetary constraints limiting the amount of time that could be spent in the country, and a lower response rate from prospective Danish interviewees led to a narrower breadth of stakeholders.

Table 3 - Interviewees by Number, Location, Institutional Category and Job Description

Interviewee	Country	Organisation Category	Individual Job Role
Interviewee 001	UK	Industry Body	Senior Executive
Interviewee 002	UK	Industry Observer	Senior Consultant
Interviewee 003	UK	Network Company	Energy Policy Specialist
Interviewee 004	UK	Small/Medium Energy Company	Head of Strategy
Interviewee 005	Denmark	Industry Observer	Director
Interviewee 006	Denmark	Industry Body	Retail Market and Energy Efficiency Specialist
Interviewee 007	Denmark	Supplier (Heat - Municipal)	Project Manager - Energy Planning
Interviewee 008	Denmark	Supplier (Large)	Senior Strategy Advisor
Interviewee 009	Denmark	Government	Construction and Energy Efficiency
Interviewee 010	Denmark	Government	Senior Policy Specialist
Interviewee 011	UK	Small/Medium Energy Company	Policy & Regulatory Director
Interviewee 012	UK	Academic	Senior Position, Energy Policy

Interviewee 013	UK	Academic	Senior Position, Energy Policy
Interviewee 014	UK	Local Authority	Senior Role, Energy & Environment
Interviewee 015	UK	Government Body - DECC	Civil Servant, Energy
Interviewee 016	UK	Consumer Advocate	Policy Specialist
Interviewee 017	UK	Industry Observer	Energy Policy Specialist
Interviewee 018	UK	Network Company	Director
Interviewee 019	UK	Big 6 Energy Company	Policy Director
Interviewee 020	UK	Environmental NGO	Head of Energy
Interviewee 021	UK	Small/Medium Energy Company	Wholesale Director
Interviewee 022	UK	Environmental NGO	Energy Policy Specialist
Interviewee 023	UK	Anon	Senior Regulatory Expert
Interviewee 024	UK	Government Body - Other	Senior Position
Interviewee 025	UK	Big 6 Energy Company	Public Affairs
Interviewee 026	UK	Environmental NGO	Senior Energy Policy Specialist
Interviewee 027	Denmark	Industry Body	Manager of International Affairs
Interviewee 028	UK	Industry Observer	Senior Energy Policy Specialist
Interviewee 029	UK	Government Body - Other	Energy Policy Specialist
Interviewee 030	UK	Government Body - DECC	Senior Civil Servant - Energy Efficiency

Interviewee 031	UK	Local Authority	Senior Sustainability & Climate Change Policy Role
Interviewee 032	UK	Government Body - DECC	Civil Servant - Fuel Poverty
Interviewee 033	Denmark	Government	Advisor - Energy Policy
Interviewee 034	Denmark	Academic	Senior Position, Environment
Interviewee 035	Denmark	TSO	Senior Energy System Developer
Interviewee 036	Denmark	Academic	Senior Position, Energy Policy
Interviewee 037	Denmark	Bank	Divisional Vice President - Sustainability
Interviewee 038	Denmark	Academic	Senior Position, Energy Use & Buildings
Interviewee 039	Denmark	Government	Special Consultant - Welfare
Interviewee 040	UK	Consumer Advocate	Senior Energy Policy Specialist
Interviewee 041	UK	Big 6 Energy Company	Policy & Regulations Manager
Interviewee 042	UK	Local Authority	Sustainability Programme Manager
Interviewee 043	UK	Consumer Advocate	Energy Policy Specialist
Interviewee 044	UK	Demand Reduction Technology Manufacturer	Public Affairs & Strategy Director
Interviewee 045	Denmark	Supplier (Electricity)	Energy Policy Specialist
Interviewee 046	European Level	European Commission	Senior Energy Efficiency Specialist
Interviewee 047	UK	Government Body - other	Senior Energy Efficiency Specialist
Interviewee 048	UK	Government Body - other	Energy Policy Specialist

Interviewee 049	Denmark	Government	Senior Energy Efficiency Expert
Interviewee 050	Denmark	Regulator	Senior Energy Policy Expert
Interviewee 051	UK	Network Company	Senior Energy Policy Expert
Interviewee 052	UK	Small/Medium Energy Company	Senior Energy Policy Expert
Interviewee 053	UK	Price Reporting Agency	Senior Market Analyst
Interviewee 054	UK	Big 6 Energy Company	Public Affairs Executive
Interviewee 055	UK	Consumer Advocate	Senior Executive
Interviewee 056	UK	Regulator	Senior Civil Servant, Energy Markets

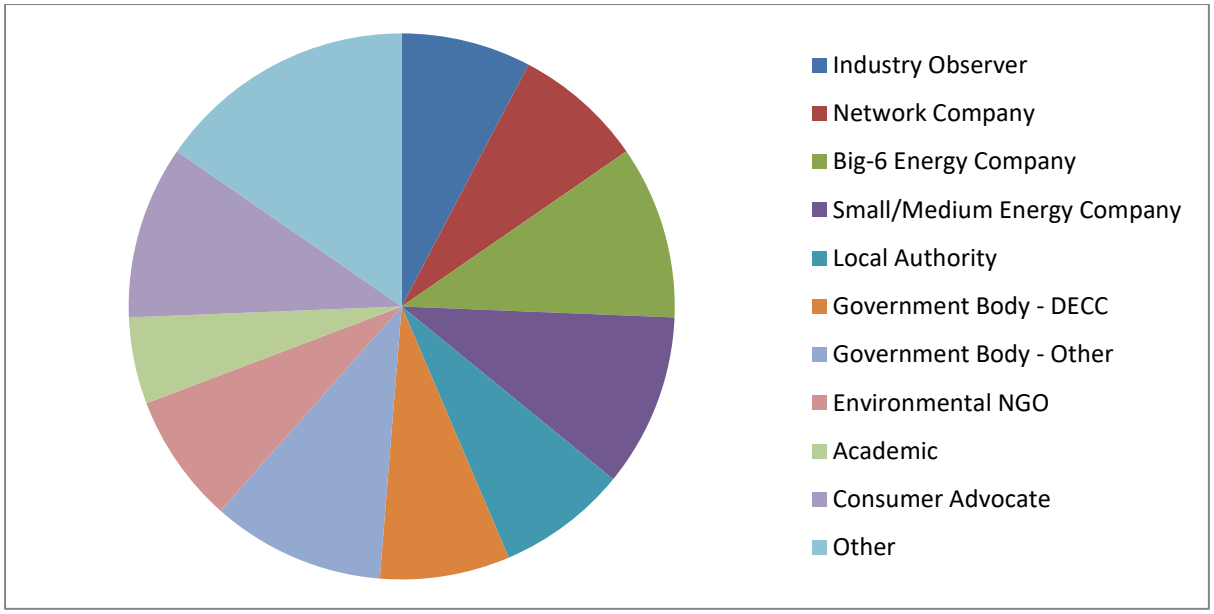


Figure 29 - GB Interviews by Category, Source: Author's Own

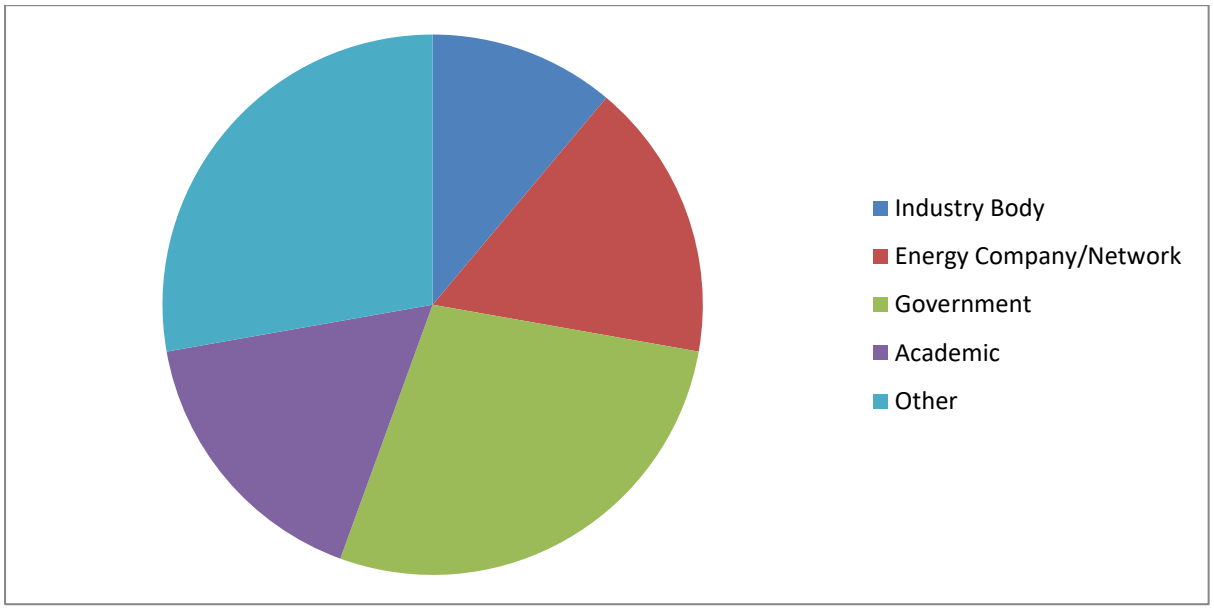


Figure 30 - Denmark Interviews by Category, Source: Author's Own

4.4.3 - Carrying out interviews

Before beginning the interview, irrespective of the medium (i.e. Face-to-face, video-call, or telephone), the researcher explained the background to the research, and the format for the interview, verified mutual understanding of time constraints, explained ethical considerations such as anonymity and confidentiality, and asked the interviewee to sign a consent form covering these matters. This included permission to use audio-recording equipment. All interviewees consented to audio recording of the interview, however there was one instance of the interviewee requesting that the recording device be stopped so she was able to make a comment 'off the record'. The same

discussion preceded all telephone and web-based interviews, however the consent form was sent electronically so the interviewee was able to query any matters and give informed consent for the interview. Interviewees then returned the form either electronically or by post.

Open questions were asked throughout the interview in order to give the interviewee opportunity to give expansive answers, beginning with a question which was likely to be easy for all interviewees to answer. This was done to allow the interviewee to relax and acclimatise to the interview process (See: Mason, 2002), and so answer later questions more fully. This initial question was 'What is your opinion of the general state of the British domestic sector in terms of energy efficiency?' (substituting 'British' for 'Danish' in interviews in Denmark). This was chosen as a very broad question that any interviewee was likely to be able to answer easily, be it from informed understanding of the state of the housing stock, or from general impressions or anecdotal evidence. It was chosen because it was both easy to answer, yet possible that it would yield some useful information. Although the researcher prepared a list of topics to cover during the course of the interview, the order and fashion which they were addressed was allowed to change slightly to fit with the natural flow of conversation. This allowed both the researcher, and the interviewee, the flexibility to explore areas of particular interest or relevance (Bryman, 2012), this is one of the benefits of a semi-structured interview style.

Following the interview, those interviewees that requested it were sent a copy of the transcript of the interview. This was done to help ensure transparency of the process, and to maintain good relations with interviewees.

The majority of interviews were carried out face-to-face, however occasionally it was necessary to carry out interviews by phone or via web-link. Generally, this was a product of geography, such as to enable interviews with Danish interviewees who were unavailable when the researcher was visiting Denmark. On occasion, it was also requested by the interviewee because it was easier to fit phone interviews in between their other engagements. Potential issues were identified with carrying out interviews by web-link such as the interviewee having access to compatible technology. To address this, a range of web-link packages were offered such as Skype, Facetime or Google Hangouts. This issue was further reduced by offering telephone interviews, owing to telephones being a much more universal and ubiquitous technology. Interviews via web-link were however considered preferable to telephone interviews because they allow for virtual face-to-face communication by means of a web-cam. Of those interviews that were not carried out face-to-face, the majority were carried out via web-link, and a small number were carried out by phone. Specialist equipment was also purchased to ensure telephone interviews could be recorded effectively.

All interviews were recorded by means of a dictaphone. This was done to enable the full content of the interview to be captured, without the need for in-depth note taking. This enabled the researcher to listen to the interviewees' responses carefully, noting key points of interest or possible follow-up questions as they occurred. Some note-taking was also performed in case of equipment malfunction, and to facilitate the smooth flow of the interview. Any additional thoughts were added to notes directly following the interview, and these were then examined during the transcription process to add any additional insight that might improve the record of the interview. Interviews generally lasted approximately one hour, however a small number of interviews were shorter, generally owing to the busy schedule of the interviewees. Two interviews were in excess of two hours. Interview recordings were periodically checked as the primary research was carried out to verify good interview practice was maintained across the interview period.

4.4.4 – Interview Questions

As set out above, interviews were semi-structured, the majority of interviews covered all areas of the questions, however on some occasions, due to the overlapping nature of the questions, some questions were not asked directly because they had already been covered in an answer to previous questions.

Great Britain Questions

- What is your opinion of the general state of the domestic sector in Great Britain terms of energy efficiency?
- What is your perception of the cost of domestic energy in Great Britain?
- In your opinion, are there any opportunities at a governance level, to reduce domestic customers' bills?
    - [If so, what are they?]
- In your view, does the governance structure of the energy system enable the reduction of energy demand in the domestic sector?
    - [If so, how? / If not, why not]
- In your opinion, how would you assess the situation regarding fuel poverty in Great Britain?

- In your view, is there a connection between governance and fuel poverty?
    - [If so, in your view, what alterations should be made to the governance of the energy system to help alleviate fuel poverty?]

- Are the governance challenges of reducing the energy demand, or at least the energy needs,

among the fuel poor manifestly different to reducing demand amongst the rest of the population?

- Is there anything further you would like to add?

Denmark Questions

- What is your opinion of the general state of the Danish domestic housing stock in terms of energy efficiency?
- In your view, does the governance structure of the energy system enable the reduction of energy demand in the domestic sector?
    - [What in terms of governance, do you think is the biggest barrier to energy demand reduction in the domestic sector?]
- In your opinion, is there an appetite among the institutions in the energy industry for creating a greater role for demand-side measures?
- In your opinion, how would you assess the situation of affordability[19] of energy in Denmark?

- In your view, is there a connection between governance and affordability of energy?
    - [If so, in your view, what alterations should be made to the governance of the energy system to help alleviate issues of affordability?]

- Are the governance challenges of reducing the energy demand, or at least the energy needs, among the those who struggle to pay for their energy needs, manifestly different to reducing demand amongst the rest of the population?

- Is there anything further you would like to add?

4.5 - Data Analysis

After each interview, it was transcribed verbatim in order to support the process of thematic analysis. Quality checking of interview practice was also carried out during this process. This was done to ensure that the researcher was not asking leading questions or introducing any other form

[19] In early interviews, the term 'Fuel poverty' was used, however it quickly became clear that this is not a term widely understood in Denmark, and so required considerable explaining. The situation for low income households was explored with sub-questions.

of bias. Notes taken during the interview were also combined with the transcripts at this stage. The coding software package 'Nvivo' was used to support the coding process. The researcher's inexperience with this particular software was identified as a potential barrier, and so the researcher attended a workshop on the use of Nvivo, and made use of online resources in order to maximise productivity. The researcher was also able to ask questions and share experiences with a social science research group, an informal group of social science PGR students present on the campus.

Coding of transcripts was an iterative process, with a large number of parent and child nodes developed on the basis of the content of the interviews (For full list, see appendix K). At the end of the coding process, data was re-examined on multiple occasions to see if it might fit better under an alternative or additional node. This enabled key themes to emerge from the data, which were then examined. Codes were interpreted individually, and in relation to one another, in order to identify what may be learned from the data (Lincoln and Guba, 1985). Interviews were designated a number, rather than a name, in order to limit identification of interviewee when analysing and reassigning codes. This was done to avoid introducing bias to the analysis, although the efficacy of this process was limited by the researcher's familiarity with the data. The researcher practiced a self-critical approach to address this issue. When identifying key themes in the data, the nature of the interviewee was considered, to examine if a large number of interviewees of the same category shared a similar view. This was done to avoid over-representation of the views of any one group, and to highlight 'industry lines' on particular topics. The 'categories' of interviewee used are aligned with those used in Table 3.

When writing up the results of the interviews, key themes were identified from the responses of interviewees. These themes were identified in reference to the existing literature as set out in chapters two and three, the definition of governance set out in chapter one, and with reference to the researcher's own understanding of the area which was developed throughout the research process. This process acknowledges the researcher as an important actor in the research process, and allows emergent concepts to be identified (See: Ritchie, Spencer & O'Connor, 2003 and Spencer, Ritchie & O'Connor, 2003). Reflexivity was used during this stage of the analysis to ensure that any pre-existing views did not affect the outcomes of the research (see below), and so the results sections offer a complete view of all relevant themes that emerged from the interviews.

In the results chapters, Quotes from interviewees have also been used in order to exemplify themes within the data and bring greater clarity to the results, and tables have been used to set out the range of interviewees which expressed support for each of the key themes identified. This is **not** an attempt to convert qualitative data into quantitative data but is done to highlight where views may

be clustered within a particular category of interviewees, or held by a broad range of interviewees from different categories. Data is displayed in this way to highlight spread of a particular view among different classes of respondent, not to attach weight to different themes to suggest that one theme is 'more true' than another. The risk of misinterpreting this information in a quantitative fashion is set out by Galvin (2015):

> *It has also been important to show the tenuous nature of the subtle shift from qualitative to quantitative results in some studies, where figures are given for the percentage or proportion of the interviewees who expressed some particular belief, etc. Findings of this kind could be taken to imply that people in general in this situation are like this, i.e. that it is reflected in the target population. This produces misleading results, and it is recommended that qualitative research of this kind remain strictly qualitative and not try to quantify proportions of specific types of responses.*
>
> (Galvin, 2015, p.10)

Conversion of qualitative data into quantitative is appropriate only for large data-sets derived either from surveys or from with much narrower, fully-structured interviews.

4.6 - Methodological Dangers, and Solutions

There are a number of potential shortcomings of semi-structured one-to-one interviews which were considered when carrying out field work and analysis, in order to minimise impact on the research.

4.6.1 - Objectivity

A lack of objectivity during interviewing manifests itself as a researcher's own personal views, beliefs, or experiences influencing the outcomes from the interviews (Russel-Bernard, 2011). This was managed by the researcher recognising and being mindful of this risk, and giving the interviewee space to give full and free responses to questions (see: Strauss and Corbin, 1998). Additional clarity was gained by periodically, throughout the interview, checking understanding with the interviewee (see: Strauss and Corbin, 1998). The semi-structured nature of interviews ensured they were carried out to a consistent framework.

4.6.2 - Validity and Reliability

Validity and reliability relate to the need to design a methodology which is appropriate for accurately examining the phenomenon in question (Russel-Bernard, 2011). In order to help ensure interviews are both valid and reliable, interview questions were carefully chosen to address all research questions, and an interviewer prompt sheet was used to ensure that these areas were all

consistently covered, and that when moving onto a new subject area, the phraseology of the question was maintained. Denscombe (2010) suggests the use of triangulation can support validity of the data, this is the process of checking of data against other sources. However, Mason (2002) suggests triangulation to be a risky approach to validity because it assumes the existence of 'one, objective, and knowable social reality'(Mason, 2002: 190) that may be effectively explained if viewed from many angles. In an attempt to address this balance, a large number of interviews were carried out from a range of stakeholders to ensure data was not skewed significantly by potentially individualistic views. Responses were critically analysed with reference to policy documents, consultation responses, other interviewees responses, researcher's own knowledge, and possible political or financial motivations. Although it is important to note that this practice does not imply that isolated views were discounted, as any such views may be considered valid and interesting.

4.6.3 - Interviewer Effect

The 'Interviewer effect' is explained by Denscombe (2010) as the issue that 'Interviewers, and interviewees come to that, have their own preferences and prejudices, and these are likely to have some impact on the chances of developing rapport and trust during an interview' (Denscombe, 2010: 178). The researcher was able to limit the impact of any prejudices he may hold by being mindful of his own behaviour (reflexivity, discussed below), and consistently conducting himself in a neutral and professional manner. It is not possible however to affect the interviewee's reaction to the researcher, beyond attempting to foster rapport, and a relaxed and trusting atmosphere. Projects with access to more than one researcher may be able to tailor researcher choice to minimise impacts of the interviewer effect, however the financial limitations of this project prevented such a strategy being adopted here. This effect may have been partially reduced during online or telephone interviews however, as the technology can partially 'mask' the identity of the researcher (Denscombe, 2010).

4.6.4 - Reflexivity

The presence of the researcher in the research process may affect outcomes, something which is not limited to the interview process. The concept of reflexivity acknowledges that the history, views, biases and beliefs of the researcher may have an impact on the way the research is conducted, or the results that are produced. In order to avoid this, the researcher *reflected* on his place in the research, and was mindful of how he may be affecting the outcome (Creswell, 2003; Bryman, 2012).

Mason (2002) suggests reflexivity can also be taken in a wider sense to mean continuously thinking critically about what is being carried out and why, calling for the researcher to consistently challenge any assumptions he may, sometimes unwittingly, be making. Mason (2002) goes on to say that

researchers should subject themselves to the same level of scrutiny as their data. Reflexivity was practiced throughout the project to attempt to minimise any distortions brought about by the researcher's history or preconceptions. Reflexivity prompts were included on the prompt sheet for interviews. Advice was also sought from other researchers throughout the project in order to discuss methodologies and research conclusions as they developed.

4.6.5 - Power

The perceived imbalances of power between the researcher and the interviewee may lead the interviewee to hold back in answering some questions (Cohen et al., 2007). The researcher exercised reflexivity in relation to this risk, being sure to make every effort to foster an equal relationship of rapport, and ensuring that the interviews were held either on 'mutual ground' or a place familiar to the interviewee (Cohen et al., 2007). This was generally easily achieved by scheduling interviews at the interviewees place of work or at an independent meeting facility.

4.7 - Ethical Considerations

4.7.1 - Informed Consent

It was essential to gain informed consent from all interviewees. Confirming consent was simple; being secured by use of consent forms. However, as Mason (2002) explains, ensuring consent to be *informed* is less straight-forward. In order address this, full background information on the aims and methodologies of the project were given to potential interviewees when first making contact. This gave them opportunity to ask any questions before consenting to the interview. E-mail was preferentially used as a mode of contacting potential interviewees, as the delayed nature of response allows potential interviewees to consider involvement fully. It was also made clear to interviewees that they have the right to withdraw from involvement at any stage of the process. None of the interviewees were considered 'vulnerable', so they were all able to give informed consent on their own behalf.

4.7.2 - Anonymity

Keats (2000) identifies that anonymity may leave the interviewee feeling 'freer' to respond to questions honestly, and Silverman (2006) goes further, identifying the need to protect the identities of participants in qualitative research simply as 'common sense'. In this project, those interviewed are kept anonymous in all cases, although identification by classification of interviewee and description of job role helps to contextualise the data. This practice was explained to interviewees both verbally, and on a written consent form. All interview data was stored separately to any information that could be used to identify interviewees. Interview transcripts and recordings were

stored electronically on 2 USB sticks, one kept on-site in a locked filing cabinet when not in use, the other stored in a locked box off-site. This was done to observe prudent back-up procedures without the use of a 'cloud' back-up, which may be considered less secure.

4.7.3 - Confidentiality

Interview transcripts were kept confidential, and data was kept secure as outlined above.

4.7.4 - Researcher Safety

The safety of the researcher was guaranteed at all times. No high-risk situations were experienced.

4.7.5 - Boundaries to Research

It is necessary to highlight some of the related areas which were not explored in detail during the process of this investigation. These are considered important in wider debates around affordability of energy, but lie outside the bounds of this research project.

Domestic Consumers - The term 'energy consumers' can usually be taken to include domestic, industrial, services, and transport consumers. However, this project is limited to examination of the domestic sector. It is acknowledged that what may generally be termed as 'domestic consumers' are likely to make extensive use of transport. However, this form of consumption is not addressed. Domestic consumption in this project is framed as energy consumed in or around the home. It is not taken to include ‘embedded’ energy, that is energy required to produce products possessed by domestic consumers (i.e. the energy consumed by a fridge when it is in use will be considered, but the energy that was used in its production will not).

Effect of income on affordability – As set out in previous chapters, policies affecting income are connected with macro-economic or social welfare decisions - such as levels of taxation or income support. Although income forms an essential part of the context to understanding affordability of energy, examination of related policy lies largely outside the bounds of this thesis. For this reason, policy recommendations which would improve affordability, but lie outside the realms of energy policy, e.g. increasing pensions, will not be made. The exception to this is where policies are designed to increase income expressly for expenditure on energy bills.

Heating fuels beyond electricity and gas - this PhD focuses on the affordability of electricity and mains-supplied gas. Virtually every household in Great Britain is connected to the main electricity network to access power for devices and appliances, and approximately 85% of households make use of the gas grid to provide energy for space and water heating (CAB, 2014). Those households that rely on other fuels for space and water heating make use of electricity (9%), Heating Oil (4%),

Solid Fuels (1%), District Heating (1%), and LPG/Bottled Gas (1%) (Baker, 2011)[20]. Due to limitations in time and resources, discussion of cost drivers will focus on electricity and gas. This captures the costs affecting 94% of households' heating fuel supply, and ~100% of households' electricity supply.

4.8 - Conclusion

This section has set out the use of semi-structured interviews across a wide stakeholder base to support answers to research questions. The selection of interviewees focussed on those institutions with formal policy-making roles, supply of energy to domestic consumers, with interests in energy efficiency, or interests in consumer welfare, as well as industry commentators. Interviewees were approached via email to facilitate giving a full background to the research in order to secure informed consent. Interview questions were selected in order to encourage interviewees to relax and so support response-giving. Interviews were transcribed in full and then coded on an iterative basis using Nvivo to gather themes before drawing conclusions. Particular attention was paid to the potential pitfalls of such a methodology, and reflexivity was used at every stage to minimise the risk of these occurring. Potential ethical issues such as confidentiality were also considered. Careful attention was paid to the methodology to help to deliver a project with a highly robust approach, devised in reference to the methodological literature. The following chapters will set out the results from the interviews in both Great Britain and Denmark, which were carried out using the methodology set out in this chapter. These results are then combined with analysis from the literature in the discussion chapter.

[20] NB. These figures do not sum to 100% owing to rounding, and reliance upon a range of data sources.

Chapter 5 - Results 1: Effects of Governance on Affordability of Energy in Great Britain

5.1 - Introduction

This section is the result of thirty-nine interviews carried out with key stakeholders from across the energy system in Great Britain, as set out in the previous chapter. The content of this chapter is based on the themes which emerged from the interviews. To bring clarity to the results, the range of interviewees which supported or opposed such views are given in a table at the end of each section, however as set out in chapter 4, these tables are expressly *not* designed to convert qualitative data into quantitative data, as doing so would be methodologically unsound. Individual quotes are used where necessary throughout each section to demonstrate an area of interest more clearly. This chapter supports the analysis in chapters two and three demonstrating the strong connection between the governance structure of the energy system, and the levels of affordability of energy.

This section follows the structure of the rest of the thesis, by examining the constituent parts of affordability. Following this introduction, this chapter begins with examining the issues identified by interviewees relating to the tariffs, pricing and the retail market. Following this, issues relating to energy efficiency are explored. The fourth section sets out wider governance issues which span across energy efficiency and retail challenges, and finally section five concludes.

5.2 – Governance and Pricing, Tariffs, and the Retail Market

This section sets out the views expressed by interviewees relating to pricing, tariffs, and the retail market. Much of government's response to issues of affordability focuses on reducing prices through increased retail competition. However, interviewees identified a number of governance issues relating to the energy retail market which undermine affordability of energy for domestic consumers in Great Britain.

5.2.1 – Prices

A range of interviewees suggested one of the primary barriers to delivering a more affordable energy system related to issues of price. A common theme was simply that there was an inherent challenge to the government's aim to improve affordability of energy because it has little control over the largest constituent of retail energy prices – the wholesale energy price.

'People expect politicians to do something about energy bills, but the reality is they can't do much about the price of gas.'

(Interviewee 53)

This view is consistent with the findings in the literature review set out in chapter two, and was expressed most commonly by those in small and medium energy companies, however there is no clear reason why views should cluster in this way.

Another common view on pricing related to network charges - a small number of interviewees suggested that there may be an opportunity to reduce bills by reforming the network price control framework. This supports findings in chapter two, however views varied significantly however between those which thought this would lead to significant savings, and others who thought any savings would be likely to be marginal.

When reflecting on price levels, it was reported by a range of interviewees that energy prices in Great Britain are not significantly different to a number of other countries in Europe (albeit no respondent linked this to a low tax rate, or commented on electricity prices being towards the higher end of the spectrum – see chapter 2). Interviewees highlighted that domestic consumers in Great Britain still face high energy bills – owed in large part to the inefficient housing stock. This is consistent with the evidence set out in chapters 2 and 3.

'You can see statistics that show we've got lower than average bills in terms of the cost per unit in Europe, and yet we've got the highest bills, or just about the highest bills in terms of overall cost, which shows that we use more energy than other countries.'

(Interviewee 23)

Although a comparison of prices between countries is an oversimplification in that it does not take account of income levels and relative costs of living in different countries, or the fact that there is a wide distribution of energy prices in Great Britain (see chapter 2), the fact that this belief was expressed by a range of different interviewees, but not by those in DECC is worthy of note. This implies that the fact that energy prices in Great Britain are not significantly out of step with elsewhere is relatively common knowledge within the industry. However, interviewees from DECC chose not to mention it. Although this does not imply that those working at DECC are not aware of how Britain's unit prices compare to elsewhere, failure to highlight this fact is consistent with a department which focuses primarily in delivering policy on affordability by means of reducing prices for consumers by means of supporting competition:

'My number one priority is to keep bills down for hardworking families and businesses across the country. A fantastic way to do this is by switching energy supplier…'

(Amber Rudd, Energy Secretary, 2015b)

Indeed the two-year CMA investigation into the energy market was designed to 'ensure there are no barriers to effective competition in the energy market' (OFGEM, 2014d). There has been no equivalent investigation on how to better deliver energy efficiency measures. The closest investigation to date is the Bonfield Review (Rudd, 2015b), however this has incredibly narrow terms of reference, focusing on information, installation standards and auditing of measures (DECC, 2015m).

	Policy and energy prices										
Category	Industry Observer	Network Company	Big 6 Energy Company	Small/Medium Energy Company	Local Authority	Government Body – DECC	Government Body – Other	Environmental NGO	Academic	Consumer Advocate	Other
Government cannot control wholesale costs	I	I		III		I				I	I
Network charges too high	I	I	I	II						I	
Prices in GB are comparable to other countries in Europe	I	I	I	I			II			I	II

5.2.2 – Regressive Charging

A key theme which emerged from the interviews is that the current structure of charges in energy bills is regressive, in that it falls most heavily on those on low incomes, or who are fuel poor.

5.2.2.1 - Regressive Levy on Bills

As was set out in chapter two, a number of costs for social and environmental policies, such as the ECO and the RO are placed on bills. Several respondents highlighted that levying charges on energy bills in this way is regressive, as the charges do not reflect a consumers' ability to pay, but drives up prices for all. Charging for the ECO in this way is particularly counter-productive given that the ECO is specifically designed to address fuel poverty.

'…I don't think really it is right that energy efficiency is paid for by households, because if it should be paid for by anyone, it should be directly out of progressive taxation, rather than regressively, which I think the energy company obligation is because poor households should

not be paying for the cost of insulation, that should be coming from people that can afford it.'

(Interviewee 16)

A broad range of respondents from different categories put forward this view. It is interesting to note that this included all four of the interviewees representing the Big 6 energy suppliers, on whose bills the majority of these charges rest. This is consistent with previous occasions when the Big Six have objected to the ECO on the grounds it adds costs to their customers' bills (See: Energy and Climate Change Committee, 2013a). These objections should be taken in the context of the large suppliers which are required to include levies for a number of environmental and social policy costs in their bills, and are losing large numbers of customers to a growing number of new entrant suppliers (CMA, 2016c) which are not required to contribute to some of these social and environmental policies, including the ECO (OFGEM, 2015f) – giving smaller suppliers a greater chance of competing. Given this context, and the fact that the Big Six energy suppliers are responsible for some the largest imbalances in the market between fixed-price tariffs to entice engaged consumers, and SVTs charging high prices to the unengaged, it seems unlikely that this rejection of regressive charging is necessarily genuinely related to a strong concern for the welfare of their customers. However, if these charges were to be taken out of energy bills and placed into general taxation, it would be the large suppliers that would have most to gain, in that their reduced costs could either be taken as additional profit, used to further reduce the price of their fixed-price deals to undercut some of the new low-priced market entrants, or used to reduce the cost of their SVT. Given the lack of competition in the area of the market occupied by customers on SVTs, and lack of transparency regarding the true cost of some policies (see chapter 2) there would be little pressure on suppliers to do the latter of these options.

This funding model, particularly in the case of the ECO, is based on the notion that retail market competition will help to keep delivery costs to a minimum (CSE, 2014a), although a lack of a fully competitive retail market appears to undermine this argument (see chapter two). There was no consensus around why, given the number of respondents that consider these charges as regressive, that these charges continue to be levied through energy bills. The appropriate method of funding for social and environmental policies is considered alongside the institutional arrangement in chapter seven.

5.2.2.2 - Regressive Tariff Structures

Some interviewees also suggested that it is not just the charges in the bill which are regressive, but also the charging structure. Currently, with each additional unit of energy that is consumed, the

average unit price becomes cheaper. This is owed to the common 'fixed standing charge + unit charge' structure, meaning that as consumption increases, the standing charge is spread over more units. This not only has the effect of economically rewarding higher levels of consumption, it also means that customers on low incomes who typically consume smaller amounts of energy (CSE, 2011), face a high per-unit cost than their high-income counterparts. This also means that the majority of consumers face a charge even when consuming no energy at all.

> *'At the moment you pay less incrementally for more energy that you use, so if you're in fuel poor household not necessarily using a lot you're still paying quite a bit rather than having say a model where you can go for a survival tariff… that lets you run your fridge, give you X number of hours of TV a day and a light bulb – whatever the basics are.'*
>
> (Interviewee 20)

Interviewees suggested that this regressive tariff structure should be replaced with one which was more progressive, which did not penalise low levels of demand and so was beneficial for low-demand consumers. A number of different structures were proposed, but most reflected the idea that lower levels of consumption should be proportionately cheaper than higher levels. Interviewees that identified the problems with the tariff structures were generally those with a specific social focus, such as consumer advocates and environmental NGOs. No energy suppliers of any size highlighted issues with the charging structure. This may be because each energy supplier will design a charging structure which best reflects their underlying costs, which will generally fit a fixed-cost + variable-cost structure. Possible alternative tariff structures designed to focus on affordability are explored in chapter seven.

	Regressive charging										
Category	Industry Observer	Network Company	Big 6 Energy Company	Small/Medium Energy Company	Local Authority	Government Body – DECC	Government Body – Other	Environmental NGO	Academic	Consumer Advocate	Other
E&S Charges	II		IIII	I		I	I	I		III	II
Tariff Structure					I		I	I	I	II	

5.2.3 – Retail Market Engagement

Lack of consumer engagement through switching is an important part of the explanation for issues with affordability in the current system. A number of interviewees commented on the switching behaviour of domestic consumers, stating that there are a number of customers who are unengaged with the market and so do not shop around to find the best priced energy tariff, staying on high-

prices SVTs for long periods. This results in suppliers being able to make significantly higher revenues from these unengaged consumers, than from their engaged counterparts. A number of interviewees supported the views set out in chapter two, that this means that unengaged consumers, who are often poor or otherwise vulnerable (OFGEM, 2015k), are in effect subsidising the energy bills of the more engaged consumers who switch supplier often to get the lowest prices.

> *'They [The Big Six] have got sticky customers that have been with them for their whole lives that don't know how to switch, or that they even should switch, they will be sticky customers that the can charge a standard tariff for… basically they're rent-seeking from people that have never switched, and making high profits off those customers.'*
>
> (Interviewee 51)

The majority of those which commented on the level of unengagement in the market discussed the need for further engagement. However, two interviewees (one industry observer, and one from an environmental NGO) discussed the promotion of switching as a convenient policy response to high energy bills in that it came at practically zero cost to the government. A small number of interviewees went further in their criticisms however, suggesting that the subsidisation of engaged consumers by the unengaged was an inevitable consequence of a liberalised energy market – which was introduced specifically on the premise that it would offer better value to consumers.

> *'I went to endless debates about do we want liberalisation, what is liberalisation going to do to the fuel poor, and we just didn't get it crystallised to this simple statement - the non-switchers are subsidising the switchers, there is no other definition for it. Absolutely none. It's not coming out of the companies' profits, it's coming out of the non-switchers.'*
>
> (Interviewee 12)

This highlights the harm experienced by the least engaged consumers, who are frequently on low incomes or otherwise vulnerable (CMA, 2015g). It is interesting to note that the widespread support was for the lack of engagement being the core problem, rather than the reliance upon a competitive market itself. This either implies that in spite of low levels of engagement, that a competitive market does on balance deliver benefits to consumers, or that retail competition has become so embedded as a concept, that most respondents are unable or unwilling to question it as a basic principle. A possible solution to this issue is discussed in chapter seven.

	Retail market engagement										
Category	Industry Observer	Network Company	Big 6 Energy Company	Small/Medium Energy Company	Local Authority	Government Body – DECC	Government Body – Other	Environmental NGO	Academic	Consumer Advocate	Other
Unengagement	II	I	I	II	II			II	I		
Liberalisation => harm								II	I		

5.2.4 – Cutting The ECO: Politically Motivated

There was little consensus around why the cuts to the ECO in 2014 took place, but there is little support for the idea that it stemmed from a genuine desire to protect the most vulnerable in society. A number of different reasons were offered for the reason the ECO was cut such as internal politics between Ed Davey and parts of the Tory Party leading to renewable subsidies being protected, a general lack of understanding from the general population about what cutting the ECO means made it a soft target, a political reaction to Ed Miliband's price-freeze proposal, and lobbying activities of the large energy companies. The latter of these received most support, and the political power of suppliers to influence governmental policy is explored in more detail below.

A combination of any, or all, of these factors could have contributed to the eventual cuts to the ECO. What is possibly most interesting to note is that only one interviewee, who worked for DECC (and therefore arguably likely to be supportive of the government), implied that the cuts were the result of genuine governmental concern for the welfare impact that levels of energy bills were having, and even she then went on to contradict herself by then suggesting it was as in response to the Ed Miliband's price freeze announcement.

> *'…And just to pick, a political response to that storm [political and media interest in prices], when you've got to do something, to pick on the only bit of the energy bill that gives you any chance of paying less in future, i.e. the levies around energy reduction, including ECO, is just bizarre. Counterfactual irrational therefore completely political'*
>
> *(Interviewee 47)*

This demonstrates that although there was not widespread agreement about why the ECO was cut, it appears that there is an agreement that the reason was a political, rather than a social motivation.

This demonstrates how potentially unstable energy policies can be – that they can be made and unmade quickly, in response to a shifting political landscape, as opposed to in order to deliver the greatest levels of consumer protection.

The selection of the ECO for the cut also demonstrates a pervasive narrative of energy efficiency obligations as primarily the cause of high prices, rather than a significant opportunity to reduce bills in the long term. The majority (£30-£35) of the £50 reduction referred to in the above quote was the result of cuts to the ECO:

> *'British households will benefit from proposals that will be worth £50 on average, thanks to Government plans to reduce the impact of energy company bill rises...While the Government cannot control the price of energy in the global market, it can help bill-payers by reducing the impact of social and environmental programmes on their bills'*
>
> (DECC, 2013c: Online)

	Cutting the ECO: Politically Motivated										
Category	Industry Observer	Network Company	Big 6 Energy Company	Small/Medium Energy Company	Local Authority	Government Body – DECC	Government Body – Other	Environmental NGO	Academic	Consumer Advocate	Other
Reaction to price freeze	I			I		I				I	
Protect renewables	I										
Soft target					I		I			I	
Supplier lobbying					II		I	I		I	II
Genuine welfare concerns						I					

5.3 – Governance and Energy Efficiency

Interviewees highlighted a number of challenges to improved deployment of energy efficiency measures. Some of these support information in the literature, highlighted in chapter three. These are included because it demonstrates alignment between knowledge in the industry and the literature.

5.3.1 – History of the Housing Stock

Interviewees identified that one of the most significant factors affecting affordability of energy for domestic consumers is the prevailing low standard of thermal efficiency in the housing stock, partly

linked to the housing stock being particularly old. This is linked to housing design in Great Britain having historically focussed more on aspects of design such as ventilation, light, damp-proofing and property size, rather than on energy efficiency. Regulations referring to minimum levels of achievable heat were not introduced until 1969 (Boardman, 1991), by which time approximately two thirds of today's housing stock had already been constructed (See Figure 35).

> '…we've got a very energy inefficient housing stock, we've got one of the oldest housing stocks in Europe, and we've had very poor building standards in terms of energy efficiency historically, which has only been corrected relatively recently compared to other countries.'
>
> (Interviewee 28)

This view was echoed by a range of interviewees from different categories. The widespread knowledge and acceptance of poor energy efficiency standards is of note because it demonstrates that both policymakers and other industry stakeholders are aware of the issues. In spite of this being by its nature being a long-term issue, this awareness has not led to the development of highly effective systems to address it effectively – indeed efficiency standards for new-build properties continue to be cut. This demonstrates how awareness of an issue, although necessary, is not sufficient for it to be solved.

	The old and inefficient housing stock presents a unique challenge										
Category	Industry Observer	Network Company	Big 6 Energy Company	Small/Medium Energy Company	Local Authority	Government Body – DECC	Government Body – Other	Environmental NGO	Academic	Consumer Advocate	Other
	I		I	I	I		II	II	I	I	II

5.3.2 – Barriers to Energy Efficiency Deployment

Interviewees from across the sector also demonstrated a strong understanding of the barriers to deployment of energy efficiency which are identified in the literature. Interviewees highlighting particularly the hassle factor, and the role of the agency problem in the private rental sector. Although there was a wide spread of different categories of interviewee supporting each of these established barriers, there were some instances where answers appeared to cluster. For example, all three of the DECC interviewees identified the agency problem in the private rental sector as a significant barrier to improved energy efficiency. The timing of these interviews may be significant in that they took place in the lead up to the publication of the new obligation on landlords to improve energy efficiency standards to a minimum of grade E (DECC, 2015n), when the interviewees would certainly have been working on, or at least aware of, this project. However, it is not possible to know

if this response was in the forefront of interviewees minds due to the work they were undertaking, or if this was a widely-held view within DECC, and therefore the policy was developed.

It is evident that across the industry there is an awareness of several the established barriers to energy efficiency which are noted in the literature. What is particularly of note however is that of those barriers identified in the literature, the one which had least support among respondents was upfront cost – the barrier which the Green Deal was principally designed to address. This could suggest either that the Green Deal was poorly conceived, or that those interviewed felt that the Green Deal was successfully alleviating this barrier. The latter however appears unlikely given the widespread expressed distain for the policy. A small number of respondents also suggested that currently energy prices were too low to lead consumers to invest in energy efficiency measures.

'What you really want is you want people to feel the pain of energy prices because that will help drive the right decision making'

(Interviewee 15)

Although it is true that low prices would reduce consumers' motivation to invest in energy efficiency measures (Eyre, 2010), this also assumes that much of consumers' decisions not to investment in energy efficiency measures was based on economically rational decision making, which is often not the case (Gillingham et al., 2009). A higher energy price would create a stronger economic incentive to investment in energy efficiency measures, however increased prices would serve to undermine affordability of energy significantly (whilst also doing nothing to address other barriers to take-up). Although there were only four interviewees which expressed this view, the fact that one of these was a senior civil servant within DECC, with direct involvement for development of energy efficiency policy, is likely to be significant. This view frames households as economically rational actors, a view which is likely to influence policy design. This takes no consideration of the fact however that a number of households have never considered installing loft or cavity wall insulation, or feel they are already doing enough to cut their energy consumption (Consumer Focus, 2012). This view is symptomatic of a governmental department which attempts to deliver affordability through market forces. This view was observed by Mallaburn & Eyre (2013),who note that some ministers, regulators, and public officials have claimed that market forces will on their own bring about cost-effective energy efficiency measures, a view that may be attributed more to an ideological standpoint, than scientific evidence gathering (Mallaburn and Eyre, 2013).

A new barrier, not identified in the literature which was identified by interviewees was that energy efficiency measures do not attract sufficient political capital to be worth prioritising for

policymakers, on the ground that large supply-side projects such as the construction of a new power station would generate greater political value.

> *'…you don't get the nice pictures of dear nice George Osborne in his hard hat and high-vis jacket standing in front of a light bulb changing program in the same way that you do in front of a nice big new nuclear plant or something similar – I'm being faintly facetious there but I think there is a political point on the optics that works well as a photo call, as a story.'*
>
> (Interviewee 20)

Although some policy-makers may support policies beyond those which bring significant political capital, the perceived political value of commissioning large infrastructure projects may work to reduce interest in domestic energy efficiency. This is because energy efficiency is a policy option which is both inherently dispersed, and may in of itself be of limited importance to consumers (Consumer Focus, 2012) - who are also voters. These barriers will be considered in the proposed changes to the governance structure, set out in chapter seven.

One of the major challenges highlighted in the successful delivery of energy efficiency measures was the lack of long-term planning. Many interviewees criticised policy uncertainty, widely framed as the "stop-start" nature of energy efficiency obligations, and called for a more long-term approach to policy-making. This would enable companies to build stable business models and longer term investment plans – this affects both those delivering energy efficiency measures, and those who manufacture the products. One of the major challenges to addressing this issue is the short-term cyclical nature of parliamentary terms and spending cycles.

> *'I think it comes back to the stop-start, so you have one scheme that you're working on, then you have to pause for breath and you have to get up to speed with a multitude of regulations and rules and a new structure and a new framework, and not only do we have to get up to speed with that, local authorities have to, housing partners have to, the brokerage system, everybody who's playing in this market has to understand.'*
>
> (Interviewee 25)

> *'…another element of ECO that frustrates us which is the short-term periods, so 2 years – extension – 2 years – extension. What we want to do for business is offer long term certainty to the suppliers, as well as to the construction industry, so that means we need to go beyond parliamentary terms.'*
>
> (Interviewee 29)

This demonstrates the importance of a governance structure that is able to deliver greater long-term planning of energy efficiency policy. This need, and how this can be met, will be discussed in chapter seven. It is interesting to note that all the interviewees from the Big Six energy suppliers, who are responsible for delivery of energy efficiency measures highlighted this point. This suggests that although suppliers generally do not appear supportive of energy efficiency obligations (see below), they also wish for any policies which are put in place to be stable and predictable. This demonstrates the importance of the governance structure in supporting effective deployment in energy efficiency, in that the barriers to deployment affect not only potential recipients of the measures, but the supply chains responsible for delivering them also.

	Barriers to Energy Efficiency										
Category	Industry Observer	Network Company	Big 6 Energy Company	Small/Medium Energy Company	Local Authority	Government Body – DECC	Government Body – Other	Environmental NGO	Academic	Consumer Advocate	Other
Hassle factor	II		I			I	I	II	I		
High upfront cost						I	II	I		I	I
Principle-agent problem (rental)			II	I	I	III	I		I	II	I
Information					II	I		II	I	I	I
Low prices		I		I		I					I
Insufficient political capital				I	I			II			
Uncertainty	II	I	IIII			I	I	I			II

5.3.3 – Suppliers as Poor Executors of Energy Efficiency Policy

Interviewees highlighted a number of issues relating to energy suppliers as executors of energy efficiency policy. The idea that suppliers' lobbying played a part in the cutting of the ECO is consistent with the position of interviewees from the Big Six arguing for the costs of the ECO to be taken out of the energy bill (see above). It also raises questions regarding why suppliers may have lobbied in such a way, and if it is appropriate for suppliers to be responsible for a social policy which they appear to played a role in having cut. Indeed, several interviewees highlighted that suppliers

may not be the most appropriate delivery body for social and environmental policies such as the delivery of energy efficiency measures.

5.3.3.1 – Energy Efficiency: Against Suppliers' Interests

It was frequently observed by interviewees from almost the full range of categories that it is against the interests of energy suppliers for energy efficiency policies to be ambitious or successful, as reduced demand for energy would lead them to suffer reduced revenues. This means that although it might be more cost effective from an overall system perspective, it is not in the interests of those individual firms who profit from the generation and sale of energy.

> *'[Suppliers] are energy retailers, they've got to sell energy. It's almost like asking petrol stations to be responsible for the fuel efficiency of cars. So, a petrol station can do things like remind people that excessive braking, excessive acceleration increases your consumption, but you wouldn't expect a petrol station to see people driving up and going "That's a really inefficient car you've got, we need to replace it!" '*
>
> (Interviewee 11)

A very small number of interviewees suggested that some suppliers, in particular British Gas, were changing their business models to one more heavily based on deployment of energy efficiency measures – however this is called into question by British Gas' decision to cut five hundred jobs from its energy efficiency arm (Centrica, 2016a) shortly after the announcement that the successor to ECO would be smaller in size (HM Treasury, 2015b). One interviewee did offer a contrasting view, expressing her bewilderment at the way that suppliers were so against the ECO, on the grounds that they could simply increase their unit prices of offset lost volume:

> '*I don't understand why the big 6 are so anti it [ECO]. I don't get it. If you haven't got upstream business, and your primary metric for profit, and primary influence on profit is number of customers, why are you worried about selling those units of gas, because you're still going to be making... and this is how they think about it, they think we need to make £30 per customer, or whatever, they don't think 'we need to sell each customer this many units of gas' because if it goes down nationally, number of units of gas they sell, it's a national competition for those customers and it would affect everyone in the same way, and you just put your supply share of cost up a bit to reflect that increased competition.'*
>
> *(Interviewee 51)*

This view was very much an outlier in that representatives from every other category of interviewee expressed that the reduced sales was categorically against a supplier's interests. Interviewee 51 is correct in theory, there is nothing to prevent suppliers taking a greater percentage profit from fewer

units, however there are a number of reasons why they may not wish to do pursue that course of action. Firstly, this would mean a supplier's percentage of profit would have to increase, which would risk exposing them to political and media pressure as this would be reflected in OFGEM's consolidated segmental statements (see: OFGEM, 2016b). It would also require a shift in business model - energy suppliers' business models are typically characterised by relying on high volumes of sales at low margins (BDO, 2014), moving to a model of fewer units and greater profit margins per-unit would require a significant change in this model. Interviewee 51 also highlights that a suppliers' ownership (or not) of upstream gas assets is relevant. This is true to the extent that many of the measures under ECO relate to thermal insulation and therefore are likely to reduce gas demand (as gas is the primary fuel used for heating in Great Britain). Two of the Big Six own upstream gas assets, one of which is British Gas, which has both the largest share of gas customers, and the largest obligation under the ECO. In addition, all of the Big Six own and operate power-stations, which will suffer reduced revenues from any measures which reduce electricity demand such as replacement of storage heaters.

A small number of respondents highlighted that fulfilling the obligations *was* in the interests of energy suppliers, but only as a product of the sanctions that were in place in the event that they did not meet their targets.

> *'It's [Suppliers' delivery of ECO] not a conflict because I have an obligation to deliver ECO, if I don't meet my target then 10% of my global turnover is at risk, OFGEM can charge me, so that's why I do it, I have no choice in the matter.'*
>
> (Interviewee 41)

Although this suggest that on balance, it may be in a suppliers' interests to meet the obligations that are currently in place under the ECO, it does not mean that it is in suppliers' inherent interests to maximise effectiveness of energy efficiency measures, or to lobby for more ambitious policies. This implies that suppliers are likely to achieve only the minimum level of deployment to comply with their obligation, rather than setting out to maximise benefit to households. This also places significant pressure on policy-makers to design policies perfectly, so that they cannot be taken advantage of. This is something that they failed to do in the past in multiple instances (see chapter 3). This reliance upon perfect policy-making risks limiting the efficacy of energy efficiency policy, and so inhibits improvements in affordability of energy for domestic consumers. DECC's policy-making capacity in this space is discussed below.

5.3.3.2 – Suppliers' Power: Getting the ECO Cut

As set out above, a number of interviewees suggested that the Big Six suppliers' lobbying was part of the reason the ECO was cut. It appears that part of the reason that they were so successful in doing so lies in the dual responsibility of delivering energy efficiency measures, and their ability to raise the bills of ~70% of domestic consumers at only 30 days' notice (From figures in OFGEM, 2016c). Not only is it not in the interests of suppliers for energy efficiency measures to be successful, but it appears that they were particularly against the ECO because of the uncapped costs it imposed upon their businesses (See: Energy and Climate Change Committee, 2013a). This occurred in the context of their losing customers to a growing number of new entrant suppliers (CMA, 2016c) which are not required to deliver the ECO (OFGEM, 2015f), and rising political pressure around levels of energy bills (Lockwood, 2016). It is possibly unsurprising therefore that the Big Six energy suppliers moved to leverage their political power against the ECO. How this occurred can be seen in the timing of the first announcement of the cuts to the ECO and the subsequent price announcements from the Big Six (See Figure 31). In October 2013 at Prime Minister's Questions, David Cameron announced the 'Rollback of the Green Levies' (Cameron, 2013). The details were confirmed in December 2013 when the government announced it would be cutting the ECO in order to reduce energy bills. In January 2014, British Gas, the supplier with the largest ECO obligation, announced a partial reversal of its latest price increase (announced in October 2013) based on the assumption that the Government's pledge to cut the ECO was carried out (British Gas, 2014). Scottish Power and SSE followed an almost identical pattern of behaviour (Scottish Power, 2014; SSE, 2014b). However EDF, Eon and RWE-Npower took a slightly different approach, choosing to put up prices in early 2014, but stating that the level of these increases was lower than it would have been had the government not announced cuts to the ECO, again attributing a reduced rise to the Government's policy changes (EDF, 2014; RWE npower, 2014; E.On, 2013). This was ahead of the formal consultation process, which began in March 2014 (DECC, 2014m), in response to which five out of the six of the Big Six highlighted the government's announcement about cuts to the ECO already being considered in their current prices. This implied that if the cuts were not to be carried out, then energy prices would have to be increased, and that suppliers would be able to hold government publicly responsible (See Figure 31).

> *'…it's a very clever move by suppliers, knowing that something has been announced but that it had to be consulted on, and they kind of made the consolation not really a real consultation. Not in any kind of legal sense, there's no way that we can say they [the Government] legally haven't consulted properly, they have consulted properly, it's just that they're over a barrel and they've allowed themselves to be over a barrel…'*
>
> (Interviewee 22)

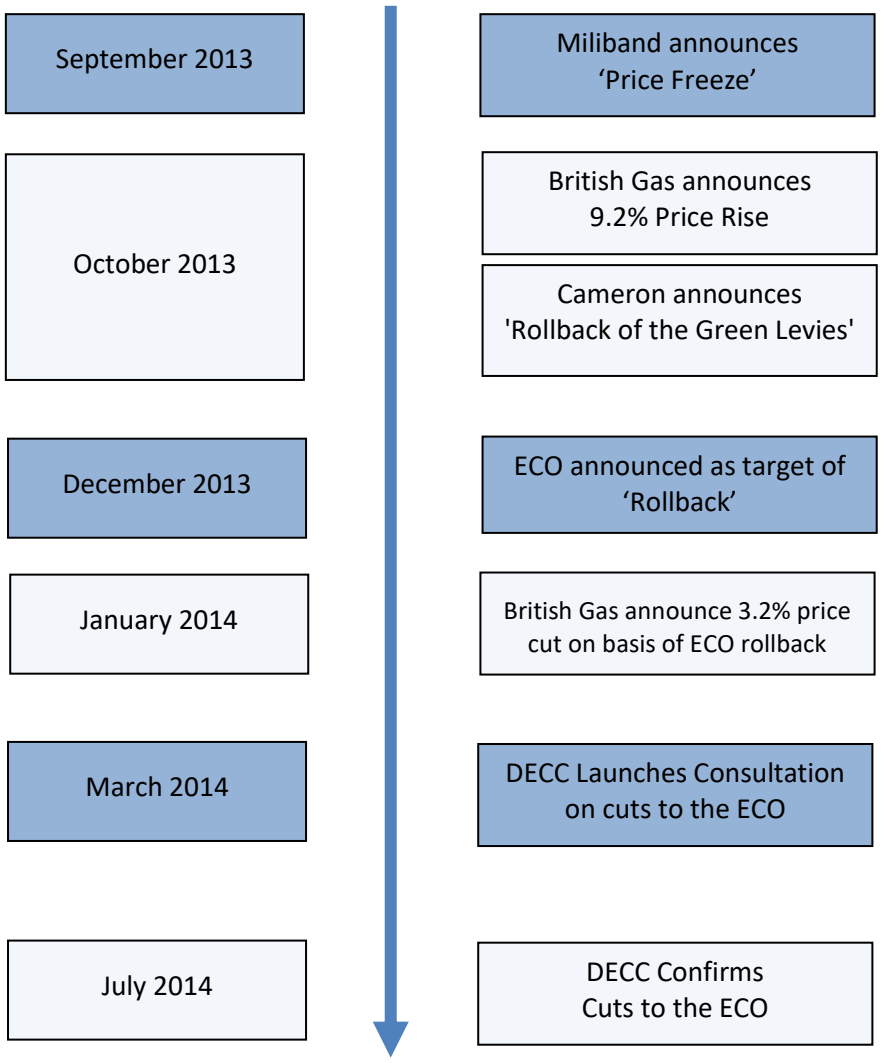


Figure 31 - Timeline of Announcements Regarding Cuts to the ECO, Source: Author's Own

This came at a time when, as set out above, energy bills were becoming increasingly political, particularly because the opposition was leveraging rising bills for political capital. The level of energy bills was being reported regularly as one of, if not the most, significant financial concern for households (uSwitch, 2013; YouGov, 2015; DECC, 2014f). This implies that there could have been significant negative political implications for the government had the cuts not been carried out as originally proposed. In spite of the majority of the respondents to the consultation objecting to the cuts, they were confirmed in July 2014 (DECC, 2014n). The cuts were in fact slightly greater than was originally announced, however no energy company announced additional bill reductions to reflect the greater-than-expected cut, a point which went uncommented upon by the government or OFGEM.

A number of interviewees highlighted that suppliers are politically powerful, this is supported by Lockwood et al. (2013) and Mitchell (2008) who comment that not only do energy suppliers control the energy bills of the majority of the population, and are relied upon by the government to avoid the lights going out, as well as to create employment. It appears that suppliers were able to provide significant resistance to the level of energy efficiency targets in the domestic sector, and although it is not possible to attribute the outcome of the consultation entirely to the actions of the energy supply companies, it appears that considerable political pressure was placed on the government by the energy companies. This is consistent with issues of regulatory capture set out in chapter one (Laffont and Tirole, 1991; Veljanovski, 2012).

It appears that it was the dual responsibilities of deployment of energy efficiency measures, and control over prices for the majority of the population, which gave the large suppliers such significant political power – which grows as prices become more politically salient. Had suppliers instead been in favour of energy efficiency action and so been calling for the targets to be maintained, the outcome may have been different. This again highlights that energy suppliers may not be the most appropriate institution for deployment of energy efficiency measures (discussed further in chapter seven).

It is interesting to note that the two groups which did not highlight the political power that suppliers hold are the government, and energy suppliers themselves. This could be explained either by the fact that this is simply how it appears to individuals outside the relationship looking in. Alternatively, it could be the result of neither party wishing to shine a spotlight on the power that suppliers can exercise over the government. Given the above set out example of the imposition of cuts to the ECO, the latter reason appears more compelling.

5.3.3.3 – Targeting of Energy Efficiency Measures

Ensuring accurate targeting of energy efficiency measures can present a significant challenge for policies designed to address fuel poverty (Boardman, 2009). Although the existing relationship between suppliers and customers was one of the original motivations for allocating responsibility for energy efficiency to customers (CSE, 2014a), it is not clear that the relationship that customers have with their suppliers is sufficiently strong to render it particularly useful. A number of interviewees highlighted that suppliers have only limited information regarding their customers, other than their consumption information, which is often only collected once or twice a year. A significant contributor to suppliers' lack of detailed knowledge about the specific circumstances of individual consumers was sometimes attributed to a lack of data-sharing between different governmental

departments, and between the government and the energy companies deploying energy efficiency measures due to issues of data-protection

> *'…the energy companies don't know who is fuel poor, because they don't have the data, so one of the things is to provide access to this kind of data, for example welfare recipients from DWP so there's some kind of exchange over there as well but they go automatically into privacy laws and privacy issues over there.'*
>
> (Interviewee 29)

The exception to this issue is in the administration of the Warm Home Discount, for which a revision was made to the Pensions Act (NatCen Social Research and CSE, 2014). There was no clear consensus view among respondents regarding why issues of data-protection could be avoided for the warm home discount, but not for the purposes of deploying energy efficiency measures. Overall however, if the ECO were to be delivered by an institution which knew more about the households it was targeting, the need for data-sharing would be significantly reduced.

5.3.3.4 – Trust in Energy Suppliers

The lack of trust that consumers have for energy companies was highlighted by a number of interviewees as a barrier to successful deployment of energy efficiency measures through the ECO. Although there is evidence that levels of trust are increasing slowly (Ipsos MORI, 2015a), they are lowest amongst those struggling to keep up with energy bills (Ipsos MORI, 2015b), who may be considered a priority group for measures designed to improve affordability.

> *'Also, they're quite a poor agent in other regards in that they're not particularly trusted by the public. If you want to get the public to buy into having someone in their home putting in cavity wall insulation or loft insulation, doing solid wall cladding, it really helps if you've got that message coming from someone they want to believe and who they trust.'*
>
> (Interviewee 40)

This is likely to make some households difficult for suppliers to engage with, which ultimately either that measures may reach fewer households, or that policies will cost more to deliver than they might have if households had more faith in the firms delivering them. This view was put forward by interviewees from a range of categories, however the concentration of this view among the Big Six energy suppliers is interesting – it appears that they are mindful of the trust challenge they face.

5.3.3.5 – Local Authorities as Alternative Executors of Energy Efficiency Policy

Having established that there are multiple reasons why energy suppliers may not be well-placed to deliver energy efficiency measures effectively, an alternative executor of energy efficiency policy is

worthy of examination. A number of interviewees from a range of different categories proposed that local authorities could be a strong alternative to energy suppliers for the delivery of energy efficiency measures, for a range of different reasons. Interviewees highlighted that local authorities have a good knowledge of their surrounding area, in terms of both where the most vulnerable households are, which could therefore be prioritised, as well as the nature of the housing stock in the area – this would help to avoid issues of data sharing – set out above.

'Local authorities are probably more attuned to their community needs, and they probably have a better handle on who is vulnerable and who isn't, and they probably have a better handle on what are the most appropriate measures locally.'

(Interviewee 56)

Deployment by local authorities could also help to address issues of lack of trust, given that it was suggested by a number of interviewees that local authorities generally well-trusted institutions. The one significant challenge to the local authority model however is one of funding. Central government funding to local authorities in England has dropped by over a quarter since 2010 (DCLG and ONS, 2016). To be successful, local authorities would have to be sufficiently well-funded to set up and maintain energy efficiency deployment schemes. Assuming such funding was forthcoming, local authorities may offer a strong alternative to energy suppliers for the deployment of energy efficiency measures.

'…energy demand reduction, fuel poverty, that can come from local authorities as well…. [but] if you fundamentally weaken local authorities at the core, they won't be able to do anything well. So, we need a strong Local Authority sector that is funded, empowered, and obligated to do the whole fuel poverty alleviation bit.'

(Interviewee 47)

Although moving responsibility for energy efficiency deployment to local authorities would be unlikely to be successful without policy and institutional development, local authorities may be able to play a valuable role in the delivery, or facilitation of, energy efficiency improvements in their local areas. This is explored more extensively in chapter seven.

	Suppliers' responsibility for delivery of energy efficiency										
Category	Industry Observer	Network Company	Big 6 Energy Company	Small/Medium Energy Company	Local Authority	Government Body – DECC	Government Body – Other	Environmental NGO	Academic	Consumer Advocate	Other
Against their interests	I		II	I	II	I	II	II	I	III	III
In interests (sanctions)			II	I	I						
New business models			II				I				
Suppliers lack knowledge	I		I	I			I	I			II
Lack of trust	I		III		I	I		II		II	I
Suppliers are politically powerful	I	I			II			II	I	I	II
LAs good alternative	I			I	II	I	II	I	II	I	I

5.4 – Broader Governance Issues

5.4.1 - Institutional Capacity

A number of interviewees highlighted that both the government, and OFGEM lack the capacity to fully understand the and make effective policy for, the energy sector.

In the case of OFGEM this is consistent with the findings in chapter two, that it may not be sufficiently well equipped to understand the operation of the network companies in order to put in place an effective revenue control mechanism - the degree to which a network is likely to successfully inflate cost forecasts is affected by the capacity of the regulator (Kuzemko, 2014). If a regulator is able to effectively critique a business plan, then prices will be kept low. However, a number of interviewees suggested that OFGEM does not have the necessary institutional capacity to do this effectively.

Questions are also raised around the government's capacity to design effective policy, particularly in the area of energy efficiency. The reduction of government capacity, in favour of expertise lying in the hands of private firms, was part of the long-term project of privatisation which spanned the 1980s and 1990s, however this has left government with limited capacity to address market failures (Kuzemko, 2015a). This is problematic because as set out above, the reliance on a supplier obligation

for delivering energy efficiency measures places greater pressure on BEIS to design policies which accurately target appropriate measures to appropriate households, and cannot be 'gamed' by suppliers, something which is in their interests. This is because their motivation is not one of maximising social benefit of deployment, but to maximise delivery against the policy criteria in order to avoid sanctions.

> *'… the energy system is becoming even more complex, it's always been complex but it's getting even more complex and not many people within government understand the different complexities and they don't have the resources to go and look at those, but the very large energy companies do have the resources to do that, it's in their interests to understand every implication of every policy and how they interact and so government tends to rely on suppliers, or energy companies, to explain to them actually how things work, and that is a very very powerful position for those companies to be in.'*
>
> *(Interviewee 26)*

> *'This goes back to the whole regulatory capture thing, because all of the knowledge about network regulation, ok OFGEM have got some, but they ship a hell of a lot out to consultancies like Oxera on their behalf, but all of the knowledge about how the system operates, how the networks work, what stuff costs, is with the networks, and although they might think they're basing their evidence on the best available data, which they might be, the networks might have a much better understanding of how things work.'*
>
> *(Interviewee 51)*

As both quotes suggest, this lack of capacity on behalf of government and OFGEM creates an imbalance of power, in favour of private firms in the industry who are able to leverage their superior understanding of the energy system to maximize value for themselves. In the case of suppliers, their political power stemming from control of energy prices was set out above. In addition to this, the views of the interviewees suggest that they also have a secondary base of power stemming from their superior understanding of the sector in which they operate. If OFGEM and government had a greater understanding of the industry they both oversee, this imbalance of information would be lessened, and with it, the balance of power redressed to some extent.

	Lack of Capacity										
Category	Industry Observer	Network Company	Big 6 Energy Company	Small/Medium Energy Company	Local Authority	Government Body – DECC	Government Body – Other	Environmental NGO	Academic	Consumer Advocate	Other
Government	I	II			I		I	II	I	II	II
OFGEM	I	II		II	I			I		I	I

5.4.2 - Power of non-state actors

In addition to the political and informational power that those involved in the energy industry wield, interviewees across a range of categories highlighted the political power of the building lobby, and of landlords, in affecting policies around energy efficiency.

> *'…zero-carbon homes is quite a complex batch of regulation, and you can image the friends of the party in the house-building fraternity would have been very ready to see that go…'*
>
> *(Interviewee 55)*

> *'So this change now is a bit of a watering down of some of those things because it says the default must be E if you can't rent out F & G but I'm very disappointed by the very weak position, they don't have to do it if there's a net cost... The landlords' association will be scaring them witless, and they do this, I know they do this, I think it's unforgivable.'*
>
> *(Interviewee 24)*

This relates closely to the principal-agent problem which was identified as a barrier to energy efficiency deployment. Neither housebuilders, or landlords, have an interest in raising the energy efficiency standards of their properties. Improved standards will simply result in additional costs for them. If they are able to influence policy in this space, as interviewees suggest, then it is likely to reduce the chances of energy efficiency policy being ambitious or effective.

It appears that in the case of the landlords' lobby, that this may have had an effect on the minimum energy efficiency standard for private rental properties. Although the minimum rental standard that was put in place is theoretically beneficial, and was introduced with sufficient timescales to allow landlords to make the necessary changes to their properties, the details of the policy were so weak that it is unlikely to make a significant difference to overall standards (see chapter three). Although it is impossible to prove a conclusive link between any one institutions' lobbying activities and the policy outcomes, the National Landlord's Association claims responsibility for affecting the design of

this policy, in achieving the number of exemptions in the scheme (National Landlords Association, 2015). It is reasonable to assert that without political resistance from the landlords' lobby, the minimum energy efficiency standard for private rental properties may have been more ambitious.

	Other politically powerful actors										
Category	Industry Observer	Network Company	Big 6 Energy Company	Small/Medium Energy Company	Local Authority	Government Body – DECC	Government Body – Other	Environmental NGO	Academic	Consumer Advocate	Other
Building lobby	I	I		I	II	I	I				I
Landlords' Lobby	I			I		I	I	I			

5.4.3 – The Role of Regulation

Part of the reason that the landlords lobby have been successful in arguing for a weak private rental sector standard is likely to be the prevailing political ideology. It was widely suggested that many of the policy decisions relating to affordability of energy for domestic consumers were the product of adherence to an ideology which favoured low levels of regulation or intervention in markets.

> *'And also, there are just the politics as well - you've got different ideologies haven't you… this government doesn't particularly like regulation because they see it as hindering businesses, and there's a full set of impacts you have to do about burdens on business hindering growth and all that sort of stuff, and there's also the whole people should be free to choose what they want to do those as well so the whole mix of those sorts of things.'*
>
> (Interviewee 15)

A number of policy decisions affecting affordability are consistent with this ideology such as the design of the Green Deal as an attempt to create a market for energy efficiency measures funded by private investors (DECC, 2010), the reductions in building energy efficiency regulations affecting new-build properties (DCLG, 2015; HM Treasury, 2015a), and the weak energy efficiency regulations on private landlords (DECC, 2015n). The ideological support for the use of market mechanisms, and a resistance to using regulation to set stringent energy efficiency standards in housing, has a negative impact on outcomes.

It is possible that the reluctance to introduce regulation which directly affects consumers could also relate to the perception of political risk associated with such policy Mallaburn and Eyre (2013) comment on the need for regulation in order to bring about increased uptake of energy efficiency

measures, however IPPR (2013b) highlights that the political risk in imposing regulations upon domestic consumers, who are also voters, make this option unattractive. An example of this was the proposed introduction of the 'Consequential Improvements' scheme, which precipitated a powerful media campaign (see Mail Online, 2012), and the policy was abandoned soon afterwards. The political risk associated with the introduction of regulation was highlighted by interviewees from a range of categories, most notable of which were from DECC. It is therefore likely that this may influence policy-makers' proposals.

> *Some academics have said you shouldn't be able to sell a home unless it meets a certain minimum level of energy efficiency, that's a very good idea but it's politically not appetising – politicians are very worried about introducing regulations like that because they think it would be unpopular.*
>
> (Interviewee 28)

In spite of this, regulation was highlighted by interviewees from a range of different categories as having been particularly effective in delivering improvements in efficiency of appliances and boilers. European energy-efficiency product policy sets a minimum standard for a range of electric consumer products (EU, 2009) and was proposed by a number of interviewees to be one area of energy efficiency policy that has been particularly successful in reducing, or at least limiting growth of, levels of electricity domestic demand, with a commensurate effect on energy bills.

> *'One thing which I think is really important is about product regulation, and I think that's potentially very important because people are going to carry on having more and more appliances, so if the present plans for the product regulation are driven through in Europe, they will at least in a sense mean that electricity consumption won't go up quite so much as it might. But without those measures it will go up, some peoples' bills will go up.'*
>
> (Interviewee 17)

Domestic boiler regulations requiring a minimum efficiency standard of new boilers installed (HMG, 2013b) were also often highlighted as having been instrumental in reducing domestic gas demand in recent years.

> *'There's a plethora of [energy efficiency] policies… the most successful one to date is boiler regulation saying you must put in a condensing boiler – very straight forward about ten years ago…very effectively it achieved that goal shift of same comfort, less energy.'*
>
> (Interviewee 44)

It is evident therefore that regulations can play an important role in delivering efficiency improvements, which in turn can support affordability of energy. In spite of the opportunities that regulation present in supporting energy efficiency standards. There is a prevailing ideology against the use of regulation, which is supported by perceived political risk of attempting to do so. The potential role of regulations in the redesign of the governance structure is considered in chapter seven.

	Regulation/Intervention										
Category	Industry Observer	Network Company	Big 6 Energy Company	Small/Medium Energy Company	Local Authority	Government Body – DECC	Government Body – Other	Environmental NGO	Academic	Consumer Advocate	Other
Ideology	I	I	I			I	II	I	I	I	I
Good for appliances & boilers	II	I		I		I		I			III
Politically risky	I		I	I		II			II		I

5.4.4 – Missing from the Governance Structure: Coordinated Representation

As set out above, firms in the energy industry, landlords, and the building industry appear able to engage with and influence government policy to protect their interests. However, interviewees highlighted that there is no institution, or set of institutions, with the capacity to provide a meaningful counterbalance to these powerful interests – there is not sufficient representation of the interests of consumers, or the demand-reduction industry.

5.4.4.1 – Lack of Strong Consumer Representation

Interviewees from a range of categories set out that there does not appear to be an institution, or set of institutions, with sufficient institutional capacity to represent the interests of consumers effectively and help ensure that the government does all it can to protect the interests of consumers. This is particularly problematic owing to the political power of the energy suppliers, alongside the building lobby and landlords, which have little motivation to support higher energy efficiency standards. This lack of adequate representation, in contrast to the coordinated actions of the suppliers and other lobby groups, is consistent with the governance literature which sets out that politically effective interest groups are generally better able to influence policy and regulations than consumers (VelJanovski, 2012).

In spite of there being a number of institutions whose role it is to ensure that the interests of consumers are protected, these include, the Fuel Poverty Advisory Group (FPAG), the Citizen's Advice Bureau (CAB) and OFGEM. It was widely suggested that these institutions may lack the resources necessary to carry out this role effectively.

The Fuel Poverty Advisory Group (FPAG) is a non-departmental body which advises government on the impact of policy on levels of fuel poverty. Although it is able to provide critique of government policy of fuel poverty, it is a poorly funded body, and government is under no obligation to follow FPAG's advice. It has born witness to the abandonment of the 2016 fuel poverty target, the reform of the fuel poverty definition into something which was virtually impossible to solve, the weakening of the ECO, and continuing high levels of fuel poverty.

> *'I have been critical for a long time that FPAG, in spite of being the body advising government, it doesn't have the legitimacy that the Climate Change Committee has for example… they have the governance, they have the legitimacy to hold the government to account, and FPAG doesn't, it's a non-departmental public body which scraps with the government'*
>
> (Interviewee 24)

The CAB is also limited in its institutional capacity and resources, which presents challenges in providing effective counterbalance to energy suppliers. This is particularly the case relating to engagement with fine detail of some energy codes, which are extensive, highly complex, and in a constantly changing.

> *'So the whole issue of consumer representation has got diluted, diluted, diluted through about six different moves if you could plot them all. And yet the numbers of companies have rocketed. '*
>
> (Interviewee 12)

OFGEM's range of duties to deliver on all aspects of the energy trilemma creates an inherent conflict between its duties (Woodman et al., 2014), and it appears that OFGEM's interpretation of its principal duty to protect consumers is heavily affected by its aims of ensuring efficient functioning of markets, to the point where its understanding of affordability appears limited to ensuring that prices are cost-reflective, and markets function effectively. This is not equivalent however to ensuring that bills are affordable.

> *'It's OFGEM really who, as its role as an economic regulator believe that cost-reflective charges are generally beneficial, because they send a price signal to customers about where they choose to take their energy from… so I can understand it from a sort of economic theory point of view... In reality though, how many customers, even know what they're being*

charged for… customers don't really know, unless they're very geeky and interested in what network charges are... and even if they did, would you really, as a customer, you know, a household customer, respond to those prices? I mean, are you going to move house because it's slightly cheaper in London than it is north of Wales to get gas? You might have a price signal there but really, in reality, how are people really going to respond to that?'

(Interviewee 2)

There are a number of institutions which are supportive of the affordability agenda. However, there appears to be an absence of any institution with both the responsibility and institutional capacity to ensure that consumers are well-represented, and long-term affordability of energy is established. Those who represent consumers' interests are unable to provide sufficient counter-balance to powerful supply-side interests, and prevailing anti-regulatory, pro-market ideology. The problems associated with the under-representation of unorganised groups (such as consumers) have been understood for a long time (See: Olson, 1965). Despite this, the interests of consumers remain insufficiently represented in the energy system. Chapter seven will set out a possible solution for the problem of underrepresentation of consumers.

5.4.4.2 – Lack of Demand-Side Influence

Consumers are not the only group who lack coordinated representation to influence policy-makers. It is not clear that those with in interest in ambitious energy efficiency policy are sufficiently politically powerful to influence the government in favour of stronger energy efficiency policy. The interests of the supply-side are supported by a number of large, well-resourced organisations such as suppliers and generators who share similar interests. However, demand-side interests are made up of comparatively large numbers of disparate institutions from different industries such as insulation manufacturers, window manufacturers, appliance manufacturers, energy efficiency installation firms and energy service companies. In spite of the presence of some industry bodies such as the Association for the Conservation of Energy (ACE), it appears that this myriad of institutions is not sufficiently coordinated or powerful to lobby government effectively for stronger energy efficiency policy.

'…there isn't really a very straightforward counterparty... if we're ultimately asking the national grid and energy companies to make decisions about doing less, maybe the governance structure isn't quite right? Who represents doing less?'

(Interviewee 30)

If those institutions in whose interests it is to support more ambitious levels of energy efficiency are unable to coordinate themselves into an effective political actor, and those institutions whose responsibility it is to represent the interests of consumers are unable to do so adequately, then there is limited counterbalance to the political power of large supply-side interests. This represents a significant risk to affordability of energy for domestic consumers.

	Lacking adequate representation										
Category	Industry Observer	Network Company	Big 6 Energy Company	Small/Medium Energy Company	Local Authority	Government Body – DECC	Government Body – Other	Environmental NGO	Academic	Consumer Advocate	Other
Consumers	I		I	II	I		II	I	I	I	I
Demand-Side		I						I	II	II	I

5.5 – Conclusion

This chapter has set out the key themes which emerged from interviews with thirty-nine key stakeholders from across the energy system in Great Britain regarding the connections between the governance structure and affordability of energy for domestic consumers.

A number of interviewees highlighted that the current structure of tariffs, whereby low levels of consumption were charged more on a marginal basis, was highly regressive, and should be reformed. This echoes findings of chapter two which suggested tariffs were more reflective of supplier interests, than consumer interests. The inclusion of social and environmental levies on energy bills was also suggested to be socially regressive, and that removing these levies would create a more progressive charging structure. Although this is accurate, it appears that the motivations of the group where the calls to remove these charges was concentrated, the large energy suppliers, appears to be as a result more for concern to reduce the cost burden upon themselves, than from a drive to reduce the price burden on their consumers. The likelihood of this view being the product of genuine concern for consumer welfare appears to be particularly unlikely in the context of each of the big six suppliers operating tariffs which use unengaged consumers, many of whom are likely to be vulnerable, to subsidise the tariffs of engaged consumers.

Interviewees suggested that lack of engagement in the retail market is harmful to consumers, particularly the fuel poor. Some interviewees however considered this a logical outcome of the liberalisation of the energy market, implying that the issue was not one of engagement, but of

fundamental market design. The latter was a niche view however, which could imply that the pro-market ideology is so firmly embedded, that many are unwilling or unable to question it.

The stark contrast in political power of different stakeholder groups is a significant challenge to improving affordability. The large energy suppliers appear able to leverage significant political power stemming from their control of the majority of domestic energy bills, and their involvement in energy efficiency policy. This allowed them to lobby effectively for the cuts to the ECO in 2014, to the point where suppliers' deployment levels were adjusted to ensure fairness between suppliers. There appears to have been little consideration of what might be considered fair to consumers however. This is in addition to the landlord's association which claims responsibility for the weak private rental policies, and the building lobby which was highlighted as a significant political force. Given that policy-makers appear to derive little political value in supporting ambitious energy efficiency policy, they may not prove particularly resistant to anti-efficiency lobbying efforts. The political power of these large stakeholders is in stark contrast to consumers and the demand-side industry, both of whom appear to be under-represented, and unable to wield sufficient power to act as a counterbalance to the lobbying forces which undermine action on energy efficiency. This issue is likely to be worsened by policy-making institutions such as BEIS and OFGEM appearing to have limited institutional capacity in some areas – a view also highlighted in chapters two and three.

It is also the case that any interest group calling for greater delivery of energy efficiency measures, is likely to find themselves fighting an uphill battle. Some recent examples of the most successful energy efficiency policy, affecting appliances and boilers, has been delivered through the use of regulatory intervention. However, the prevailing ideology in the governance structure at the moment is highly resistant to the use of regulation, preferring instead to rely on market mechanisms. This means that anyone wishing to advocate greater levels of energy efficiency is facing not only a number of powerful interests which are against it, but a prevailing ideology which is likely to reject the policies which have historically proved some of the most effective in delivering it.

This chapter highlights how the current efforts which do exist for delivery of energy efficiency measures are undermined by their policy design. Currently energy efficiency measures are delivered primarily through suppliers, who it appears have neither the motivation, or the institutional capacity, to deliver them effectively. Reallocating this role to another set of organisations, such as local authorities, will not only support more effective delivery of measures, but also erodes suppliers' power base in this area as they will no longer have such a legitimate role in debates around energy efficiency.

Overall, this chapter has highlighted a number of features of the governance structure which shows it to be one of the most significant barriers to improving affordability of energy in the domestic sector, both relating to tariff and pricing issues, as well as domestic energy efficiency standards. The following chapter will examine an alternative set of governance arrangements regarding energy efficiency in Denmark, in order to understand what has allowed the country to become an international case study for effecting energy efficiency deployment (IEA, 2011). Findings from both results chapters will then be brought together in the discussion with findings from the opening three chapters to set out recommendations for changes to the governance structure in Great Britain to deliver higher levels of affordability of energy for domestic consumers.

Chapter 6 - Results 2: Energy Efficiency in Denmark

6.1 – Introduction

This chapter examines the governance arrangements in Denmark relating to energy efficiency, in order to shed light on what lessons may be learned for Great Britain. Denmark was selected for comparison because it is renowned for its high standards of energy efficiency (IEA, 2011). This chapter uses a range of documentation alongside data from eighteen semi-structured interviews with representatives from across the Danish energy sector, in order to establish the role that governance in Denmark has played in successful deployment of energy efficiency. To bring clarity to the results, the range of interviewees which supported or opposed such views are given in a table at the end of each section, however as set out in chapter 4, these tables are expressly *not* designed to convert qualitative data into quantitative data, as doing so would be methodologically unsound. Individual quotes are used where necessary throughout each section to demonstrate an area of interest more clearly.

This chapter begins by setting out the context of energy policy in Denmark and the current situation of different factors of affordability - energy bills, levels of income, and energy efficiency, with comparisons to the situation in Great Britain. The impact of the governance structure on energy efficiency is then set out, examining such features as building regulations, financing, the political landscape, and institutional capacity. The final section concludes.

6.2 - Context of Energy Policy in Denmark

The structure of the energy sector in Denmark differs from that in Great Britain[21]. In 2015, over 60% of Denmark's domestic consumers heated their homes by means of district-heating (DEA, 2015), 70% of which was produced in combined heat and power (CHP) plants in 2014 (DEA, 2015). The district heat networks are operated on a non-profit basis (Danish Energy Authority, 2011) by a combination of private supply firms, co-operative groups, and municipalities (Danish Energy Agency and DBDH, 2013). Other households meet their space and water heating needs through mains gas supply (15%), oil (18%), or solid fuels (3%) (Danish Energy Agency, 2015). In 2016, there were over fifty electricity supply and generation companies (Kitzing et al., 2016), many of which are small firms.

[21] For an in-depth explanation of the broad institutional arrangements in the Danish energy sector, see Lockwood (2015).

However there is also one large, predominantly state-owned firm[22], DONG, which in 2015 was responsible for approximately half of all thermal generation capacity, 25% of all Danish offshore wind capacity, and 26% of electricity distribution capacity (DONG, 2015). The gas and electricity transmission systems are operated by a state-owned non-profit company - Energinet.dk. The energy sector is regulated by the Danish Energy Regulatory Authority (DERA), an independent authority which oversees the electricity, gas and district heating markets (IEA, 2011). Government policy on energy is set predominantly by the Danish Energy Agency which is located in the Ministry of Energy Utilities and Climate.

There are a number of long-term targets that frame the energy policy in Denmark. In 2010, The Danish Commission on Climate Change Policy concluded that Denmark could become independent from fossil fuels by 2050, and from the Commission's work, 'The Energy Strategy 2050' was published. This sets out the policy instruments needed in order to reach this goal, and names both energy efficiency and renewables as the key tools to achieving it (Danish Government, 2011). In 2012, an agreement was reached setting out a pathway to 2020, consistent with the 2050 goals. This gained political agreement from 95% of members of parliament, supported by all parties except one (Danish Energy Agency, 2012), and has the following targets to be attained by 2020:

- More than 35% renewable energy in final energy consumption.
- Approximately 50% of electricity consumption to be supplied by wind power.
- 7.6% reduction in gross energy consumption relative to 2010.
- 34% reduction in greenhouse gas emissions relative to 1990.

(Danish Energy Agency, 2012)

6.2.1 - Energy Prices

Final electricity prices in Denmark are considerably higher than in Great Britain (see Figure 32). Although such comparisons are quite 'broad-brush' i.e. there is variation in pricing between customers, and such figures do not consider differences in incomes, or cost of living (both of these are examined later in this chapter) these figures demonstrate that Denmark has among the highest electricity prices in Europe. The same relationship is true for final gas prices (see Figure 33), however the final gas price faced by household consumers is less significant in terms of affordability of energy for Danish households than for their British counterparts. This is because fewer Danish households have individual gas boilers - 15% of homes in Denmark are heated by gas (Gram-Hassen and Toke

[22] The Danish State's holding in DONG was decreased substantially in recent years with the sale of shares to two Danish pension funds, and a firm managed by Goldman Sachs. The state maintains the majority holding however (DONG, 2013).

Haunstrup, 2011), compared to approximately 85% in Great Britain (CAB, 2014). The majority of homes in Denmark rely on district heating, however comparative pricing data between countries for district heating is not readily available. Although there is much variation in district heating prices within Denmark (Danish Energy Regulatory Authority, 2015), the Danish Energy Agency asserts that only 4% of households spend more on district heating than they would if they were to heat their home with an individual gas boiler (Danish Energy Agency, 2014b). It is important to note that a number of Danish district heating systems are run on gas, and therefore changes in wholesale gas prices will affect both households with individual gas boilers, and those who rely on district heating. It is also important to note that the underlying 'basic price' in Denmark is far lower than in the UK, the majority of Denmark's final electricity and gas price is the product of taxes and levies.

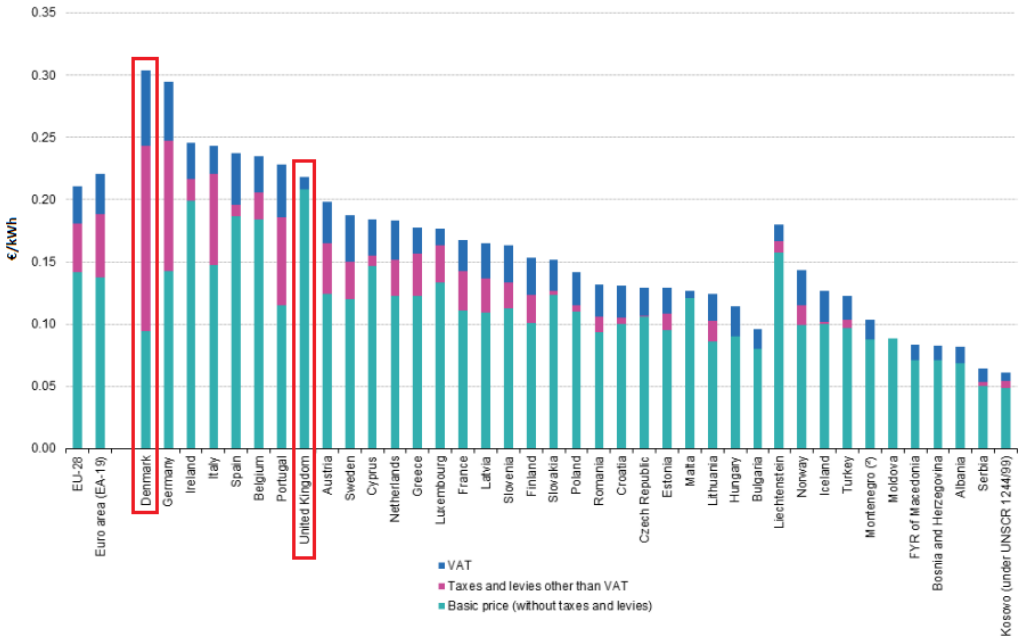


Figure 32 - Domestic Electricity Prices for European Household Consumers in Second Half 2015, Source: Eurostat, 2015a

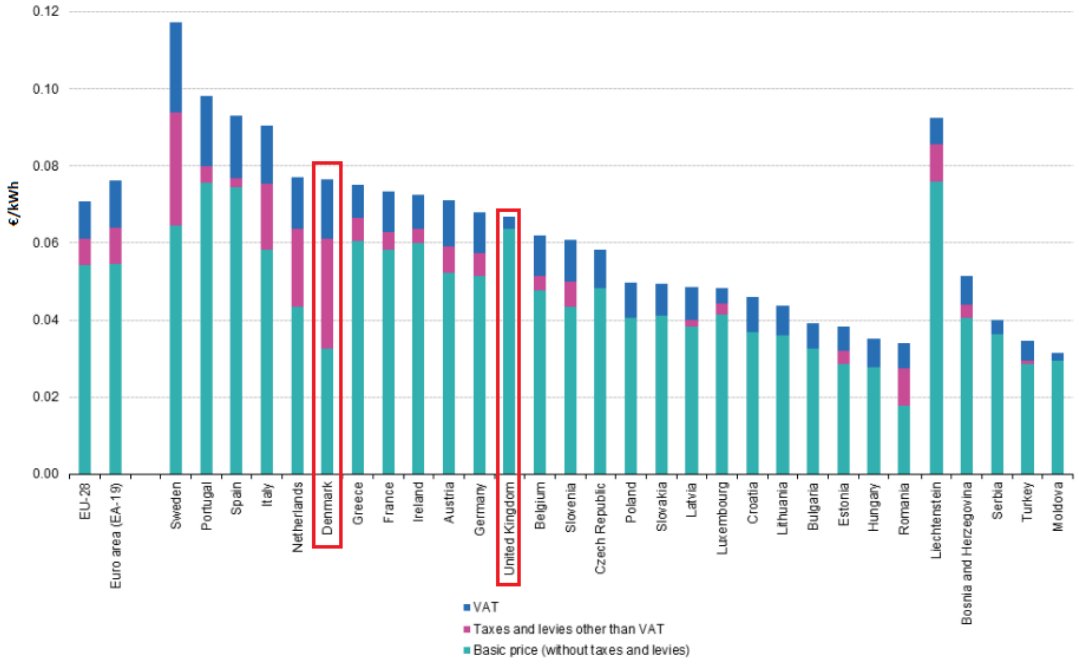


Figure 33 - Domestic Gas Prices for European Household Consumers in Second Half 2015, Source: Eurostat, 2015b

6.2.2 – Domestic Energy Demand & Energy Efficiency

Average domestic energy demand in Danish households is declining (Danish Energy Agency, 2015c), with average demand per-dwelling falling 14% between 2000 and 2012 (ODYSSEE, 2013) particularly in use for heating, to the point where it offsets the increasing numbers of households (Danish Energy Agency, 2013). Although final energy demand per dwelling is slightly higher in Denmark than in Great Britain (Danish Energy Agency, 2013; OFGEM, 2013f), when figures are adjusted for climatic differences, this relationship reverses. Climate-adjusted average per-household demand is approximately 10% higher in Great Britain than in Denmark (ODYSSEE, 2013). Although these figures do account for differences in climate, they do not account for the typical dwelling in Denmark being slightly larger than that in Great Britain (Kristensen, 2007), or adjust for possible differences in average internal temperature.

This level of demand would be considerably higher if Denmark had not put in place such high levels of energy efficiency. In Figure 34 below, the energy efficiency standards of the domestic sector in a number of European counties are shown, based on the average U-values for walls, roofs, floors, and windows. U-values are a measure of heat loss per square metre of surface area (and so indicate the standard of insulation) - a lower value signifies a higher standard of insulation. Denmark is

consistently high up the ranking, whereas the UK is consistently much further down the rankings[23]. Denmark is now considered to have one of the highest standards of energy efficiency of buildings in the world (IEA, 2011).

Rank	Country	Walls	Country	Roof	Country	Floor	Country	Windows
1	Sweden	0.3	Sweden	0.2	Sweden	0.2	Finland	1.9
2	Finland	0.4	Denmark	0.3	Denmark	0.4	Austria	2.3
3	Denmark	0.5	Finland	0.3	Finland	0.4	Denmark	2.4
4	Czech Republic	0.8	Czech Republic	0.6	Germany	0.8	Sweden	2.5
5	Austria	0.9	Austria	0.6	Czech Republic	0.9	Germany	2.7
6	Germany	0.9	Ireland	0.7	Belgium	0.9	Czech Republic	2.7
7	UK	1.0	Germany	0.7	France	1.0	France	3.1
8	Netherlands	1.1	UK	1.1	Ireland	1.0	Netherlands	3.2
9	France	1.2	Netherlands	1.2	Austria	1.0	Belgium	3.8
10	Ireland	1.2	France	1.3	UK	1.2	Ireland	3.8
11	Belgium	1.5	Belgium	1.6	Netherlands	1.3	UK	3.9

Figure 34 - Average U-Values of Walls, Roofs, Floors & Windows, Source: ACE and Energy Bill Revolution, 2015

The comparatively high energy prices for domestic consumers in Denmark and high energy efficiency standards, mean that the investigation will focus primarily on the role of governance in delivering such high-energy efficiency standards, rather than impacts on pricing policy.

6.2.3 - Household Income

Equivalised disposable income can be used to compare the income of households in different countries. It is based on the total income of a household, after tax and other deductions, that is available for spending or saving, divided by the number of 'equivalised adults' - which are calculated based on household members' ages. This is done to account for differences in household size and composition (for more details see Eurostat, 2014). In Denmark, the equivalised median household disposable income is considerably higher than that in the UK[24] (Eurostat, 2015a) - with median equivalised disposable income in a Danish household of €27,861, compared to in the UK where it is €20,528 (2014 figures). However when the relative spending power of the different currencies is taken into account (expressed by means of the purchasing power parity) this difference becomes smaller with Denmark with a PPP of 22,458 and the UK with a PPP of 22,297 (2014 figures) (Eurostat, 2015d). Together this implies that although Danish households have higher incomes, this difference is largely counterbalanced by the higher cost of living in Denmark. The UK shows greater levels of income inequality and a greater percentage of the population in severe poverty (2010 figures) – classed as having an equivalised income below 50% of the median (OECD, 2014). The wider income distribution in the UK leads to higher levels of poverty than in Denmark.

[23] Comparable data for Great Britain, rather than the United Kingdom is not available.
[24] Figures for Great Britain, rather than the United Kingdom are unavailable.

6.3 - Comparing Affordability

Denmark was selected for study because of its high standards in domestic energy efficiency, something which offers one of the greatest opportunities for improving affordability of energy in the domestic sector in Great Britain. However, a brief examination of levels of affordability of energy in Denmark adds useful context to this analysis.

Making direct comparisons of affordability of energy between different countries is challenging owing to the fact that, as set out in chapter one, what may be considered 'expensive' or 'affordable' can be seen as subjective (Owen, 2010), and normative (Feitelson and Chenoweth, 2002; Niëns and Brouwer, 2013). It is also closely related to other issues such as differing expectation of what an adequately warm home may be (Energy Bill Revolution and ACE, 2013), which will affect cost to heat. Some comparisons relating to fuel poverty and deprivation exist, which show the state of affairs in Denmark to be considerably better than in Great Britain. In Great Britain 10.6% of households report being unable to afford adequate warmth, and 8.7% report being in arrears with energy payments, whereas in Denmark 3.9% of households report being unable to afford adequate heat, and 3.7% report being in in arrears (ACE and Energy Bill Revolution, 2015). Thomson and Snell (2013) carried out a study using a range of variables to quantify fuel poverty, which consistently demonstrated Denmark to have among the lowest levels among the EU-27 countries. The UK, although not amongst the very lowest in these rankings, consistently came considerably lower than Denmark. This may be partially explained by higher poverty levels in Great Britain.

These figures are consistent with the views of the majority of interviewees regarding fuel poverty in Denmark, which revealed that fuel poverty is not considered a significant problem in Denmark.

> *'Actually it [Fuel Poverty] is not an issue in Denmark... and I think it's because of the social service system. It's nothing that's discussed. I tried to look into the numbers actually, because first I googled it because I'd never heard of it, maybe I'm just ignorant or... but no, it's not in the official debate in Denmark at all.'*
>
> (Interviewee 6)

The idea that the low levels of fuel poverty in Denmark are related to the high standard of social welfare was supported by a large number of interviewees from a range of categories, and is also identified in the literature (Healy, 2004), it is also likely due to lower levels of severe poverty (OECD, 2014). Only one interviewee in Denmark made a link between low levels of fuel poverty, and high domestic energy efficiency standards. However, it is worth noting she had worked on issues of fuel poverty, and was well aware of the arguments found in literature of fuel poverty in Great Britain regarding the need for greater domestic energy efficiency. The view that fuel poverty is not a

significant issue in Denmark, and that this is owed to high standards of social welfare support was most concentrated among government respondents. Although it is likely to be in the interests of the government to paint a picture of the country as having a strong welfare system, the fact that this view was echoed by a range of other categories of respondents suggests that it is not just the governmental interests which are leading respondents to offer this view.

This does not necessarily imply that the level of welfare support, and low levels of general poverty offer a full and complete explanation for the high levels of affordability of energy in Denmark however. Firstly, it is important to reiterate that fuel poverty is a distinct issue from general poverty, and that this relationship is mediated by high standards of energy efficiency. Secondly, it is self-evident that if standards of domestic energy efficiency in Denmark were lower, there would be increased pressure from energy bills for those on low incomes, as well as likely pulling a number of additional households into poverty. It is not possible, without an extensive modelling exercise, to establish the relative roles of welfare support, and high energy efficiency standards in limiting levels of fuel poverty in Denmark. Both of these would be beneficial to households in Great Britain, however given the significant potential for improving energy efficiency, and that doing so would reduce the amount of social welfare support necessary for a household to establish a good standard of living, there remains a strong rationale for studying the impact of the Danish energy governance structure on standards of domestic energy efficiency. It is also important to reiterate that issues of affordability and fuel poverty are not equivalent, and that high levels of energy efficiency are also supportive of affordability of energy for all domestic consumers.

	Fuel Poverty				
Category	Industry Body	Energy Company/Network	Government	Academic	Other
Fuel poverty is not significant	II	III	~~IIII~~	II	II
Social welfare support	II	III	IIII	I	I

6.4 - History of Danish Energy Policy

6.4.1 - The Oil Shocks

There are a number of features of Denmark's history that have led to high levels of efficiency in its energy system, central to which were the oil shocks of the 1970s brought on by the OPEC

embargoes. When this occurred, Denmark's energy system was over 90% dependent on imported oil, making it one of the worst affected countries in the OECD (Danish Energy Agency, 2012). The impact of the oil shocks and the policy responses to them played perhaps the most significant part in shaping Denmark's energy policy today – a view supported by a range of respondents from across the energy sector.

> *'…way back in '73, Denmark was maybe the country in the World that was hit hardest by the oil crisis... So at that time started the whole development of renewable energy, energy efficiency, much more district heating, a lot of things started during the mid-late '70s because we were hit so hard by the first oil crisis, and again next by the next oil crisis in '79.'*
>
> (Interviewee 7)

In response, the government imposed a number of emergency measures such as extinguishing of every other streetlamp, a banning of lighting in shop windows, and a ban on driving on Sundays (Danish Government, 2014). More long term measures were also introduced, especially diversification of energy supply through the pursuit of renewable generation, greater conversion efficiency through more combined heat and power (CHP) generation, and ambitious levels of energy efficiency - particularly in the building sector with the introduction of strict building regulations (Danish Energy Agency, 2012). Energy taxes were also introduced to encourage energy efficiency, the level of which was expanded as the price of oil began to fall (Sovacool, 2013a).

A significant part of the response to the oil crisis in the 1970s was the rise of municipal level planning of heat supply policy (Danish Energy Agency, 2012). Before the oil shocks, domestic heating in Denmark was approximately 50% reliant upon oil (Mortensen and Overgaard, 1992). In order to address the energy security concerns brought about by the oil shocks, local authorities were required to begin assessing the heat demand in their locality and how it was currently delivered. This paved the way for regional and local planning of heat provision, written in reference to the first Danish Technology Catalogue, which gave information on technologies, costs, and energy price forecasts (Danish Energy Agency, 2012). The 1979 Heat Supply Act empowered municipalities to enforce a mandatory connection to district heat networks, banning use of other forms of heat (Ministry of Climate Energy & Buildings, 2011). This process gave local authorities the opportunity and resources to become intimately involved with heat planning of their areas.

The depth of the problems the oil shocks caused, and the very visible nature of the impacts, meant that the Danish people accepted the highly interventionist policy that the government began to impose (de Lovinfosse, 2008). This is consistent with views set out in chapter three that the presence of large and cheap indigenous energy resources in a country can lead occupants to take energy for

granted (Lockwood et al., 2013; Grubb et al., 1991), and therefore to undervalue energy efficiency. It is logical therefore in a country with no such indigenous energy resources, energy and energy efficiency would likely be highly valued – particularly following such a significant supply shock. This supported understanding and acceptance among the public, policy-makers, and private institutions for ambitious energy efficiency policies. A range of interviewees explained how this has laid a powerful narrative of the need for energy security in Denmark, and energy efficiency as a central part of the solution.

> *'I think there are opinions in Denmark that we should focus on reducing energy and I think it's historically based due to the oil crisis, because since then it has been in the public awareness that we should use less energy, reduce it a bit. In the last couple of years, it has been not that much in focus in the public but I think it starts again due to climate and due to the fact that we are running out of oil and gas here.'*
>
> (Interviewee 33)

	Oil Shocks				
Category	Industry Body	Energy Company/Network	Government	Academic	Other
Oil-shocks a defining moment	II	I	III	II	II
Energy security & energy efficiency	II	I	I	I	II

6.4.2 - History of the Housing Stock

The oil shocks are not the only historic factor which affects affordability of energy in Denmark, the history of the housing stock is also very relevant. At the end of World War 2, almost half of the population lived in rural areas, with a significant urban expansion taking place between 1960 and 1980 (Kristensen, 2007). Between 1975 and 2000, there was large-scale urban regeneration, which improved the standards of older dwellings. In the early years, this regeneration of inner city areas generally came in the form of destruction of old properties. However, this later gave way to retrofitting (Kristensen, 2007). This led to a housing stock that is generally newer (see Figure 35), and otherwise of a higher thermal standard than that in Great Britain (ACE and Energy Bill Revolution, 2015).

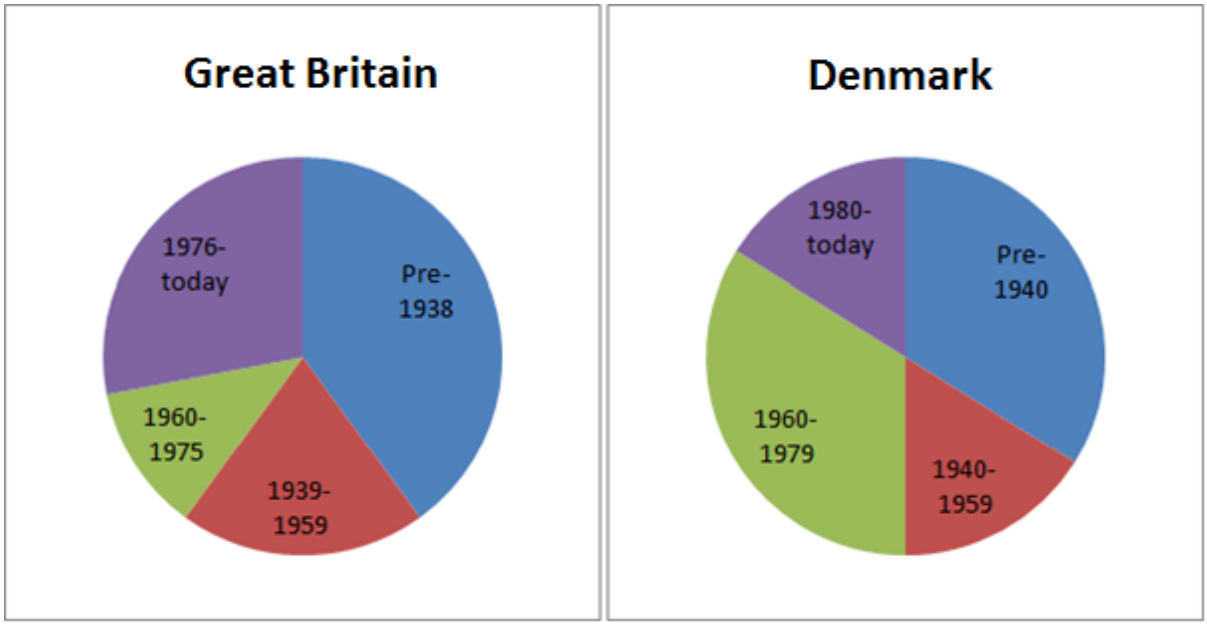


Figure 35 - Comparison of Housing Stocks in Britain & Denmark, Source: Source: DECC, 2011c and Kristensen, 2007[25]

6.5 - Policies Supporting Domestic Energy Efficiency

There are a large number of policies which support energy efficiency of the domestic sector in Denmark today, some of which have been in place for a number of years.

6.5.1 - Taxation

Energy taxes were introduced for all households in 1977 following the first oil shock (Sovacool, 2013b), and since then have been a motivator in the uptake of domestic energy efficiency measures (Danish Energy Agency, 2012). As energy prices began to drop back down in the 1980s and 90s, the level of taxation kept retail prices high, serving to keep up pressure to improve energy efficiency standards (Sovacool, 2013a). A carbon tax was added in 1996 (Togeby et al., 2008), and VAT on energy is charged at 25% (Espensen et al., 2014).

> *'…after the oil crisis was fading out a little bit and the energy price was starting to go down, the state decided to make an energy taxation that, so to speak, levelled out the price so that when the prices went down on oil, the taxation went up so that people would still have the same energy price, and that was the main reason for that was to give an incentive, to keep the incentive for energy savings.'*
>
> (Interviewee 5)

Although these taxes are not specifically hypothecated, the Danish government did introduce a number of publicly funded energy efficiency policies alongside the introduction of energy taxation. These included information campaigns, energy audits, and retrofit of public and residential buildings

[25] NB. Time periods do not correspond exactly owing to restraints of available data.

(Sovacool, 2013b). Energy taxes now form a significant part of government income and therefore are unlikely to be reduced in the foreseeable future. Revenue from all space heating and electricity (including both industrial and domestic consumers) is valued at approximately DKK 20billion (approximately £2.2bn[26]) - ~1% of Danish GDP (Danish Energy Agency, 2012). In electricity, taxes equate to approximately €0.10/kWh (Espensen et al., 2014), and in gas, just over €0.05/kWh, making up more than 61% of the unit price (Eurostat, 2015c) (Approximately £0.08/kWh and £0.04/kWh respectively[27]) (see Figure 32 and Figure 33)[28]. The high level of tax on energy was referenced by interviewees from across the range of interviewee categories as having been effective in incentivising high deployment of energy efficiency in the domestic sector.

'…the state needs the revenue from these energy taxations and if somebody suggests to change, or to reduce the energy taxation in some sector, the state will immediately say "well, fine if you can compensate by giving us similar revenue from a different sector".'

(Interviewee 5)

6.5.2 - Building Regulations

There is a long history of strong building efficiency policy in Denmark (Sovacool, 2013a), with building regulations for energy dating back to 1961 (Energiklyngecenter Sjaelland, 2014) and having been periodically tightened, particularly in response to the oil crisis. The effect of improving levels of building regulations can be seen below:

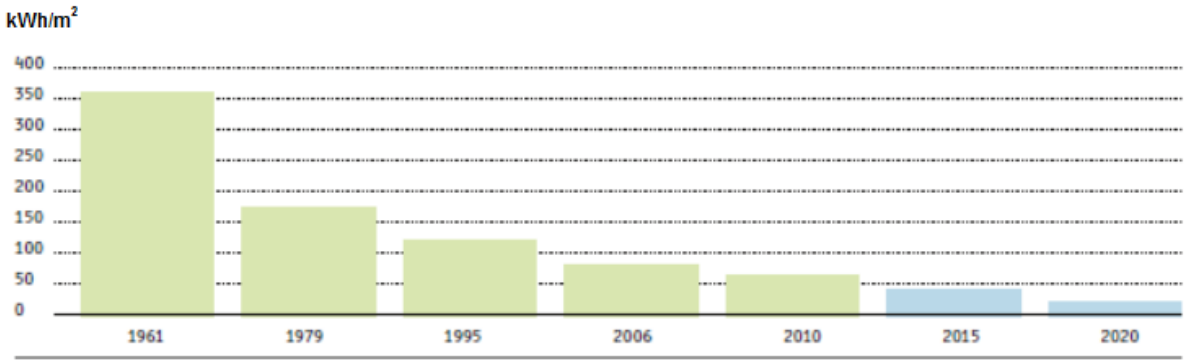


Figure 36 - Building Regulations: Energy Consumption in New Buildings in Denmark, Source: Danish Government, 2014

Danish building regulations are based on setting a maximum level of energy use per square metre. From 2015, the required standard for new builds was 30kWh/m^2 + 1000 kWh divided by the floor area (Danish Enterprise and Construction Authority, 2010) and from 2020 this is reduced further to

[26] Conversion Rate DKK1.00 = £0.11 (07-04-16)
[27] Conversion Rate €1.00 = £0.801 (14-06-14)
[28] For district heating, the tax is levied on the fuel burned, not the heat supplied (Danish Energy Authority, 2005), therefore owing to variation in efficiencies of different plant, and different fuel sources, a per-unit level of taxation is not easily calculable.

20kWh/m^2 (Danish Enterprise and Construction Authority, 2011). These levels not only represent a requirement for new buildings to perform far better than the average (which is currently 135kWh/m^2 (Danish Government, 2014), but also sets out a clear pathway for future action so those in the building industry are aware of future requirements.

Owing to the significant difference between new-build standards and the average existing home, and the fact that 'most of [the] existing buildings will remain in use until after 2050, since turnover in the building stock is only around 1%-2% a year' (Moller Andersen et al., 2012, p.121), much policy attention is now being paid to the existing housing stock. Unlike the regulations for new buildings, retrofit standards refer to specific individual features or items within the upgrade or extension, such as roofing, windows, doors, and walls (Danish Enterprise and Construction Authority, 2010). Some measures are only required if deemed to be cost-effective[29], however there are a number of items which are required to comply to minimum standards listed in the building regulations irrespective of cost-effectiveness. These are generally those which affect the external envelope of the property such as windows, roofs, walls, floors (Danish Enterprise and Construction Authority, 2010). In 2014, the Danish government published a strategy for the retrofit of existing homes (Danish Government, 2014) which set out commitments to upgrade or review standards for various aspects of home renovation contained within the building regulations. Other routes to support improved retrofit of existing properties are also set out, such as the launch of the *'Bedre Bolig'* [Better Homes] initiative (see below), consideration of introducing a sub-target to the energy efficiency obligation to be met in existing properties (see below), and a pathway for the review and tightening of requirements on a regular basis so policy can reflect technical and cost developments (Danish Government, 2014). Retrofit policies have supported significant improvements in the housing stock, as can be seen in Figure 37, which sets out the actual energy consumption of houses in 2011 by construction period. When compared to Figure 36, it can be seen that levels of actual consumption are significantly below the level set by the building regulations of the period.

[29] '… structural measures are deemed to be cost-effective if the annual saving multiplied by the lifetime, divided by the investment, is greater than 1.33 which amounts to the measure concerned paying for itself within 75% of its expected lifetime' (Danish Enterprise and Construction Authory, 2010).

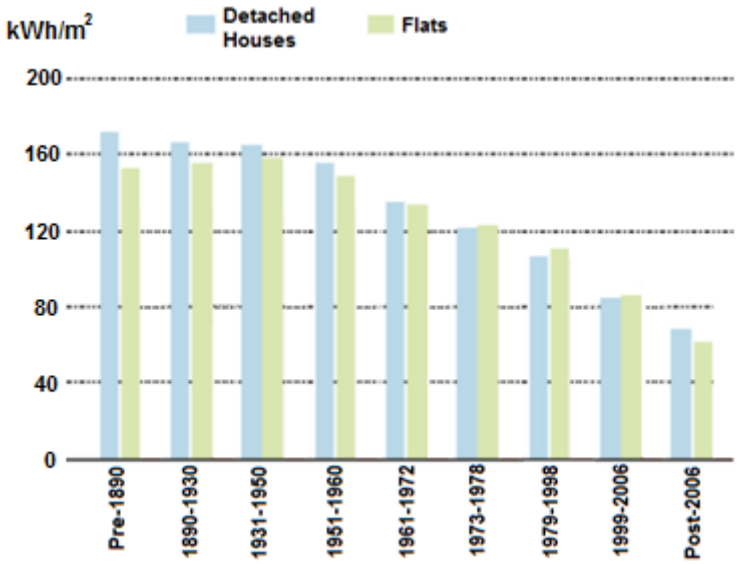


Figure 37 - Energy Consumption in Dwellings in 2011 by Construction Period in Denmark,

Source: Danish Government, 2014

Interviewees from a range of categories supported the ideas that a combination of building regulations and high levels of taxation on energy were significant contributors to delivering high standards of energy efficiency in the domestic sector in Denmark.

	Policies supporting energy efficiency				
Category	Industry Body	Energy Company/Network	Government	Academic	Other
Taxation	I	I	I	I	I
Building regulations	II	II	III		II

6.5.3 - Energy Efficiency Obligation

Since 2006, in Denmark there has been an obligation on all energy network companies (electricity, gas, and district heat), as well as the oil sector[30], to support energy reduction through advice, consultancy, or payments to end users who install efficiency measures (i.e. residential or industrial customers) (IEA, 2011), as well as improving efficiencies within their own operations (Danish Energy Agency, 2014a). This means there are four-hundred and seventy-nine companies involved in the obligation – seventy electricity grid operators, three natural gas distributors, four hundred district

heating companies, and six companies within the oil sector (Danish Energy Agency, 2014a). The commitment is divided between network types (i.e. x% of the total target is given to the gas network companies, y% to district heating networks and z% to electricity networks etc.) the target for each individual network is then administrated by the industry body (e.g. the district heating association). The total reduction targets are imposed for a given period, and have been ratcheted up over time (Bundgaard et al., 2013) - see Figure 38. Currently the target stands as equivalent to saving 3% a year of total end use consumption (excluding transport) (Danish Energy Agency, 2014a)[31].

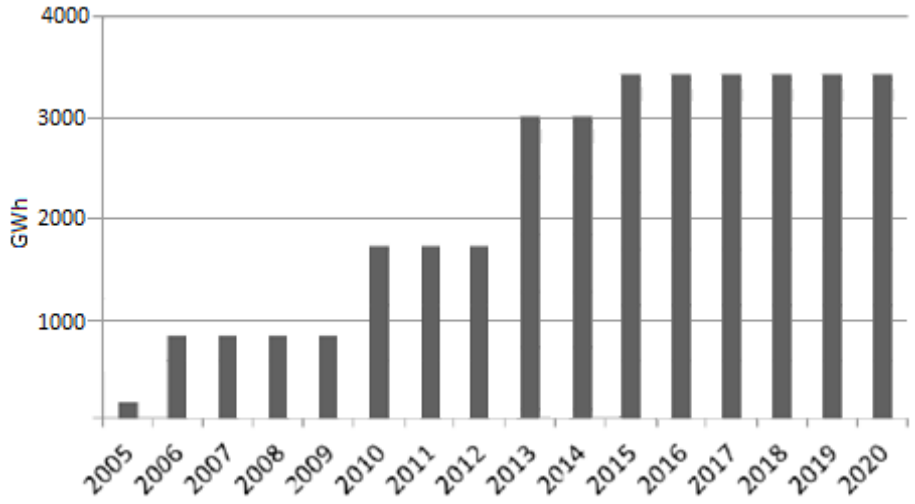


Figure 38 - Development in the Danish Energy Efficiency Obligations Target, Source: After Bundgaard et al., 2013[32]

To reduce administrative burden, if a standard measure is installed (e.g. windows, a new boiler etc.), then accreditation of savings is based on the level of savings accrued within the first year, which are then weighted based on the lifetime of the measures, banded as 1-4 years, 5-15 years, or 15+ years (Staniaszek and Lees, 2012). In the case of more bespoke projects, such as large industrial measures, then savings are accredited based on calculations of improved efficiency (Togeby et al., 2009; Staniaszek and Lees, 2012).

Similar to the ECO in Great Britain, the obligated firms are able to recover the costs of the scheme through their charging of customers (Bundgaard et al., 2013), and there is no hard-and-fast cap for these costs. In 2012, the average cost of savings was €0.05 per kWh saved (approximately £0.04/kWh[33]), which was lower than anticipated (Danish Energy Association, 2012). There are some

[31] In 2013 total energy use, excluding transport stood at approximately 405PJ (112 TWh) (Danish Energy Agency, 2015c).
[32] NB. The value for 2005 (0.6PJ) shows savings from the previous system and is estimated based on reporting from utilities (Bundgaard et al., 2013).
[33]Conversion rate €1.00 = £0.79 (12-06-12)

concerns that the costs will increase as opportunities for cheaper measures are being exhausted, and targets increased.

'…now they increased the ambition of the scheme to 1.75% a year, whereas the first scheme was about 1% a year, and that was probably relatively easily achievable, whereas 1.75% is a bit more. But now it's becoming increasingly costly and difficult to find these savings because a lot of the low-hanging fruit have been harvested already.'

(Interviewee 27)

Interviewees that held this view were predominantly from energy supply/network companies, as well as one from an industry representative body – this suggests that these increasing targets represent genuine concerns for the companies who deliver them.

Unlike the ECO however, the obligation does not specifically target reductions on the domestic sector. It permits firms to find savings wherever they can do so most cheaply. Interviewees from a range of different categories explained that this has led to the majority of measures being delivered to commercial customers where large savings can be realised in a single installation (Bundgaard et al., 2013).

'… [households] are not worth going for, it's too small and too expensive, so they focus on industry and that's actually quite remarkable because we're the only country in the EU that goes for industry, but we have been very successful in that.'

(Interviewee 36)

In spite of this, in the earlier years of the obligation the levels of savings realised in the domestic sector were approximately in line with the domestic sector's share of total demand (Danish Government, 2014). There was no consensus on why there continues to be some focus on domestic properties however proposed reasons included possible government pressure to deliver measures in the domestic sector, or the opportunities for district heating companies being able to easily contract with building owners such as flats where they can offer advice based on benchmarking total heat consumption against other similar buildings on their network.

'There's an understanding of this problem [limited focus on domestic consumers] and it has been written in the political deal between the minister and the DNOs that there must be some focus on the household sector, so there is an understanding of this and I suppose if they came out with a big zero then the deal would be off I guess or prolonged the next time or harsher demands would be imposed or more emphasis would be put on the household sector…'

(Interviewee 50)

'…if we have a street, with similar buildings, we can compare them. We can see that number 5 uses 30% more energy than number 7, which uses 20% less than number 11, or whatever. So we can compare them and we can tell them you should do something with your energy demand. Because we can see, we can benchmark them. And we can tell them "you have a building which is similar as your neighbour but you use much more energy, so we advise you do something about it".'

(Interviewee 7)

Also unlike the ECO, obligated companies are unable to carry out the majority of improvements themselves, instead having to contract with trades-people, consultants, engineers etc. (Danish Energy Agency, 2014a). Some of the obligated firms do however avoid this requirement through the arm's-length operation of energy efficiency firms which work can be passed on to (Togeby et al., 2009). As under the ECO, savings can be traded between companies on a secondary market (Danish Energy Association, 2012).

The power to impose legal obligation for energy efficiency are set out in the natural gas, electricity, and heat supply acts, however in significant contrast to the ECO, the Danish Supplier Obligation operates not by means of a legal obligation, but a negotiated *agreement* between the energy minister and the network companies to meet targets (Danish Energy Agency, 2014a; Hamilton et al., 2010). There is no licence obligation to fulfil, and no sanctions if targets are not met (Bundgaard et al., 2013), however this does not appear to weaken firms' resolve to meet their obligations, indeed in 2008, electricity distributers exceeded their target by 25% (Hamilton et al., 2010). A range of interviewees commented upon the design of this mechanism, and how it required a more mature relationship between government and industry. It was suggested by respondents from a range of categories that the consistent meeting of targets in spite of there being no penalties for not doing so may be because if the sector were to fail to uphold its end of the agreement, then a legal obligation will be enforced in future. This process of agreements leads to reduced need for regulation and a reduced administrative burden, which could be sizeable given the number of obligated firms (Danish Energy Agency, 2014a).

'…the new Efficiency Directive for the EU where all 28 member states have to do something and then again how the governments choose individually to do this together with the sector is of course up to them and in Denmark we have chosen to do this - we have a government that has asked us to play ball and then made a voluntary agreement. But of course if we didn't make this agreement voluntarily they would just politically tell us what to do.'

(Interviewee 45)

The success of the design of the policy may also relate to the institutions on whom responsibility is placed. Giving the obligation to network companies was highlighted as bringing a number of benefits including reduced conflict of interest, as successful demand reduction would not necessarily reduce revenues for a network in the same way it would for a supplier. It is also the case that energy companies, particularly in district heat, are owned either by cooperatives of those connected to the network, or the municipalities in the area (Lockwood, 2015), meaning it is the owners, or residents of the area, that benefit from effective deployment of energy efficiency measures. In the case of district heat networks reduced consumption would lead to reduced revenue for supplying heat. However issues of conflict of interest are limited by the fact that heat networks are required to operate on a non-profit basis (IEA, 2014), so reduced revenues owing to reduced demand has no impact on profits. This is a significant contrast to the supplier obligation structure in Great Britain.

'It has worked, to some extent there can be a conflict but you have to be aware that until now, our obligation has been on the distributors, not on the retail sales companies, and the conflict for the distributors is maybe a bit smaller'.

(Interviewee 49)

'Most of the energy companies in Denmark are owned by the consumers themselves…So that's also what makes quite good sense, that why sell your owners something they don't need?'

(Interviewee 6)

A number of respondents, particularly those from the Government, suggested that the network companies do not object to delivering these energy efficiency measures because it allows them to develop new revenue streams, and form stronger relationships with their customers. However, one representative from an industry body suggested that many of the smaller heat networks object to the policy because they find it difficult and inconvenient to meet their contributions.

	Energy Efficiency Obligations				
Category	Industry Body	Energy Company/Network	Government	Academic	Other
Increasing annual targets present a significant challenge	I	II	I		
Industrial installations are more cost effective	I	II		I	II
Some measures continue to be delivered in the domestic sector	I	I	I		I
Use of a voluntary agreement is significant	II	I	II		I
Government will regulate in firms do not cooperate	II	I	I		
Ownership structure of networks creates reduced conflict of interest	II	I	I		
Energy efficiency offers alternative revenue streams for firms		I	III		
Some firms do object	I				

6.5.4 - Information & Coordination

Interviewees from a range of categories highlighted the important role that the information schemes in Denmark play in supporting delivery of energy efficiency measures in Denmark. A number of information schemes have been set up including The Danish Energy Agency's 'case-bank' which gives real-world examples of households that have made energy renovations. This clearly sets out the different options for different types of house renovation - costs, process, and energy savings (Danish Energy Agency, 2015b).

'You can use the information campaigns and we have a lot of information campaigns and case examples and how much money can you save by doing this. Our [Case-Bank] website is very good on this – we have spoken to 20 people having their house, new windows, new roof, whatever and saying how much they paid, how much they have saved on energy bills and stuff like that.'

(Interviewee 33)

The value of the 'Bedre Bolig' [Better Homes] program was also highlighted by a range of interviewees. This is a Danish Energy Agency initiative, which is another source of information, training advisors to provide detailed bespoke information. Inspired by the UK's Green Deal, Bedre Bolig advisors are trained and accredited to give advice on how best to carry out whole-house retrofits to improve the energy efficiency of a domestic home.

> *'…the idea is that you or I as a person living in a house could go to one of these people [Bedre Bolig Advisors], and they could help us in the way that they'll say 'Ok, this is your house, I had a look at it, you can like change with windows that will give you this much, you can change the roof, that will give you this much, or you can put some insulation on it or whatever is needed'*
>
> (Interviewee 10)

The scheme also aims to facilitate better links between trades, so the advisor is able to connect the home-owner with all the trades, and potentially also the financing through means of a partnered financial institution, necessary to carry out the retro-fit. Although the information scheme is modelled on the Green Deal, there is not an equivalent pay-as-you-save mechanism (Danish Energy Agency, 2014c). Some respondents suggested that this was owed to the availability of finance through other routes. Similarly to the Green Deal assessment however, interested households are often required to pay for a Bedre-Bolig plan to be drawn up, however they are able to shop around to find the best quote for the plan (SparEnergi, 2016).

	Information Campaigns				
Category	Industry Body	Energy Company/Network	Government	Academic	Other
General Information	I	I	III		I
Better Homes	I		II		I

6.5.5 – Finance

As set out above, there are strict rules around energy standards when renovating properties that lead to the standard of energy efficiency being improved. This is supported by easily-accessible finance. In Denmark, it is common for home owners to extend their mortgages, or remortgage their

properties, to allow them to pay for renovation works. The exact value and terms of which vary depending on the property the loan is being mortgaged against, the financial situation of the individual taking the loan, and the term of the loan (Frederikshavn Municipality, 2014). Interest rates for these loans can typically be between 5-8% (Frederikshavn Municipality, 2014), however some institutions offer rates of 3% and below (Frederikshavn Municipality, 2014; Nykredit, 2015a). A number of respondents highlighted that this gives a number of homeowners' access to affordable finance, which is instrumental in supporting energy efficiency retrofit. Some banks are starting to offer bespoke products for energy renovation - for example Nykredit, who has ~45% of the mortgage market (Nykredit, 2015b), has gone into partnership with DONG to offer advice on potential upgrades to properties, and the financial opportunities available to enable them to be carried out (Nykredit, 2014). It is interesting to note that government respondents were most common in their highlighting that finance was accessible, and that this facilitates retrofitting of energy efficiency measures. This may be related to work the government had carried out focussing on the barriers and facilitators to retrofitting of energy efficiency, which was undertaken in the lead up to the interview period. This work examined and rejected the Green Deal finance mechanism. Alternatively, this could imply that the government has an over-inflated idea of the role that mortgage finance plays in facilitating retrofit. However, the fact that interviewees from other groups also voiced the same views makes this less likely. One government respondent commented however that there are some banks which are yet to understand the value in offering such loans to households, and so part of the Government's retrofit policy is to improve understanding of opportunities among financial institutions.

The challenge with a financing mechanism which is reliant upon mortgages however is that it is inevitably tied to the value of property, meaning those with very low-value properties have limited access to finance to improve them (Frederikshavn Municipality, 2014). In areas where there is large-scale migration from rural areas into cities, rural properties are losing value, preventing their owners leveraging finance against them.

> *'…in the part of Denmark where the economy is not very good, people cannot afford it, you cannot take more lending money in your building because the building is not really worth anything, so even it might be economically feasible to do the renovation, if the house is worth nothing then improving the house it will still not be worth anything because it's in the wrong place.'*
>
> (Interviewee 38)

This was exacerbated by the widespread falls in house values following the 2008 financial crash which left a number of consumers facing negative equity in their property and so without access to

what would otherwise be a common form of finance. A recent survey revealed that one in ten Danish households believe themselves to be in negative equity (Apt Capital Management, 2015). This issue was highlighted by some interviewees, but interestingly was not mentioned by the government respondents who highlighted the benefits of this financing mechanism. It is possible either that the government is not aware of the challenges, or more likely (given the work that has recently been undertaken in this space) that they are less willing to highlight the possible shortcomings in a funding mechanism which is foundational to their retrofit policy. It is possibly less surprising that energy suppliers and networks did not discuss these financing opportunities or issues, owing to there not being directly involved in this part of the retrofit supply chain.

	Finance				
Category	Industry Body	Energy Company/Network	Government	Academic	Other
Generally accessible	I		III	I	I
Challenge for low-value homes	I			II	I

6.6 – Broader Features of Governance

6.6.1 - Relationship Between Government and Industry

A range of interviewees discussed the collaborative nature of the relationship between the government and private firms in the industry, explaining how they work together to establish new targets and policies. Lockwood (2015) sets out how this tradition for consensus building and the strong collaborative relationships between actors in the governance structure are crucial in the success of Danish energy policy. This is particularly evident in energy efficiency policy making. As set out above, the supplier obligation is set through a process of negotiation between the government and the obligated parties. This allows government to take on the role of a facilitator (Schmidt, 2002), and gives obligated parties ownership and involvement of the process and means that they do not feel like they are simply forced into action.

'…either they can tell us what we need to do, or they can politely ask as to take part of this, to have an ownership of the process and empower us for what we see is the best solution.'

(Interviewee 45)

This is a mature form of relationship, which is contingent upon a balance of knowledge between government and the private sector - government and industry both need the capacity to understand the policy which is being negotiated. As set out above, government will, by its nature, always have the power to impose regulation, which was suggested it would willingly exercise if there was significant resistance from obligated parties. However, if government does not understand the subject area is it unlikely to be able to negotiate, or wield its power effectively (Kuzemko, 2014; Lockwood et al., 2013). This process of negotiation between government and firms is not limited to the supplier obligation, but also extends to product standards, and building regulations.

6.6.2 - Political Consensus

The relationships between political parties are also a significant feature of the governance structure in Denmark. There is a high degree of political consensus around some issues such as the need to tackle climate change, and the importance of energy efficiency as a central pillar of Danish energy policy. Lockwood (2015) attributes this in large part to the presence of a proportional representation electoral voting system. This has created a multi-party system, which makes coalition governments commonplace (Cusack et al., 2007). This has led to a level of relative stability in the political landscape, leading to a continuity of policy, with particular buy-in around particular issues such as energy efficiency (Lockwood, 2015). The importance of the political consensus was highlighted most commonly by those interviewees which worked for the government. This is perhaps unsurprising as a collaborative or combative nature between parties would be likely to have a significant impact on the day-to-day lives of those that develop policy which is later to be passed through parliament.

> *'There's broad support in the political parties in parliament that this is something that we have to do… there's a broad consensus that we have a problem and we have to do something about it, and one of the things that we will have to work on is efficiency because up to 2050, that's where we will harvest most results in terms of getting a more efficient society, or more intelligent energy usage.'*
>
> (Interviewee 9)

With negotiation for energy efficiency targets and product standards, and political consensus building around key policy areas, there are very few dissenting voices to stand in the way of chosen pathway (See: Grubb et al., 1991; Lockwood et al., 2013). This of course is not necessarily always a positive thing, as it can build a strong degree of policy lock-in, however in this instance this structure of governance works to keep Denmark on a path of increasing levels of efficiency and deployment of renewables, fostering more affordable energy.

This gives a strong element of stability and credibility to policy-making; stakeholders know that policy is not going to radically change direction after every election and are able to plan accordingly. It is interesting to note that this consensus is not necessarily founded on similar values, but can be a product of overlapping goals. This was set out by one interviewee in reference to the adoption of the Energy 2050 agreement:

> *'Whether or not they cared about climate didn't make a bit of difference, the idea of not being dependent on the middle east for oil was really appealing…That's where you find the explanation of the fact that you get 172 out of 179 members of parliament supporting this agenda because we have the very right wing… that really are not convinced about climate and are not sure that it's a problem, and if it is a problem then the free market will fix it, as far as they're concerned if you could just block the middle east out…[then it is worthwhile]* '(Interviewee 34)

	Relationships				
Category	Industry Body	Energy Company/Network	Government	Academic	Other
Collaboration: government & industry	I	II	II	I	
Political consensus		I	IIII	II	

6.6.3 - Developing Expertise

Energy technologies are a significant source of income for Denmark. In 2011, they accounted for 10.4% of Danish exports, equating to approximately DKK 80billion (Approximately £8.7billion[34]) (Danish Energy Agency et al., 2012). Figures are not suitably subdivided to calculate what portion of these can be attributed to energy efficiency, but approximately one fifth of all Danish energy technology companies work in the energy efficiency sector (Lean Energy Cluster, 2014). A range of interviewees highlighted the significant economic role of energy technology companies has a bearing on the policies that are developed. The high standards of regulation in the Danish market drive Danish energy efficiency firms to advance quickly – developing products and expertise for meeting strict national regulations, which can then be exported at high value. Four firms in particular were referred to by interviewees:

[34] Conversion Rate DKK1 = £0.11 (07-04-16)

- Velux - A window manufacturer
- Grundfos - A manufacturer of pumps - particularly for heating and air conditioning
- Danfoss - A manufacturer of heating, cooling, and control products
- Rockwool - An insulation manufacturer

> *'…right after we came through with the 'Bedre Bolig', there were actually four companies - like four big Danish companies – Velux, Danfoss, Grundfos and Rockwool… that are very big companies in Denmark came through with a deal that matched ours quite a lot and that's because they found out that if they could get people to make renovations in their home they could sell more windows, they could sell a lot of technology to do that kind of stuff. So I guess one of the important things it to try and figure out where do we have some common interests with these companies…'*
>
> (Interviewee 10)

This is significant because it means there are powerful interests supportive of ambitious energy efficiency standards. This is because it gives large firms a safe market in which to develop advanced high-efficiency products, allowing them to gain competitive advantage when exporting to other countries.

Together, the collaboration to negotiate targets between government and industry, the strong cross-party support for energy efficiency, the powerful voices speaking out *in favour* of tighter regulations helps to deliver a stable policy environment. This is significant because it enables firms to develop new products, and make investments with confidence that the policy landscape will not unexpectedly change around them (Lockwood et al., 2013). This not only encourages investment, but also supports lower costs of capital which helps to make products and product development cheaper.

	Demand-Side Interests				
Category	Industry Body	Energy Company/Network	Government	Academic	Other
Developing expertise	I	I	I	II	

6.7 – Conclusion

This chapter has set out the policies and the governance structure in Denmark relating to energy efficiency, and has highlighted some significant differences between the Danish governance structure, and that which is present in Great Britain. The context of the governance structure in Denmark is very different to that of Great Britain. Denmark is characterised as having high domestic energy bills, which are kept artificially high through taxation, however there are also very high standards of energy efficiency. Alongside a supportive social system, this supports few issues of affordability, and low levels of fuel poverty.

The oil shocks of the 1970s were key events in Danish energy history, and contributed to supporting a more interventionist ideology where the government was willing to intervene in markets to promote high energy efficiency standards. Ambitious energy efficiency standards were introduced at this time alongside high energy taxation, and a narrative of energy efficiency being intimately connected to delivering energy security also started to develop. The same is not true for the impact of the oil shocks in Great Britain, instead security was provided from supply-side policies including greater exploitation of North Sea oil supplies (Helm, 2002). This demonstrates how a countries' supply of natural resources can have a significant impact on its energy policy (Kuzemko, 2013)– in Denmark security was connected with energy efficiency, whereas in Great Britain it was connected to self-sufficiency, and alternative routes of supply.

Denmark's equivalent policy to the ECO appears to play less of a role in the deployment of energy efficiency measures to the domestic sector than the ECO does in Great Britain, although some measures are still delivered to households. The governance relating to Danish policy is very different to that in Great Britain. Firstly, it is based on agreements, rather than regulations backed by sanctions. This functions on the idea that if the energy companies do not meet their commitments, then the government will begin to regulate – it is the threat of regulation which encourages them to comply. This demonstrates the power that government has over the industry. This is in stark contrast to the situation in Great Britain where the government responded to political pressure from suppliers to reduce the regulations, and so reduce their expectations for delivery. In Denmark, these measures are delivered by the network companies, rather than the supply companies (which in the case of district heating operate on a not for profit basis). This helps to alleviate some of the conflict of interests that are faced by energy suppliers in Great Britain which are required to deliver measures which will inherently harm their core business interests. Placing the obligation on energy networks could offer an alternative delivery model in Great Britain, however as is seen under network revenue regulation, it is not clear that OFGEM has sufficient institutional capacity to ensure

that costs were kept to a minimum, and the different ownership structure in Great Britain would also make it less likely to be successful.

The nature of relationships is shown to be important in the governance structure in Denmark. There is strong collaboration between the government and firms in the industry in the development of energy efficiency targets. It is not clear however that such a process could be easily fostered in Great Britain. Currently the firms with greatest responsibility for deployment of energy efficiency measures are the energy suppliers, landlords, and housebuilders. As set out in chapters three and five, it is not clear that governmental departments have adequate institutional capacity in the energy efficiency policy-making space to ensure that the balance of power did not lie with the firms in the industry. It has already been seen that the energy supply companies, and landlords in Great Britain are able to influence government policy. The nature of lobbying in Denmark is very different – there are a number of powerful demand-side interests which benefit from increasing levels of energy efficiency standards, and therefore lobby *for* higher standards. Part of the reason these firms are powerful is that they have become economically important for Denmark, exporting their advanced energy efficiency technology to other countries.

Finally, the cross-part consensus which exists around the importance of energy efficiency, and the need to transition away from fossil-fuels, is an important feature of the governance landscape in Denmark. This has helped to build a stable investment landscape for energy efficiency supply chains. Although there was cross-party consensus in the development of the Climate Change Act in Great Britain, this has not translated into agreement regarding the centrality of energy efficiency to delivering on that commitment, meaning that the stability enjoyed by firms in Denmark, does not exist in Great Britain.

The unique nature of governance structure in Denmark is central to supporting high standards of energy efficiency. This helps to support good levels of affordability, in spite of higher energy prices. The following chapter will set out proposals for improving affordability of energy for the domestic sector in Great Britain, where appropriate drawing on the lessons from the Danish governance structure which have been set out in this chapter.

Chapter 7 - Discussion: Proposed Solutions for Issues with Governance for Affordability

7.1 – Introduction

Previous chapters have examined the policy and academic literature, as well as results from primary research to set out how the governance structure in Great Britain impacts the levels of affordability of energy for domestic consumers, and set out how the governance structure in Denmark is supports affordability of energy for Danish households. This chapter brings all these findings together. An over-arching theory under which a number of these issues may be grouped is set out, and solutions are also offered to the issues in the governance structure to support the delivery of a higher standard of affordability of energy for domestic consumers.

The recommendations in this chapter are not intended to be overly prescriptive, setting out proposed solutions in minute detail, rather to highlight the key hallmarks of an alternative governance structure which is more supportive of an energy system which delivers high standards of affordability of energy for domestic consumers, and how they interrelate. The majority of the proposals here are not quick-fixes, but would take time to implement, and although none of the recommendations in this chapter are wholly reliant upon one another, progress in one area is likely to support progress in others.

This chapter draws together evidence from the literature chapters (chapters one, two and three) and the primary evidence from interviews in both Great Britain (chapter five) and Denmark (chapter six). This is done by proposing changes to the governance structure in order to rectify the issues identified in the current structure which undermine affordability of energy for domestic consumers in Great Britain. A conclusion is offered at the end of the chapter which sets out how many of the changes relate to the central need to change the prevailing policy narrative.

7.2 - Changing the Narrative: 'Affordability = Low Prices' vs. 'Affordability = High Efficiency'

An over-arching theme that has emerged from the research is one of the importance of narrative. There is a pervasive narrative present in the governance structure in Great Britain whereby affordability is considered as best achieved through pursuit of low prices, delivered through market mechanisms, and founded upon basic market principles such as cost-reflective pricing. This 'affordability = low prices' narrative not only channels the policy solutions that are put in place, but

also serves to crowd out other narratives which may be more beneficial to improving the affordability of energy in the British context, in particular the narrative of 'affordability = high efficiency', discussed below.

This 'affordability = low prices' narrative appears a common-sense approach, making it easy for policymakers to communicate, however it treats energy as a ‘normal’ good - no different from bread. However, this is not the case - energy has no easily substitutable alternatives, and the amount consumed is not simply a product of consumer choice, but is directly affected by the property the consumer lives in, and appliances he/she owns. Framing affordability of energy as relating primarily to price levels allows policy-makers to pursue simple, short-termist measures such as cutting the ECO or renewable subsidies (see chapter three), whilst supporting the idea that low prices are best achieved through encouraging consumers to engage in the retail market in order to drive competition.

Framing affordability purely as a price and market issue also allows policymakers to work within a narrow policy area, delivering low cost policies (a priority for government given the current focus on austerity), achievable within the electoral timetable. This framing is also coherent with traditional supply-side policy-making, and can be used to support political projects in other areas. For example, the idea that energy prices are linked to international energy markets is used to promote development of new indigenous energy sources such as new nuclear power and fracking. These may be perceived by policymakers as creating greater political capital than measures to improve energy efficiency. The drive to reduce prices is also used by policy-makers to justify reductions in subsidies for renewables.

This narrow narrative also means policymakers can claim that by attempting to facilitate the smooth operation of the market, they are doing everything that can be done to deliver affordable energy to consumers. The OFGEM referral to the CMA announced as being to 'once and for all clear the air and allow the CMA to ensure there are no further barriers to effective competition' (OFGEM, 2014c) was coherent with this position. This also allows policymakers to pass much of the responsibility for achieving affordable energy onto the consumer, stating that low prices are available in the market, but it is the consumer's responsibility to go out and find them. This is characterised in a government press release:

> '13.5 million households across the UK are missing out on their share of £2.7 billion by sticking with their energy company. By shopping around and taking advantage of the best energy deals on the market, millions of people can save around £200 - and some can save even more' (DECC, 2015o: Online)

However, as set out in previous chapters, this means that under the current design of the market, engagement in the market is a prerequisite to accessing the lowest prices. Although this benefits the engaged consumer who switches, this arrangement leads to significant harm for those on low-incomes, the elderly, or otherwise vulnerable, who are some of the least likely to switch supplier (OFGEM et al., 2014), and most likely to be in fuel poverty. These consumers are subsidising the bills of those engaged consumers who shop around. Overall this means that switching is a route to improving affordability for the individual, but not for those that do not engage and therefore face higher prices as a consequence. What is more, it is not clear that significant benefits would be achieved if all households were to become simultaneously engaged.

Part of the attraction to policymakers and other stakeholders of the 'affordability = low prices' narrative is its coherence with a pro-market ideology. It is interesting to note however that the government's support of market mechanisms in the retail market is not entirely mirrored by policies affecting the wholesale market. For example, BEIS is currently overseeing the introduction of a capacity mechanism designed encourage the building of new generation gas plant by financially supporting them outside the market (DECC, 2016a), as well as committing to the construction of Hinkley Point C, a new nuclear plant with a 35-year subsidy contract priced at more than double the day-ahead market price in 2016 (BEIS, 2016b; OFGEM, 2017b). This in spite of modelling showing that the equivalent power could be produced by a combination of renewables, energy efficiency and interconnectors for £1bn a year less than the cost of Hinkley Point C (ECIU, 2016). This suggests that the government is willing to intervene in one market to support a particular generation technology, but is less willing to make significant interventions in another market to support affordability of energy. This suggests that the dedication to the 'affordability = low prices' narrative is, if not a conscious choice by policy-makers, at the very least a demonstration of ‘wilful blindness’ not to see the alternative policy solutions such as high levels of energy efficiency deployment because they are not coherent with other policy goals (Geels and Schot, 2007).

As set out in chapter one, dedication to particular forms of policymaking can become heavily embedded in the governance system (Kuzemko et al., 2016), which can lead to ideology overriding evidence and channelling decisions by policy-makers (Metcalfe, 1993; Geels and Schot, 2007), and this appears to be occurring in Great Britain’s energy system. The 'affordability = low prices' narrative fails to consider that although there are opportunities to reduce energy prices in Great Britain, and these are important to investigate, prices are not significantly out of step with those in Europe, and the largest opportunity to improve affordability of energy in Great Britain is in the energy efficiency of the housing stock. It appears that the 'affordability = low prices' narrative,

although useful to policymakers, holds back affordability of energy for domestic consumers by crowding out other policy solutions.

This thesis therefore proposes a transition to a new narrative, which will be hereby referred to as that of 'Affordability = High Efficiency', signifying a move away from the market-based approach to delivering affordability, to one where high levels of end-use energy efficiency is put at the centre of policy to support affordability of energy, and the importance of energy as an essential good is acknowledged. The Danish example demonstrates the significant affordability benefits of placing high standards of energy efficiency at the centre of policymaking in energy, as opposed to an added-extra, as is often the case in Great Britain. A transition in narrative would help this to change.

7.2.1 – Pathway to a New Narrative

Narratives can be considered both lenses through which people view the world, and avenues for political influence (Bushell et al., 2017). Alternative narratives may be deployed in such a way to challenge the regime, and emphasise the opportunities arising from alternatives (Smith and Raven, 2012). Smith and Raven (2012) set out how support for the energy transition may be gained through reframing fossil fuels away from being considered as cheap, plentiful sources of energy, towards being insecure and responsible for climate change. Affordability could be similarly reframed away from being principally a product of low prices, towards being a product of high energy efficiency standards. However, successfully contesting established orthodoxy and replacing it with an alternative narrative is challenging. It requires engagement by interested parties with policymakers at a range of levels to challenge the assumptions which underlie the current policy regime, and to begin to cultivate support and a perception of legitimacy for the alternative narrative (Kuzemko et al., 2016), as well as engaging with individuals in order to influence public sentiment (Bushell et al., 2017; Campbell, 1998). This could both be used to develop an interest in energy efficiency measures as a route to reducing bills, but also a desire to see policymakers take steps to make energy efficiency measures more easily accessible.

One of the major barriers to the change in narrative was set out in chapter five, in that the so called 'supply-side' institutions such as the energy suppliers are well resourced and politically powerful (Kuzemko et al., 2016), whereas 'demand-side' interests are significantly less so. However, if the other recommendations set out in this chapter are also pursued, the political salience of institutions lobbying in support of energy efficiency measures as a route to protecting consumers is likely to increase.

7.3 - Strong Consumer Representation

As was set out in chapter five, one of the challenges to building comprehensive policy around affordability of energy is the lack of a high-capacity institution to represent consumers' needs. This thesis therefore proposes the introduction of a new consumer advocacy institution.

It would be important for a new consumer advocate to be a well-resourced body with a high level of capacity to understand and question the arrangements in the energy sector, with a brief to offer critical insight into policy and regulation, and challenge government and OFGEM. Its focus should be the protection of the long-term interests of all domestic consumers, ensuring that policy is put in place so the energy transition can occur, with minimal negative impact on consumers. This would mean that those consumers who wish to engage fully with the energy system by means of offering generation or flexibility services, are able to do so (Hoggett, 2016), but at the same time that those consumers that are unable or unwilling to engage, either in this way or through switching, are well-represented.

The new advocacy body should take a nuanced understanding of the needs of consumers, avoiding the 'affordability = low prices' narrative. To be as effective as possible, its remit of enquiry should expand beyond the policies affecting the production and distribution of energy, to other areas affecting energy consumption such as building regulations, and product policy. This is because, as has been demonstrated in previous sections, some of the most important decisions affecting affordability of energy relate to policies which lie outside the areas currently presided over by BEIS (e.g. building regulations). This would require a strong connection with a range of other institutions, including (although not limited to) BEIS, DCLG, DWP, Treasury, OFGEM, EU-DG Energy, CAB, suppliers, networks, generators and local authorities. Affordability of energy is not a siloed issue within BEIS, but spans across different departments' remits. This broad remit would allow recommendations to be made based on joined up, coherent policy-making between parts of government, such as the reform of the winter fuel payment.

This broad remit and understanding of affordability will also allow the new consumer advocate to make policy recommendations which take consideration of other policy objectives, such as the need to move to a low-carbon energy system. This will help to create pressure to avoid short-termist, narrow decision-making such as that which led to the reductions in the FiT, justified on the basis of small bill reductions[35].

[35] These have led to a significant slowdown in the solar energy sector, however only reduced the average household bill by ~£5 (HM Treasury, 2015b).

There are examples of high-capacity, effective consumer advocates in energy systems in a number of other countries, and any new consumer advocate institution would be most effective if its design could be based on best practice from these. Examples include the Energy Consumers Australia (ECA) consumer advocacy body which has capacity-building and research as central activities. An ability to carry out independent and robust research is an important ability for any organisation wishing to interrogate the energy market and if necessary, challenge the prevailing 'received wisdom' in the industry, and so challenge policy-makers and other actors.

Arizona's Residential Utility Consumer Office (RUCO) is also worthy of consideration. Energy prices in Arizona are regulated, and suppliers must apply to the Arizona Corporation Commission to increase their rates. The RUCO reviews every such application and then plays an active part in the hearings which are used to assess the case for such increases, representing the interests of the consumer (RUCO, 2017). It would be unable to carry out such a role effectively without a detailed understanding of the operation of the industry, and the impact on the costs faced by suppliers. Fremeth et al. (2014) show that US states which have a consumer advocate body generally enjoy lower prices than they would do if there were no consumer advocate body in place. This shows the import role that a consumer advocate can play in affecting outcomes for consumers. Holburn and Bergh (2006) set out that consumer advocates are often put in place by policymakers that are concerned that they will not win a forthcoming election, in order to create a legacy of protection for their vulnerable voters. This demonstrates both the political nature of energy policy, and that consumer advocates can help to bring both lasting protection and policy stability, spanning across changes in government – the value of which was shown in Denmark to be highly supportive of improved affordability of energy.

The need to introduce new institutions to remedy the shortcomings of the existing governance structure is also recognised by Mitchell et al. (2016) in far-reaching proposals to introduce a number of new institutions and changing the roles of others to better-facilitate the transition to a low-carbon energy system. This demonstrates support for the idea that it may be necessary to fundamentally alter the fabric of the governance structure in order to produce different outcomes of the system. Within Mitchell et al. (2016)'s framework (hence forth the 'IGov framework') is the Climate and Energy Policy Committee (CEPC) which carries multiple roles, primary of which is to provide a stable political consensus on how the UK can decarbonise its energy system. This is facilitated through a 'national conversation' combining the views of all stakeholders in the industry. It would also monitor progress against energy policy goals (including affordability) and make recommendations to government. In addition it would help provide coordination across government to deliver building regulations and retail market rules which both protect consumers, and are fit for the future (Mitchell

et al., 2016). There are clear parallels between some of the responsibilities of the CEPC in the IGov framework, and the proposals in this thesis, and these proposals should be considered as complimentary rather than competing. Both proposals identify the need for a new institution with responsibility which spans across government departments, and the capacity to understand and make recommendations on policy. It is indeed possible that a new advocacy function could be nested within the CEPC of the wider IGov framework. A new consumer advocate would take time to develop, however, the more institutionally robust it can be made, the more effective it is likely to be; therefore a lengthy process would likely prove worthwhile.

The introduction of a new consumer advocate body is not reliant upon the change in narrative set out above, but would be significantly more likely if such a change took place. The current narrative is based on the principle that best outcomes for consumers are delivered through the cultivation of a competitive retail market. However, moving away from such a belief, and beginning to acknowledge that other measures may be necessary to deliver for consumers, could help to unlock the understanding of a well-resourced consumer advocate as an important part of a governance regime which protects consumers.

7.4 - Responsibility for Energy Efficiency: Moving the Obligation to Higher Capacity Institutions

7.4.1 – Local Authorities: Well Placed to Deliver and Facilitate Energy Efficiency

As set out in chapter five, there are a number of issues relating to energy suppliers being the primary institution responsible for delivery of energy efficiency measures. However, there is support for the idea that there are significant opportunities for the obligation to be moved to an alternative institution such as local authorities (LAs). By their nature, LAs have an inherent interest in improving the lives of those in their area of responsibility. This could remove the need for threat sanctions, which under current supplier-led models could potentially harm consumers if they resulted in bill increases. They are generally well-trusted (IPPR, 2014) and they have significant knowledge of the building stock and social issues in their region, all of which could help them to address issues of targeting those most in need (Wade et al., 2007).

Local authorities across the country have also demonstrated their potential though the Local Authority Central Heating Fund (DECC, 2015p) and the Green Deal communities scheme (DECC, 2014k), as well as being demonstrated more fully in Wales and Scotland under the area-based HEEPS, and the Nest schemes. Before responsibility could be fully reallocated to LAs, that every

opportunity should be taken to learn from the experiences in the devolved administrations, as well as observing the essential role that local authorities provide in the energy sector in Denmark.

A number of suppliers partnered with LAs for the delivery of their ECO obligations. Although this alleviates a number of the issues regarding trust because it allows the schemes to be branded by the LA, it continues to give large supply firms power over policies which are not inherently in their best interests to meet. It inevitably also influences the design of delivery because the suppliers' primary objective remains to avoid sanction rather than deliver best outcomes for householders in a particular area. Giving sole responsibility for energy efficiency obligations to LAs would not only take this element of power away from the large firms, it would also allow LAs to take ownership of the schemes; laying the foundations for them, alongside a new consumer advocate, to begin to act as a counterbalance to the power of supply-side interests. LAs would be able to provide a local voice in support of energy efficiency, to help to start building political pressure for improved energy efficiency policy.

7.4.2 - Improved Targeting for Fuel Poor Households

It is well-established that effective targeting is one of the most important aspects of a program to address fuel poverty (Boardman, 2009). LAs have the institutional capacity to improve the targeting of energy efficiency measures to the households that are most in need, both because of their significant local knowledge of the area (Platt et al., 2012), and because of their existing obligations. LAs have an existing statutory duty to gather information on health and wellbeing needs of their constituents (Department of Health, 2011) and where necessary to offer grants for improved heating systems for disabled individuals (HMG, 1996). This could be added to existing information they hold regarding claimants of some benefits such as housing benefit. Although this use of this data may require changes in the law (DWP, 2014), the granting of access to data of a different arm of local government is likely to lead to fewer issues than sharing data with private institutions. LAs will also be able to build up a comprehensive picture of levels of fuel poverty in their area, this was previously a requirement on LAs, but was discontinued in 2010 (FOE, 2011).

LAs are well-positioned to build partnerships with a wide range of welfare institutions (CAG Consultants et al., 2011; Community Energy Plus, 2013), children's centres (ACE et al., 2015b), Home Improvement Agencies, and social landlords (Department of Health, 2014). As was demonstrated under Warm Front, partnering with a range of local organisation can improve reach of the schemes (DECC, 2014j). This would enable cross-referencing of area-based information of deprivation, with individual identification of vulnerable consumers which live in less deprived areas. LAs are also in a position, where appropriate, to organise street-by-street distribution of energy efficiency measures

(ACE et al., 2015a; Boardman, 2007), rather than suppliers whose customers are distributed over wide geographic areas. LAs will also be able to build a database of the housing stock in their area to establish which houses are likely to benefit most from various measures, as has been done by Durham County Council (Commission for Rural Communities and Durham County Council, 2011) – something which is essential to a successful targeting scheme (Boardman, 2009).

7.4.3 - Able-to-pay households

In order to maximise the value of financial resources, it is essential that subsidised measures are targeted at those most in need – i.e. the fuel poor. However, it is likely, particularly if the LA is employing an area-based approach, that LA operatives will come into contact with households which may not qualify for direct financial support, but would still benefit from improved energy efficiency. LAs will be able to leverage expertise gained from delivery of fuel poverty measures in taking the opportunity to explain the benefits of energy efficiency to able-to-pay households, which measures are appropriate for the household. As was seen in Denmark through the development of the 'case-bank' service and 'Bedre Bolig', accessibility of information tailored by property type, can support energy efficiency improvement. There is no reason why similar measures would not be successful in Great Britain. This information could also be coordinated with existing local third sector organisations, along with providing direction towards other reputable sources of information, such as the Energy Saving Trust. LAs are generally well trusted institutions, and so will also be able to offer a trusted source of other local information such as which installers in their area are able to install which measures. This also offers efficiency installers a route to market, allowing them to partner with LAs to deliver measures for both fuel poor, and ‘able-to-pay’ households. This also allows LAs to support the growth of SMEs in their area, rather than the value being taken out of the area by national delivery bodies such as the energy efficiency arm of a large energy supplier. LAs should not seek to hold a monopoly position, as this would risk crowding out innovation in delivery of energy efficiency measures, but aim to work alongside any other actors which seek to deliver energy efficiency measures – recognising that this will bring significant benefits to households in the region.

This dual approach of targeting both fuel poor, and ‘able-to-pay’ households is important for ensuring that the housing stock of an area begins to become ‘fuel-poverty proof’ – so that if people on low incomes moved into a property in the future, they would not find themselves forced into fuel poverty because the previous owners had not made efficiency improvements.

7.4.4 – Collaboration and Support

Building a structure of strong communication between LAs, such as through existing institutions such as the Local Government Association, or Local Authorities Leaders' Boards would allow LAs to share

best practice, and collaborate with adjacent LAs to share knowledge and resources across boundaries. This would allow a strong capacity to be built among LAs to become powerful and effective participants in the energy efficiency sector.

Not only is it important that LAs are able to support one another, but also by central government (ACE et al., 2015a). Although a number of LAs have a successful history with deployment of energy efficiency measures (Wade et al., 2007), a number currently lack the staff or expertise to deliver measures effectively. Probability of success is likely to be much greater if central government were to put in place a framework of funding, training, and information to support LAs to build capacity prior to reassigning responsibility from energy suppliers. Lessons from the Nest in Wales, and HEEPS in Scotland should be taken, and staff from LAs in England should be allowed to visit their counterparts from the devolved administrations to learn from their experiences

7.4.5 – Reduced Policy Complexity

Reassigning the obligation to LAs could also help reduce some of the complexity of the obligation, which derives from the three targets in the ECO (one of which features a sub-target). Multiple targets are required to enable the regulator to ensure that energy suppliers target measures in a particular way, delivering on an obligation that is otherwise not in their interests. However, if LAs held funds to deliver measures to their areas, the policy could be simplified. This is both because it would be in the interests of the institution to deliver maximum benefit for the area as opposed to exploiting failings of policy design, and use their knowledge of the area to establish which works would create maximum benefit

7.4.6 - Funding

A number of funding options remain open for LA deployment of energy efficiency measures. As set out elsewhere in this chapter it would be most progressive for funding to be levied through taxation. However, it would be technically feasible for funding to continue to come from a levy on bills and then passed on to LAs. It is essential that if the obligation were to be reassigned to LAs, that adequate funds were allocated to support it. LAs have suffered significant funding cuts in recent years (ACE et al., 2015a), and so it essential that this new role does not further stretch already limited resources.

7.4.7 - Transition

The transition from the supplier-obligation model to a LA-delivered model would take time, and should be managed carefully. It is essential that LAs are able to build institutional capacity before becoming entirely responsible for the role. This would help to avoid the cliff-edge reduction in

measures which was seen following the CERT. Steps, such as sharing of expertise between LAs, could be taken in the near term however, to begin this process of capacity building. Chapter six set out the key role that municipalities play in Denmark as key local actors in the energy system. The delivery of energy efficiency measures through LAs, alongside the growth in LA-owned energy suppliers which began in 2015 with Robin Hood Energy, would support the development of LAs becoming important, trusted local energy actors. Once again, although the proposed change in narrative is not fundamental to reallocating responsibility for energy efficiency delivery to LAs, it would increase its likelihood. This is because energy suppliers were originally assigned responsibility for energy efficiency measures because it was believed that competitive pressure would encourage them to deliver the measures at least cost. Moving away from a focus on market mechanisms in favour of focussing on the most effective routes to delivery of energy efficiency measures would facilitate examination of new and alternative policy options for delivery of energy efficiency measures, such as via local authorities. A move to local authority deliver of energy efficiency could also support the change in narrative, as there will be a greater number of actors with a stake in high standards of energy efficiency, and an understanding of the value that they can bring in supporting improved affordability of energy.

7.5 – A New Ideology: Ambitious Regulation for Retrofit & New-Build Home Energy Efficiency Standards, Backed by Affordable Finance

The government has demonstrated a willingness to intervene in the wholesale energy market to deliver policy goals, such as through the introduction of the CfD and the capacity market (DECC, 2016a, 2013d). Significant improvements in energy efficiency could begin to be fostered if this could be mimicked in the building sector with a move away from the current ideology which frames intervention through regulation as a burden on business (which led to the repeal of both the code for sustainable homes, and the zero-carbon homes commitment) (DCLG, 2015; HM Treasury, 2015a). The benefits delivered by ambitious regulations can be seen in particular in Denmark, where new-build properties are subject to ambitious energy efficiency standards which have a clear pathway of tightening in the future. Although new-build properties make up a relatively small percentage of the housing stock, it is short-termist not to build them to the highest standards of the day.

It was also demonstrated in Denmark how applying a principle of gradually tightening energy efficiency requirements for aspects of retrofitting, such as roofing, windows, doors, and walls can help to lift the energy efficiency levels of the existing housing stock. Applying this principle in Great Britain would help to ensure that where aspects of a building are changed, new components are of the highest standard. As well as improving standards in individual properties, this will help to

support development of high-efficiency building practices which can then be exploited in the new build sector, and support whole-house retrofit.

The private rental sector could be used to help create a market for the developing standards of retrofit products. Reforming the private rental standard to feature a more ambitious energy efficiency target, which could either be based on a higher EPC grade, or based on minimum required measures such as (for example) draft-proofing, cavity wall insulation, full loft insulation, and a condensing boiler, would be highly supportive of affordability of energy. Although it is important to note that any regulation of this kind on the private rental sector may need to be accompanied by improved regulation on rent. It is essential that any policy which is designed to improve affordability of energy for domestic consumers, does not simply lead landlords to significantly increasing rents to compensate.

Proposals here do not extend to imposing regulation directly upon owner-occupiers to improve overall standards in their properties (e.g. at the point of sale). This is on the basis that other measures here may be sufficient to deliver energy efficiency improvements in this sector, and imposing regulations on households without first allowing an understanding of the importance of energy efficiency measures to develop, risks backlash which may undermine the policy – as was seen under the consequential improvements scheme (see chapter 5). This is what Roberts (2014) describes as the importance of gaining meaningful public consent, rather than imposing change upon an unsupportive community.

Although regulations on owner-occupiers are not proposed, other proposals will support the improvement of energy efficiency in this sector, taking inspiration from Denmark. In addition to improved access of tailored information, creating wide availability to cheap finance packages to pay for energy efficiency improvements, raised against the value of the home-owners' property could help to address the upfront cost barrier. There is an opportunity in Great Britain for the government learn lessons from the failure of the Green Deal, and to create a fund to offer straightforward, low-cost loans to able-to-pay households wishing to install energy efficiency measures. Lessons may also be taken from positive examples such as Germany's KfW, which offers low-cost loans to households at very low interest rates (Kuzemko, 2015b), and the HEEPS loan scheme in Scotland which delivers interest-free loans, backed by the Scottish government to households and landlords for improving energy efficiency standards in their properties (Scottish Government, 2016a; Energy Saving Trust, 2015). A key factor is making interest rates on loans as low as possible, and the system to obtain them transparent and straightforward (as it is in Denmark). Alternative innovative financing

solutions such as the HEEPS equity release scheme should also be considered (Energy Saving Trust, 2016a).

Improved energy efficiency regulations of new-build properties and retro-fit products, alongside greater access to energy efficiency finance, will both support, and be supported by a change of narrative from 'Affordability = Low Prices' to 'Affordability = High Efficiency'. The change in narrative will facilitate a move away from the existing anti-regulatory ideology which persists among policy-makers, which has framed energy efficiency regulations as barriers to development. Also, the strengthening of energy efficiency standards for many retrofit products will help to normalise such standards, which could help contribute to a change in public discourse, in the way that fuel efficiency of cars is now often a major consideration for motorists, and so foster a new narrative of energy efficiency. The presence of a consumer advocate with a cross-cutting policy approach, able to critique not just energy policy, but building policy too, could also support the introduction of stronger energy efficiency regulations. Regulations could be introduced relatively quickly, particularly in the new build sector by reintroducing the code for sustainable homes, and zero-carbon homes standard.

7.6 – More Powerful Demand-Side Interests

As set out in chapter five, the energy supply sector in Great Britain is a powerful political force, but this is not matched by actors who support increased levels of energy efficiency. If this balance of power were to shift, then higher standards of energy efficiency, and so higher standards of affordability, would likely follow.

The situation in Denmark is very different to in Great Britain. A number of large firms are important stakeholders in the high standards of energy efficiency which are put in place in Denmark. Denmark has also demonstrated that energy efficiency, as well as bringing significant benefits for consumers, can be a significant source of economic growth in the form of large successful companies such as Danfoss and Velux. If Great Britain were to nurture expertise in this area, technologies could be exported. Many jobs could also be created, both in the development of technologies, and in energy efficiency installation firms - a sector that is dominated by SMEs. Both of these areas could support strong long-term economic growth (Cambridge Econometrics, 2012), and create additional interests which will support the development of ambitious energy efficiency policy. As demand side actors grow in economic importance, they will have more resources at their disposal to participate in lobbying activities, and as it becomes a more important area of economic activity, its needs are likely to be considered more important by policymakers.

The proposed change in narrative, although not a prerequisite to the development of demand-side interests, is likely to support the expansion of firms which operate in the energy efficiency sector. The understanding of these actors as essential for delivering affordable energy will also help to increase their political salience, and so create another group able to push back against, and constrain, the power of supply-side interests. The reverse is also true however; a shifting narrative whereby energy efficiency gains greater importance will increase the political salience of those firms engaged in delivering high energy efficiency standards. Allowing local authorities to become important stakeholders in the demand-side through delivery of energy efficiency measures will also help demand-side interests to be better represented.

7.7 - Tariffs & Charging: Designed for Affordability

Although the most effective route to delivering long-term affordability of energy in the British context is through improved levels of energy efficiency, there are significant opportunities for reform of tariffs to support affordability of energy for domestic consumers, and particularly to protect the fuel poor. The need for intervention in the retail market was accepted by the CMA, in its proposal for a temporary price cap for PPM customers (CMA, 2016c), this proposal is however narrow in scope – something highlighted by a member of the CMA panel, Martin Cave. He called instead for a temporary price cap for all SVT customers (CMA, 2016c). This solution is also limited, and is reliant upon OFGEM having the capacity to accurately monitor the costs suppliers face in order to set an appropriate level for such a cap, something it does not appear to have.

The tariff structure of most tariffs in Great Britain are currently designed around best outcomes for suppliers, rather than best outcomes for consumers, and lead to higher marginal costs for low-demand consumers, and so to a degree are supportive of higher energy use. This can undermine affordability particularly for those on low incomes, who may be fuel poor and often use small amounts of energy (CSE, 2015). The evidence in this thesis supports the principle of an alternative structure for all tariffs in the market, focussed not on mimicking the cost structures of suppliers, but on supporting access to affordable energy for all consumers, whilst rewarding greater levels of energy efficiency.

7.7.1 - Tariff Reform: Rising Block Tariffs

This thesis proposes a move away from tariffs which are designed around suppliers' costs structures, in favour of tariffs which protect consumers. One possible means to achieving this, whilst helping to incentivise greater levels of energy efficiency, is through the introduction of a rising block tariff structure (CSE, 2015). There are multiple ways to set such a tariff, but these broadly involve charging a lower unit rate for initial units of consumption, and a higher rate for higher levels of consumption

(see Figure 39). This has the effect of charging lower prices to consumers with low levels of demand, which is heavily correlated with low incomes (CSE, 2015), and higher rates to households with high levels of demand which are often in higher income brackets (CSE, 2007), albeit this is not a hard and fast relationship.

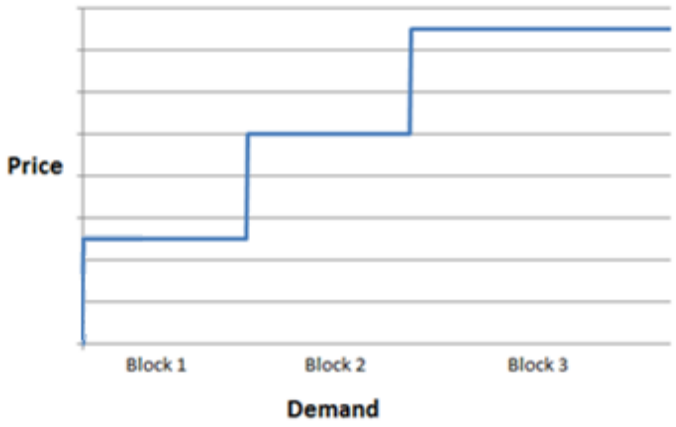


Figure 39 – Three-Tier Rising Block Tariffs, Source: Author's Own

7.7.1.1 - The Mechanics of RBTs

The RBT tariff structure could be based on various principles. For example, the higher blocks could generate revenues for supply companies in order to compensate for the low/zero revenues associated with low-demand blocks (something which would likely increase the acceptability by industry stakeholders). Alternatively, the higher demand blocks could be used to contribute more to environmental and social policy costs, in keeping with the 'polluter pays' principle (White and Baker, 2008). This may present a new challenge for suppliers in setting tariffs to ensure fixed costs are fully recovered effectively. However, this risk is not insurmountable, having been managed by the small number of suppliers that offer zero-standing charge tariffs (Ebico, 2016).

A range of different pricing structures based on the rising block principle could be put in place, with any number of consumption blocks, at increasing price points. It would be possible, for example, to require an initial block of consumption to be free, and later blocks to increase (See Figure 40). Alternatively, it would be possible to introduce a two-block system whereby an initial block of units is free, followed by a flat per-unit rate (See Figure 41) - as is the case in Flanders in Belgium (CSE, 2015, 2007; OFGEM, 2009a). A greater number of blocks would reduce the risk of threshold effects; however, this need should be balanced with the need for easily understandable pricing structures. The design of the block structure fundamentally affects the impact that it will have on society. As was shown in (see chapter 3), different domestic consumers have a wide array of levels of consumption; the way this rising block structure interacts with those levels of consumption will affect who in the population faces differing levels of charges. For example, if a high-rate charge

began at 20,000kWh of gas, it will affect many more households than if it began at 30,000kWh of gas. This will have a significant impact on how consumers are affected by the change. The size of each blocks also has an impact. For example, if the structure in Figure 41 were employed, a large volume of demand in block 1 would lead to a higher priced rate in block 2, as this would be necessary in order for suppliers to cover their costs. Conversely, a smaller volume in block 1 would facilitate a lower price in block 2. However, the less volume that is in block 1, the less beneficial it becomes to fuel poor households.

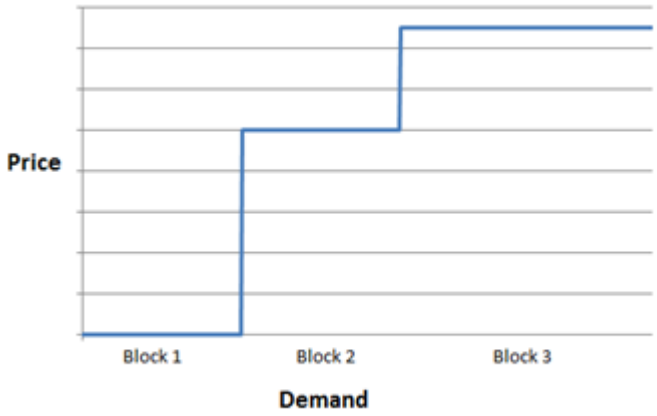


Figure 40 - Three-Tier Rising Block Tariff with Zero-Rated Block 1, Source: Author's Own

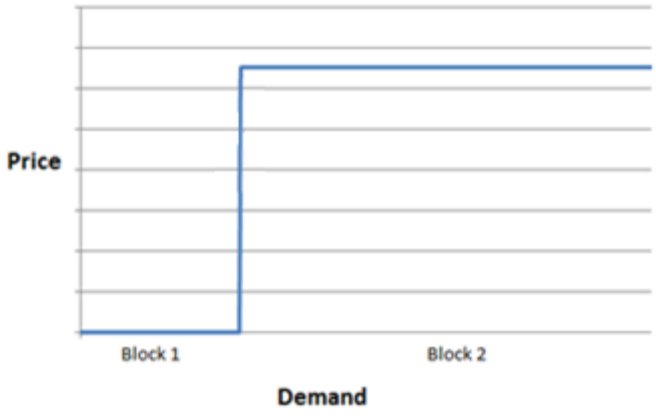


Figure 41 - Two-Tier Rising Block Tariff with Zero-Rated Block 1, Source: Author's Own

Rising block tariffs are present in a number of other countries. For example, in Flanders in Belgium households can receive a free block of energy, the size of which depends on the number of members of the household. Consumption above this free block is charged on a basis which resembles the current 'standing charge + unit rate' arrangement which is present in Great Britain (CSE, 2015, 2007; OFGEM, 2009a) – see Figure 41. RBTs are also in place in California, where they have been operated

for approximately 40 years (Public Utilities Commission Of California, 2015). These have been criticised for not producing optimal 'economically efficient' outcomes, instead creating a trade-off between economic efficiency and distributional effects (Borenstein, 2010). However, the RBTs in California have been shown to be an important part of relieving pressure of energy bills on low income households (Borenstein, 2010).

The exact design of the RBT (i.e. number of tiers, volume within each tier, and pricing differentials) should not be decided without extensive examination and testing in the British context to ensure intended outcomes are achieved. Consideration should also be given to which elements of the tariff are set – ranging from prescribing all aspects of the tariff, to basic requirements for the initial block. Of the limited modelling of the appropriate RBT structure for Great Britain which has been done, initial research suggests that a market-wide requirement for an initial free block of units could be highly beneficial (CSE, 2015). This is because it would be simple to understand for consumers, simple to administer for suppliers (so helping to keep costs down), and setting it industry-wide reduces complexity related to targeting. CSE (2015) carried out some modelling work which suggested that a tariff regime where the initial 500 kWh of electricity and 1000 kWh of gas were free of charge would carry considerable benefits for low income and other vulnerable consumers, with very limited negative impact on other consumers (CSE, 2015).

If such a charging structure were to be introduced, regular reviews of the block structure would be required to take account of trends in energy demand (White and Baker, 2008). The efficacy of rising block tariffs would be improved with time, as smart meters are deployed, which would allow consumers to monitor their energy demand (CSE, 2015). Although smart meters are not essential for RBTs as they could be incorporated into existing bill cycles (CSE, 2007; White and Baker, 2008), smart meters would significantly improve their utility. This is because, along with monitoring of consumption, smart meters would allow the charging structure to operate across different timescales e.g. the first units of the day are the cheapest, or cheap units are saved for use in winter. This is opposed to them being the first units of the month, quarter, or year (depending on the existing bill cycle). It has already been proposed by the CMA that the rollout of smart meters prioritises those households on prepayment meters (CMA, 2015f); extending this prioritisation to low income areas, identified in collaboration with LAs, would support the efficacy of RBTs. RBTs could bring particular benefits to PPM customers as it could reduce the likelihood of their being cut off for protracted periods, and could give them access to basic levels of energy even if smaller suppliers continued not to offer PPM tariffs.

It is highly unlikely that RBTs would be introduced by suppliers in Great Britain without specific regulation to introduce such pricing strategies. Prior to the RMR, both rising and falling block tariffs were permitted, however only falling block tariffs existed (Hills, 2012). Any suppliers introducing an RBT on an individual basis may find that it would be favoured only by engaged low-demand consumers, with engaged high-demand consumers preferring tariffs without a rising-block structure (CSE, 2008). This would mean that these tariffs would soon become uneconomical for suppliers to offer (Owen and Ward, 2010). Other factors which may discourage suppliers from independently introducing RBTs include uncertainty of cost recovery for suppliers because RBTs do not reflect the way suppliers experience costs (CSE, 2008), potential technical challenges regarding metering (CSE, 2015), and the administrative burden of managing the tariffs (CSE, 2015).

Although tariff reform appears to be necessary to support affordability of energy, it would be important not to regulate RBTs so closely that innovation and competition are restricted. Any prescribed tariff structure should not interfere with the changing role of some consumers in the future of the energy system. Increasingly, some consumers wish to participate directly in the energy system by means of selling power from solar panels, or offering flexibility services from batteries to help balance the grid (Hoggett, 2016). These opportunities for innovation should be supported, potentially through a separate payment mechanism, as is currently the case with domestic FiT customers.

Moving away from a pricing structure which broadly reflects the way costs are incurred by suppliers implies a departure from fundamentals of competitive market design. Therefore, the introduction of an RBT structure would be more likely if a shift in narrative took place whereby affordability was no-longer principally achieved through the facilitation of competitive retail markets, reliant upon cost-reflective market signals.

7.7.1.2 - Minimising Negative Impacts on Consumers

It is essential that general affordability is not undermined by pursuit of a tariff structure which is likely to benefit fuel poor households in particular. Any reductions in welfare, in addition to the social implications, could carry political implications which could undermine progress towards more progressive tariff structures. The design of the structure should take into consideration the current context of households, to minimise the risk of significant bill increases for large proportions of the population – most of whom are on SVTs (CMA, 2015j). As set out above, this may be achieved by modelling impacts of the tariff structure in relation to the existing distribution of consumption levels. There are likely to be a number of households which currently have relatively high bills (as a combination of a high-priced SVT and/or a very inefficient property), yet not high levels of income.

Although these households would be supported by proposed changes in energy efficiency policy, the effects of such policy will take time to disseminate through the population. It is important that households are not harmed by changes in tariff policy whilst awaiting energy efficiency improvements. This is likely to affect both the design of the new tariff arrangements, and the timing of its introduction alongside other policy changes.

Although no policy can be put in place which absolutely guarantees no negative consequences, there are a number of steps that can be taken to maximise value, and minimise risk for consumers. Firstly, consideration should be given to if the same rising block structure is appropriate for all households, or if for example, electrically heated homes should be subject to a different block structure to those households whose consumption is spread across other fuels. The principle of this consideration of circumstances is demonstrated in Flanders in Belgium where larger households receive a larger block of free energy (OFGEM, 2009a). This suggests an element of targeting may be beneficial, however as set out elsewhere, targeting is something which suppliers are not well equipped to deliver effectively. As with all policies designed to improve welfare, a balance should be struck between simple wide targeting and complex narrow targeting, with consideration of the impact of tariff complexity for consumers.

In addition to the careful design of RBTs, other policy proposals in this thesis would help minimise the risk of negative impacts. The restrictions in breadth between highest and lowest tariffs is likely to have a flattening effect on the range of tariffs, which will lead to reduced tariffs for SVT consumers and the proposed removal of VAT, and environmental and social policy costs from bills would also help to reduce bills across the board (set out below). The delivery of energy efficiency measures by local authorities is also important, as more effective energy efficiency policy will help households to reduce their cost of warmth. It would even be possible, for example, for local authorities to tailor their marketing efforts regarding the benefits of energy efficiency to households which may be considered at risk of losing out from a new tariff regime.

Overall, the introduction of RBTs is not without challenges, such as the risk of negative impacts on some consumers. However, there are clear social benefits to redesigning tariffs to facilitate access to basic levels of energy consumption. The proposed changes should not be introduced without careful and regular examination of the tariff design to ensure that it does not undermine levels of general affordability. It is also important that this policy is not implemented in isolation, but alongside the other policies proposed in this thesis. If, following the modelling of the likely impacts, RBTs are not deemed appropriate, then alternative arrangements for designing a new retail market regime which is supportive of access to energy for fuel poor consumers should be investigated. Access to energy is essential for maintaining a healthy living environment (Harrington et al., 2005; Stockton and

Campbell, 2011) – a fact which should form be the basis of retail market design. Therefore, tariffs should be designed around delivering what is best for consumers, not based on what is best for suppliers (mimicking their cost structures). RBTs would take time to introduce because it would be essential to properly model and test the design before widespread introduction. Their introduction would be more likely if other proposals set out in this thesis also came to pass, for example, the acceptance of a need for government to take a more interventionist approach through the introduction of stronger building regulations (see above), could bring with it an acceptance of the need to intervene in the retail energy market to better protect consumers.

7.7.2 – Limited Breadth of Tariffs

In addition to the introduction of RBTs, the introduction of a maximum price differential between a suppliers' highest price tariff, and lowest price tariff would further help to protect those consumers which do not engage in the market (CSE, 2015), and would help to reduce the strength of the incentive for suppliers to discourage unengaged consumers from engaging in the market. It should be set at an appropriate level to ensure that whilst there remains an incentive for engaging in the energy market, in that cost savings may still be realised from shopping around, the degree to which unengaged consumers subsidise the bills of engaged consumers is significantly reduced. The effect of introducing this policy would likely be a compression of tariffs, with the cheapest tariffs becoming more expensive, and the most expensive tariffs becoming cheaper. This would mean that income-focussed energy policies could provide greater relief because they are often focussed on low-income households, who are frequently on the most expensive tariffs owing to being unengaged with the energy market. This could be relatively quickly introduced, with reference to the longest fixed-price tariffs active in the market.

7.7.3 – VAT and Environmental and Social Policy Charges in Energy Bills

Although the level of VAT on energy bills in Great Britain is low by international standards, the charging of VAT on energy bills frames energy as a non-staple item. Moving to a zero-rate of VAT on energy would be more consistent with charging on other staple items. It may be argued that there is a level of consumption above which energy stops being an essential item, and becomes a luxury. Therefore, if a RBT tariff structure were to be introduced, it may be possible to apply VAT only to higher bands of consumption to reflect this difference between staple and luxury consumption. Although there may be practical challenges introducing a reduced rate of VAT owing to the EU VAT directive preventing reductions below 5% (EU, 2006), the long-term impact of this directive is unclear however owed to the vote for the UK to leave the EU. If affordability of energy were to be considered a suitably significant issue this could become a focus of negotiation with the EU, however

its introduction would be entirely contingent upon the Brexit negotiations. It is likely that lost VAT revenue would have to be recovered from elsewhere in taxation however.

Levying environmental and social policy charges from energy bills is a highly regressive funding regime. It would be considerably more progressive to raise the funds from general taxation. Alternatively, as set out above, if a RBT tariff structure were introduced, these charges could be levied for higher levels of consumption, this would be consistent with the 'polluter pays' principle (White and Baker, 2008).

7.8 – Price Comparison Websites

The proposals of the CMA (2016) to remove the requirement for PCWs to show the whole of the market, and allow them to host exclusive tariffs are beneficial to both PCWs and suppliers, but they will not benefit consumers. These proposals will require an even greater level of engagement, and will by their nature only be accessible to consumers with internet access. This creates a barrier to accessing the lowest prices, and particularly excludes a number of poor or vulnerable households (OFGEM, 2013c). Of all the proposals set out in this chapter, this could be introduced most quickly, by means of not introducing the proposals of the CMA relating to PCWs.

7.9 - Expanding Institutional Capacity

It is not clear that OFGEM or BEIS have sufficient institutional capacity to deliver affordable energy for domestic consumers. As set out in previous chapters, BEIS has made significant errors in the design of energy efficiency policy, and OFGEM is not able to effectively monitor trades in the market, or supplier costs and profits, or sufficiently critique the plans of network companies. The benefits of strong capacity building for policymaking institutions is set out in chapter 6, as it enables the Danish government to have an equal relationship with companies in the energy sector, which would not be possible if there were a significant imbalance of information or understanding (something consistent with Soskice and Hall (2001)'s definition of Denmark as a Co-ordinated Market Economy). This demonstrates the significantly different outcomes which can come from policy-making institutions which have a high degree of institutional capacity.

Steps may be taken to increase institutional capacity. Granting OFGEM greater powers to carry out a short-notice detailed audit of an energy suppliers' trading and pricing activities would help ensure that that the prices charged to customers are reflective of the wholesale costs faced by the supplier. With regard to the regulated returns of network companies, OFGEM suffers a significant asymmetry of information regarding the necessary investment in energy networks. It is essential that it begins to

develop its understanding of this area either by training existing staff, or hiring new staff, with a greater understanding of the construction and operation of network assets.

BEIS's institutional capacity may also be expanded, for example through cultivating mechanisms to support policy learning, so to avoid repeating mistakes of the past. Institutional capacity should also be developed to interrogate policies to understand how a profit optimising firm may react, so that issues such as the widespread deployment of CFLs, and the subsidising of engaged consumers who switch by those who do not, are avoided.

If the government as a whole were to develop greater cross-departmental policy collaboration, this could support more coherent, 'joined-up', policy development. This would help to reduce issues such as those relating to the winter fuel payment subsidising energy suppliers via elderly households on high tariffs.

Other proposals set out in this chapter support the development of institutional capacity among policymakers. Firstly, the creation of a new consumer advocate, operating as a 'critical friend', will support policymakers to avoid pitfalls. A change in narrative away from market mechanisms as the primary route to delivery of affordability could help to weaken other aspects of the pro-market ideology – such as that which led to the decision to reduce the capacity of government, instead allowing expertise to lie with private market actors (Kuzemko, 2015a).

7.10 - Policy Stability

As was set out in chapter five, a lack of policy stability in Great Britain creates a significant challenge to improving energy efficiency in the domestic sector. This issue is significantly reduced in Denmark through the taking of a long-term perspective whereby policies and objectives are set over long periods of time with clear end-goal. For example, the commitment to be entirely independent of fossil fuels by 2050 (Danish Government, 2011) gives a clear direction to policy-making. This gives firms a high degree of investor certainty - any investments that are not conducive to supporting or surviving in a future with a decreasing role for fossil fuels are less likely to be successful. The ambitious nature of this target is also significant, not only does it indicate general intension, but indicates a high level of commitment, setting out the intended velocity to that policy direction.

Such long-term policy making is however only possible in Denmark owing to the presence of three things:

- Cross-party consensus-building, which is born of a proportional representation voting system, this makes multi-party coalitions commonplace (Bawn and Rosenbluth, 2003), creating an atmosphere in politics where parties are forced to work together. This means

when governments change, multiple parties have been involved in setting policies meaning there is less disturbance than in the British political system (Lockwood et al., 2016).

- The mature relationship between the government and the private sector. Targets and policies are negotiated between firms and the government; this gives firms ownership of policies that are put in place, meaning the amount of pressure to get such policies changed is lessened. This is contingent upon policymakers having a high degree of institutional capacity to understand the industry.
- Large firms have significant vested interests in ambitious energy efficiency policy, and so leverage their power in favour of continuing high standards.

With little pressure from either change in government, or from interest groups within industry, a level of policy stability is created that allows policies to be made over the long term, giving firms the confidence to invest. Reducing policy uncertainty in this way could bring significant benefits to Great Britain, where policy uncertainty is noted as having a significant negative impact on firms in the energy sector (Watson et al., 2014).

The value of developing greater institutional capacity and supporting of demand-side interests has already been set out, therefore the long-term recommendation for Great Britain based on this finding is to make a change in the electoral system to support a greater level of consensus politics, which is an essential ingredient for long-term policy making. Although a proportionally representative voting system is not a prerequisite to cross-party collaboration (as was demonstrated by the Climate Change Act (HMG, 2008)), it is highly supportive of it and therefore should be considered. If the building of cross-party consensus can begin without elective reform, then this too should be pursued, for example through the creation of the CEPC of the IGov framework (Mitchell et al., 2016). A proportional representative voting system would likely take many years to introduce, and would take even longer to truly 'bed in' because competencies for collaboration within British political parties are yet to develop, whereas Denmark has a long tradition of political collaboration. However, the level of policy stability it could generate, with the potential to reduce risk and significantly increase investment in the energy efficiency sector (and other sectors), would be likely to justify such a lengthy and difficult process.

7.11 - Conclusion

This section has drawn on the policy and academic literature reviewed towards the beginning of the thesis, and on primary data collected in Great Britain and Denmark and demonstrates that there is much that may be altered in the governance structure to support affordability of energy in the domestic sector in Great Britain. The most significant change is that of narrative, which has

previously led to a narrow focus on affordability as limited to minimising short-term prices, and promoting a freely operating retail market based on cost-reflecting pricing structures. In the British context of low energy efficiency standards, one of the greatest opportunities to improve affordability of energy lies in improved energy efficiency, therefore a new narrative of 'affordability = high efficiency' is likely to be more beneficial.

As set out at the beginning of this chapter, although none of the recommendations in this chapter are wholly reliant upon one another, the change in narrative would have a supporting effect on a number of other proposals, and vice-versa:

- An ‘affordability = high efficiency’ narrative would make the development of an ideology supporting increased use of regulation for new build and private rental properties more likely. Conversely, the introduction of such regulations would allow both policy-makers and consumers to begin to see the value to affordability of stronger energy efficiency standards, helping to put pressure on the existing narrative. The acceptance of the need for a more interventionist approach in this way to deliver better outcomes for consumers could lead to similar thinking with regard to the retail market, and vice-versa.
- The reassignment to local authorities of responsibility for energy efficiency deployment to the fuel poor, which could also support them becoming facilitators of energy efficiency to able-to-pay households, would be more likely to be introduced under the new narrative. Also, a new narrative with a greater focus on affordability through energy efficiency, and less focussed on competitive pressure on prices, would make exploration of new and innovative routes of energy efficiency deployment, more likely.
- A more powerful demand-side lobby, particularly among energy efficiency firms, could lobby government to place more focus on energy efficiency measures as a route to delivering affordability of energy. Equally, if energy efficiency were a central part of the government’s approach to delivering affordability of energy, the firms involved in delivery of energy efficiency would carry greater political salience. The new position of local authorities as stakeholders in the demand-side would also be supportive of this change.
- A stronger consumer advocate could put pressure on the government to place energy efficiency at the centre of policy for affordability of energy, so developing a change in narrative. Similarly, a departure from the narrative which suggests that consumers are best served by competitive retail markets, creates space for the idea of the need for greater consumer protection through a stronger consumer representative.

There are likely to be secondary effects from the changed narrative as well:

- The weakening of neoliberal principles such as this also means that policymakers may be more willing to bring greater capacity into government, and be less reliant upon private actors
- A reduced focus on cost-reflective pricing structures, in favour of energy efficiency, also paves the way for development of new tariff structures such as RBTs.

  Each of these is summarised in Figure 42 below:

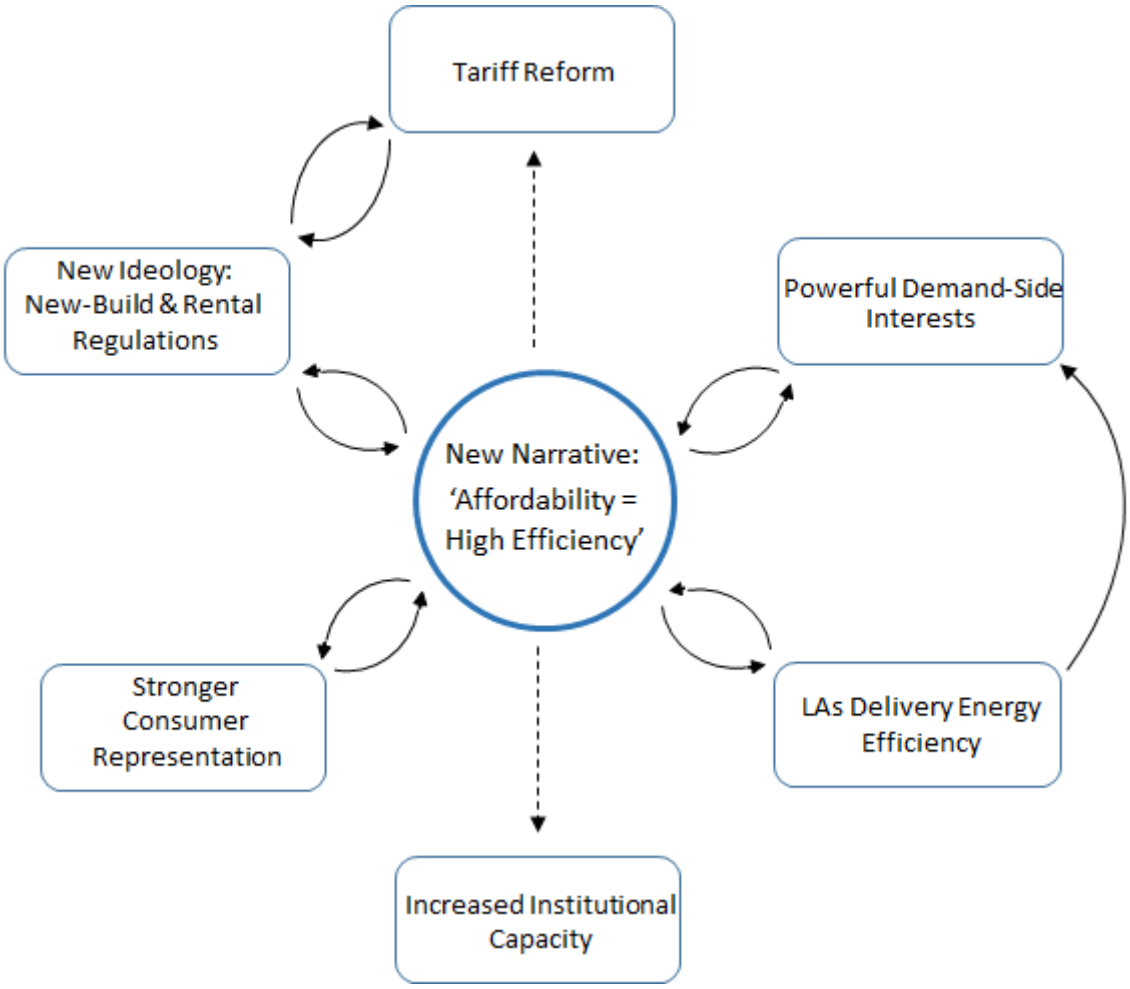


Figure 42 - Relationship between new narrative and other proposed solutions, Source: Author's Own

Very few of the solutions proposed in this chapter would be quick to implement. Some, such as the maximum differential between a supplier's cheapest and most expensive tariff, and reversing the proposal to allow price comparison sites to show only part of the market, could be introduced relatively quickly, as could removing environmental and social policy costs from bills. The introduction of rising block tariffs could be achieved as soon as the relevant research was carried out to determine appropriate divisions in blocks of consumption. However, other proposals such as

cultivating institutional capacity, fostering a new narrative, and electoral reform, could take many years to complete.

Complete replication of the Danish energy sector in its entirety in Great Britain is not likely to be viable. For example, Denmark's reliance on district heat networks delivering low-cost, high efficiency heat would be prohibitively expensive to replicate, the use of energy taxes as an incentive for energy efficiency would drive more households into fuel poverty, and the fact that many energy suppliers are owned as cooperatives of users, which helps to reduce conflicts of interests, stems from a unique history of cooperative ownership of many key industries in Denmark, which does not exist in Great Britain. However, the lessons from the Danish governance structure set out in this chapter are all considered broadly viable for introduction in the British context, given enough time, if they occurred alongside the other proposed changes.

Overall it has been demonstrated that there are a number of issues with the current governance structure in the energy sector in Great Britain, and this has a significant negative effect on affordability of energy for domestic consumers. However, there are a number of viable changes to the governance structure which may be introduced in order to address many of the current issues. The proposals set out here place the interests of consumers at the centre of the governance structure, and demonstrate that a reformed governance structure could produce very different outcomes, through which affordability of energy for domestic consumers could be significantly improved.

The following chapter will go on to discuss how these proposals align with the research questions that this thesis investigates, as well as setting out their place in the existing literature, so to highlight contributions to knowledge that have been made. The proposals here also shed light on useful future avenues for further research, so these too will be examined.

Chapter 8 - Conclusion

8.1 - Introduction

This thesis set out to understand the impacts that the governance structure of the energy system has on affordability of energy for domestic consumers in Great Britain, and how governance may be changed to improve affordability. This section summarises and concludes the research that was undertaken. An overview of the background to the research is given, followed by responses to each of the research questions. The contributions to knowledge are identified, and limitations to the research are then examined alongside future avenues of possible study. Finally closing remarks are given.

8.2 - Background to the Research

Affordability of energy has significant political, social, and system design implications. Affordability of energy is defined in this thesis as a product of three interrelated factors - level of household income, level of energy bills (which are a product of unit prices and levels of energy demand, mediated by tariffs and the retail market) and the amount of energy that a household needs to maintain a healthy living environment. However, the factors which are most relevant to the energy policy of affordability are energy bills, and energy efficiency, both of which are considered in the context of household income. This thesis examined the impact that energy governance has on each of these factors of affordability of energy for domestic consumers in Great Britain, and the implications for energy policy. The energy governance structure in Denmark was also analysed, in order to draw lessons from an energy system with high levels of affordability, backed by high standards of energy efficiency (IEA, 2011).

Following a review of the affordability and governance, policy literatures were examined to set out the governance affecting the different costs contained within domestic electricity and gas bills in Great Britain. This was followed by a study of the drivers of domestic energy demand, and a review of the governance affecting different policies that exist in Great Britain to support domestic energy efficiency. The methodology which supported the gathering of primary data was then set out, followed by analysis of the interview data collected pertaining to both Great Britain and Denmark. Finally, findings were discussed in reference to the literature, and policy proposals were developed to support a transition to a more affordable energy system.

8.3 - Answering the Research Questions

Although there is much which is understood about affordability, fuel poverty, costs in the bill, and the barriers to deployment of energy efficiency, there is currently a significant gap in the literature that brings these factors together and examines the impact of governance on affordability of energy in the domestic sector in Great Britain. The research questions that this thesis examined to address this gap were:

1. Are current governance arrangements regarding pricing and tariffs supportive of affordability of energy for domestic consumers in Great Britain?

2. Are current governance arrangements regarding domestic energy-efficiency supportive of affordability of energy for domestic consumers in Great Britain?

3. What lessons may be learned from the Danish system of energy governance which may be beneficial to affordability of energy for domestic consumers in Great Britain?

4. How might the governance structure in Great Britain be reformed to improve affordability of energy for domestic consumers?

In order to set out how this thesis responds to these questions a brief summary of how the results relate to each of these questions will be addressed in turn.

1. Are current governance arrangements regarding pricing and tariffs supportive of affordability of energy for domestic consumers in Great Britain?

This thesis has identified a number of fundamental issues with the governance structure relating to pricing and tariffs which undermine affordability of energy for domestic consumers in Great Britain.

A Damaging Narrative

A fundamental issue facing affordability of energy in Great Britain is the narrative of 'affordability = low prices'. This narrow understanding of affordability not only channels the policy solutions that are put in place, but also serves to crowd out other narratives which may be more beneficial to improving the affordability of energy. This 'affordability = low prices' narrative is beneficial for policy-makers because it is easy to communicate, and allows policymakers to work within a narrow policy area, delivering low cost policies. It also supports policies which may be achieved within the electoral timetable, are coherent with the long-standing supply-side approach to policy-making, and can be used to support political projects in other areas – e.g. development of new nuclear power and fracking. A central part of the ‘affordability = low prices’ narrative is that low prices are best achieved through facilitating a competitive retail market with which consumers engage with. This

means that engagement in the market through switching becomes a prerequisite to accessing the lowest prices, resulting in a partial passing of responsibility for accessing affordable energy to the consumer. This is particularly detrimental for those who are unengaged in the energy market who can pay in excess of £300 more a year for energy than their engaged counterparts (CMA, 2015b), a significant number of whom are on low-incomes, the elderly, or those who are otherwise vulnerable (OFGEM et al., 2014). This straddles research questions one and two as focus on prices directs action away from energy efficiency.

Insufficient Consumer Representation

It has been demonstrated that consumers are under-represented in the governance structure of the energy system in Great Britain, and this has a negative impact on both general affordability, and fuel poverty. Twenty-five years after the release of Professor Brenda Boardman's first book defining the concept of fuel poverty (Boardman, 1991), in spite of the constant presence of a consumer advocacy body, the creation of new institutions such as the Fuel Poverty Advisory Group, and the changing of the primary duty of OFGEM in 2000 to that of protecting the interests of consumers (HMG, 2000a), most recent figures available at time of writing show millions of households continuing to face fuel poverty (DECC, 2015a).

It appears that there is no single body with broad oversight of long-term affordability, or the institutional capacity to put pressure on the government and OFGEM to ensure that it is built into the system in a holistic sense. This issue straddles both Research Question One, and Research Question Two – in that this lack of representation has facilitated both pricing, and limited action on energy efficiency.

Retail Markets, Tariffs & Charges

Regulations affecting tariffs and charges currently undermine affordability of energy for domestic consumers and is designed around the needs of suppliers, rather than the needs of consumers. Tariff structures reward higher levels of demand, something associated with high income households (CSE, 2015). This is likely to worsen with the removal of a number of the RMR regulations meaning that falling block tariffs may now be reintroduced in the market. Low-priced tariffs may also now be offered exclusively to new consumers, forcing customers to engage more fully in the market to access the lowest prices. Changes to the regulations affecting price comparison websites will lead to reduced transparency in the retail market owing to there no longer being required to show the whole of the market, and being allowed to offer exclusive deals. This limits opportunities for those who are unable to use the internet to access the best deals. In addition, the charging of VAT, and

levying social and environmental policy charges on all units of energy consumption is highly regressive.

Despite over fifteen years of full retail competition, the retail market is not functioning effectively. There are a significant number of unengaged consumers on high-priced standard variable tariffs subsidising those that are on lower-priced fixed tariffs. This has a negative impact on affordability because it means large numbers of consumers are paying high prices, many of whom are likely to be on a low income or otherwise vulnerable. There is also an inherent conflict in that consumer engagement is relied upon to drive competition in the retail market, but it is in suppliers' financial interests to discourage their customers from engaging. Also, a well-functioning retail market is relied upon to provide suppliers with an incentive to pass through cost savings such as from falling wholesale markets. However, without that there is limited pressure on them to do so – this undermines affordability of energy for domestic consumers.

Wholesale Transparency & Institutional Capacity

Affordability is significantly undermined by a lack of institutional capacity, particularly within OFGEM. The private nature of PPAs and OTC trades in the wholesale market means that OFGEM is unable to monitor the majority of the trading activity which takes place, leaving the regulator unable to ensure that reductions in wholesale costs are passed through to end consumers. Competitive pressure from the retail market would usually be relied upon to encourage suppliers to pass through costs savings, however as set out above, there is a high level of unengagement in the energy retail market. Without this competitive pressure, and with OFGEM unable to examine trading behaviour, there is little to ensure that suppliers pass cost savings on to consumers – with potentially significant negative implications for affordability of energy for domestic consumers.

In addition to issues in the wholesale market, it is also not clear that OFGEM has sufficient capacity to accurately monitor the costs faced and profits made by suppliers in order to ensure pricing is fair to consumers. Furthermore, the high levels of returns realisable by network companies suggests that they are able to leverage the asymmetry of information between themselves and OFGEM (who sets their regulated returns). This leads to inefficiently high network costs, which in turn leads to higher prices for consumers – undermining affordability of energy.

Overall

The presence of a damaging narrative, insufficient consumer representation, arrangement of retail markets, tariffs, and charging, and issues relating to the wholesale markets and OFGEM's lack of

institutional capacity demonstrate that on balance the current governance structure relating to pricing and tariffs is not supportive of affordability of energy for domestic consumers in Great Britain. However, these do present significant opportunities for improvement.

2. Are current governance arrangements regarding domestic energy-efficiency supportive of affordability of energy for domestic consumers in Great Britain?

This thesis has identified a number of fundamental issues with the governance structure relating to domestic energy efficiency which undermine affordability of energy for domestic consumers in Great Britain.

A damaging narrative: Affordability = Low Prices

The presence of a narrative focussed on affordability of energy for domestic consumers delivered through promotion of low prices based on market mechanisms undermines progress on energy efficiency. This is because a focus on prices directs action away from energy efficiency. This straddles research questions one and two.

Suppliers' Responsibility for Energy Efficiency

Energy efficiency policy inevitably reduces the market for supply of energy. Therefore, it is not in suppliers' inherent interests for energy efficiency policies to be successful or ambitious. In spite of this, suppliers are chosen as the conduit for delivery of energy efficiency measures. This means the only motivation that suppliers have for meeting the obligation is the threat of sizeable sanctions for failing to meet their obligations. These fines, whilst helping to ensure compliance, have the potential to be harmful to domestic consumers if passed on through consumers' bills. Although threat of these fines may drive suppliers to deliver measures, this does not mean they will support stronger targets or strive to maximise societal good, simply to deliver the very minimum number of measures necessary to avoid sanctions. It is also not clear that suppliers have sufficient institutional capacity to deliver measures to those who need them most. Finally, the involvement of energy suppliers in the delivery of energy efficiency measures appears to limit the development of successful policy because it gives them political power over the development of policies which are against their interests to be successful.

Anti-Regulatory Ideology

It appears that an anti-regulatory ideology has led to weak energy efficiency standards for the private rental and new-build sectors. Both of these sectors are affected by the 'principal-agent problem'. The private rental sector is of particular importance because this tenure has some of the lowest standard of properties, thermally speaking. The new-build sector should also be targeted

because it is significantly more cost-effective to construct a property to a high standard, than to retrofit additional measures later in the property's life.

Lack of Demand-Side Influence

It is evident that those with an interest in greater deployment of energy efficiency measures are not able drive this agenda forward effectively. The interests of the supply-side are supported by suppliers and generators who are able to act as a coordinated group, whereas demand-side interests are made up of a large number of different institutions from different industries, with less clearly aligned goals. This is exacerbated by a prevailing supply-side bias in policymaking, and contributes to the limited level of support for ambitious energy efficiency policy among policymakers.

Insufficient Consumer Representation

It is evident that consumers are under-represented in the governance structure of the energy system in Great Britain, and this results in a lack of action on affordability, particularly relating to fuel poverty. There is no single body with oversight of long-term affordability, or which is able to hold the represent consumers' needs effectively. This issue straddles both Research Question Two and Research Question One – in that this lack of representation has led to both limited action on energy efficiency, and regressive pricing structures.

Institutional Capacity

It is evident that affordability is significantly undermined by a lack of institutional capacity, particularly within BEIS. It is not clear that BEIS has the capacity to design effective energy efficiency policy, as evidenced by the shortcomings of the ECO and CERT, and the significant failings of the Green Deal. This is particularly problematic for future supplier obligations as a mechanism for delivering energy efficiency. If policymakers misalign policy design with optimal social outcomes, as occurred with regard to CFLs and loft insulation, this can have a negative impact on affordability.

Overall

It is evident that the current governance arrangements affecting domestic energy efficiency are, on balance, <u>not</u> supportive to affordability of energy for domestic consumers in Great Britain. Suppliers' reasonability for energy efficiency, a damaging narrative, an anti-regulatory ideology, a lack of demand-side coordination, insufficient consumer representation, and limited institutional capacity within BEIS come together to undermine progress on energy efficiency in the domestic sector. Although there are some areas such as appliance regulations which are supportive of affordability, such policies are the exception rather than the rule. The shortcomings in the governance structure do however present a number of opportunities for improvement.

3. What lessons may be learned from the Danish system of energy governance which may be beneficial to affordability of energy for domestic consumers in Great Britain?

There are a number of features of the Danish system of energy governance which would be beneficial if they could be emulated in Great Britain. Some of these features such as the need for strong building standards are highlighted by other research questions.

Energy Efficiency as a Pillar for Economic Growth

Denmark has also demonstrated that energy efficiency, as well as bringing significant benefits for consumers, can be a significant source of economic growth in the form of large successful companies such as Danfoss and Velux. If policymakers in Great Britain were to understand this value, and nurture expertise in this area, technologies could be exported, and jobs could be created, both among energy efficiency technology companies, and installation firms - a sector dominated by SMEs. Both of these could support strong long term economic growth (Cambridge Econometrics, 2012). This would create significant economic interests in, and so giving additional political salience to, institutions which are supportive of high energy efficiency standards.

Long-Term Policy Stability

At the heart of energy policy-making in Denmark is the long-term perspective that is taken. Policies and goals are set over long periods of time, and are set out clearly. This is possible because of the presence of three things. The first is the cross-party consensus which in part grows out of a proportional representation voting system – this produces a multi-party system of coalitions which necessitate creating cross-party consensus around policies. The second is the mature relationship between the government and companies in the energy sector. Many targets and policies are negotiated between the firms and the government; this gives firms ownership of policies that are put in place, meaning the amount of pressure to get such policies changed is lessened. Thirdly, large firms such as Velux and Danfoss have significant vested interests in ambitious energy efficiency policy, and so leverage their power in favour of continuing high standards.

In addition to greater institutional capacity and fostering a more powerful demand-side, significant benefits could be gained in Great Britain from supporting the forming of cross-party consensuses around energy policy. This may necessitate changes in the electoral system to one which paves the way for a greater level of consensus, such as proportional representation, or through the development of a new institution to support the building of consensus, such as the CEPC in the IGov Framework (Mitchell et al., 2016). Creating stability in this way could bring significant benefits to Britain, where such uncertainty is noted as having a significant negative impact on firms in the energy sector (Watson et al., 2014). This could support firms to develop innovative business

practices which could deliver significant financial savings to consumers in the long term (See: National Infrastructure Commission, 2016).

Ideology supporting Energy Efficiency Regulation, Backed by Finance and Information

High standards of energy efficiency retrofitting are commonplace in Denmark owing to an ideology which is supportive of the use of strong regulations. These are backed by a widely-available, low-cost, familiar mechanism of finance to pay for energy efficiency improvements (Nykredit, 2015a). This is supported by measures to reduce informational barriers to successful retrofit through its online 'case-bank' and 'Bedre Bolig' advisors (Danish Energy Agency, 2014c). If the interventionist ideology present in the wholesale market in Great Britain could be brought into the domestic sector, a similar package of regulation and affordable finance backed by readily available information could be introduced in Great Britain. This would be highly beneficial to affordability of energy if it were widely deployed across Great Britain (taking inspiration from the KfW in Germany and the HEEPS Loan scheme available in Scotland). Information could be delivered through local authorities, as part of their new role as facilitators of energy efficiency.

Valuing the Demand-Side

Finally, one of the most important factors in the Danish governance structure which supports affordability is a high degree of commitment to energy efficiency from policy-makers. Since the oil shocks of the 1970s, energy efficiency has lain at the heart of energy-policy in Denmark. This has created an environment of knowledgeable policy-makers, and businesses that have built themselves on strong regulations. If a similarly meaningful commitment to energy efficiency could be cultivated among the policy-makers in Great Britain, replacing the bias for supply-side policymaking, much could be achieved to support affordability. This relates closely to the need to change the narrative from that of a price focus, to one which focuses on high levels of energy efficiency (discussed below).

Overall

There is <u>much</u> that can be learned from Denmark which would be beneficial to affordability of energy for domestic consumers in Great Britain. This thesis has demonstrated that standards of affordability of energy in Denmark are high, and that this is large part may be attributed to a governance structure which is supportive of high standards of energy efficiency in the domestic sector. There are many lessons that may be learned from studying the Danish governance structure, these include the creation of long-term policy stability; and ideology supporting the use of regulation backed by affordable finance and clear information; the understanding that energy efficiency can deliver economic growth delivering political salience to demand-side institutions; and a strong governmental commitment to energy efficiency as part of demand-focussed policymaking.

4. How might the governance structure in Great Britain be reformed to improve affordability of energy for domestic consumers?

In addition to the lessons that can be taken from Denmark, the research has highlighted a number of other reforms to the governance structure in Great Britain which could significantly improve affordability of energy for domestic consumers.

A New Narrative

The replacing the 'affordability = low-prices' narrative with 'affordability = high efficiency', focussing on high standards of end-use efficiency, would be highly supportive of affordability. This new narrative acknowledges energy as fundamentally unique, and not as a 'normal good'. This framing would create opportunities for nuanced energy debate, in which demand-side actors have a greater role. The understanding of these actors as essential for delivering affordable energy will help to increase their political salience, whilst helping to constrain the power of supply-side interests. This greater policy emphasis on energy efficiency could also lead to increased understanding of its importance by the general public, helping to reduce some of the barriers to take-up. Such a solution does not imply that levels of unit prices are not important, but that replacing the current narrative of 'affordability = low prices' to one of 'affordability = high efficiency' would support policies which more effectively reflect the context of the energy sector in Great Britain.

Reformed Retail Markets, Tariffs & Charging

Tariffs should also be reformed to reflect best value for consumers, rather than suppliers. This could be effectively achieved through changes to the tariff rules such as the introduction of a market-wide regulation requiring rising block tariffs, which as well as improving access, also incentivises lower levels of demand. Removing VAT (if possible following the UK's departure from the EU) and environmental and social policy charges from bills entirely, or only charging them on higher levels of consumption, would be considerably more progressive. Price regulation should also be introduced alongside RBTs to dictate the maximum breadth between the most expensive tariff and cheapest tariff that a supplier offers. This will limit the extent to which consumers who do not switch subsidise those who do. Rules affecting price comparison websites should also be altered to ensure they show the whole of the market, and do not host exclusive tariffs – so to improve transparency and not to create additional barriers to switching.

A New Consumer Representative

This thesis has shown that there is a lack of well-resourced consumer representation in the energy sector in Great Britain. In spite of OFGEM's primary duty to protect the interest of consumers, and a number of consumer advocate organisations being present in the energy sector, the interests of

consumers remain under-represented. This could be remedied with the creation of a new institution with a deep understanding of the energy industry, better able to offer policy critique and help ensure that policies are written that will serve the best interests of consumers. It should have a broad remit, including areas of policy that lie outside BEIS's responsibilities but which have a direct impact on affordability of energy, such as building regulations. The new institution, along with local authorities and a growing energy efficiency sector, could also begin to act as a counterbalance to the power of institutions which can be obstructive to improvements in affordability, such as some energy suppliers and the National Landlords Association. This will allow consumer protection to become a central pursuit of policy-making, beyond the limiting belief that the interests of consumers are necessarily best served through efficiently operating markets.

Local Authorities to Deliver Energy Efficiency

Passing the responsibility of overseeing deployment of energy efficiency measures from energy suppliers to local authorities is likely to be supportive of better deployment. Local authorities are well positioned to become facilitators of energy efficiency deployment – both to offer direct support to fuel poor households, and offering information to households that do not qualify for direct support. This is due to their deep understanding of their regions, high levels of trust from consumers, opportunities for forming partnerships with other organisation such as charities, and collaborating with other local authorities to improve delivery. Local authorities should be given the freedom and resources to maximise deployment of measures in whichever way is most appropriate for their region.

More Interventionist Ideology

Fostering a new, more interventionist ideology is proposed, as this would support deliver of tighter energy efficiency regulations in the private rental and new-build sectors. This would also increase the likelihood of development of the proposed rising block tariff structure. In future regulation should focus more on outcomes for consumers, than on an anti-interventionist, pro-market approach to policymaking. This is consistent with the shift in narrative from 'Affordability = Low Prices' to 'Affordability = High Efficiency'.

Expanded Institutional Capacity

It is evident that a number of institutions in the energy system in Great Britain lack the capacity to carry out their responsibilities as effectively as is necessary. If OFGEM was given legal powers to audit the internal trading and pricing activities of suppliers, and invest in expanding its capacity to understand the operation of network companies, affordability would be considerably better supported. If BEIS were able to develop its understanding of energy efficiency policy, it too would be

in a stronger position to deliver more effective policy in this area. It is also important that government as a whole is able to develop the ability to produce joined-up policies which take account of the policies designed in different areas of government, such as in the case of the winter fuel payment which crosses the boundaries between BEIS and DWP.

Overall

There are many viable changes to the governance structure which may be introduced in order to address many of the current issues which undermine affordability of energy for domestic consumers in Great Britain. The need to foster a new narrative where affordability of energy is closely associated with levels of energy efficiency has been shown to be of particularly high importance. In addition to this, the need to reform retail markets; introduce a new consumer representative; replace energy efficiency obligations in the hands of local authorities; foster a new ideology supporting use of regulation to support energy efficiency; and expand institutional capacity have all been demonstrated to be important steps in the delivery of affordability of energy for domestic consumers in Great Britain.

8.4 - Contributions to Knowledge

This thesis makes contributions to a number of areas of the literature. Firstly, although there is much in the literature relating to barriers to affordability and drivers of fuel poverty, there is little which specifically examines the role of governance in these issues. Therefore, this thesis increases understanding in these areas. This thesis addresses a gap in the literature pertaining to the impact of governance on the structure of charges in the energy bill, tariffs, or the retail energy market. Much is also understood relating to the barriers to deployment of energy efficiency measures, however there is little too in this area relating to the role that the governance structure plays as a facilitator or barrier, therefore this thesis contributes to the energy efficiency literature. Energy has become an inherently political topic in Great Britain in recent years. This thesis has highlighted how actors can place political pressure on policy-makers, and the role that narratives and ideologies can play in steering energy policy in relation to affordability. This thesis therefore connects with the politics literature. Finally, this thesis works as an effective case study for the governance literature, demonstrating how governance can have a direct impact on a broad range of outcomes and practices of that system.

8.5 - Limitations of Research & Future Areas of Study

As with any academic study, this PhD project faced some limitations. There was an inherent limitation around the solo-nature of the project. A greater budget, or a broader scope to the research would have allowed for more researchers to be involved. When coding and analysing data,

this was carried out in a random order, and transcripts were revisited to allow critique of the codes that had been initially assigned. At every stage reflexivity was observed, however it is inevitable that having a greater number of researchers involved may have subtly altered the research process.

As with all research, time and budget both placed limitations on the research. More of both of these would have allowed more interviews to be carried out, particularly in Denmark. Time was carefully managed, particularly during the interview stages to ensure that interviews fit around each other. However, there was an inherent limit to the number of interviews that could viably be carried out in a single day, not only for logistical reasons, but also to ensure that interviewer fatigue did not encroach on quality of the interview process.

There is an inherent limitation in any research which sets out to understand a dynamic system by carrying out research over a relatively in a short space of time. Since the completion of data-gathering, a number of policy changes have taken place in the area. Although none of these appear to resolve issues identified in the research, or depart from the 'affordability = low prices' narrative, it would be untrue to say that nothing has changed. Carrying out future rounds of interviews to examine how the governance landscape has changed, and what effect this has had would be a natural avenue for future research.

This thesis considered affordability in the whole of Great Britain. However, owing to the additional interviews that would have been required to build up a detailed picture of policies which were unique to devolved administrations, research focussed primarily on GB-level policies. Therefore, in future, greater richness of understanding could be gained from carrying out in depth comparisons of the governance structures that have grown up in Scotland and Wales, particularly with regard to the HEEPS loan and equity loan schemes, and the role of local authorities in delivering the area-based element of the HEEPS, and the Nest scheme. This could both shed light on the effectiveness of these policies, and give greater insight into the situation in Great Britain as a whole.

Although income was considered in this thesis, it formed context rather than being specifically examined. This is because income is generally affected by economic and welfare policy, and therefore by-and-large lies outside the realms of energy policy. This however may have affected the possible policy solutions examined. An opportunity for future research would lie in examining the interaction between social policy affecting income, and the specific issue of affordability of energy.

This project did not closely examine the impact of individuals' behaviours, considering it as an external factor to the governance system. However, the interaction between different groups of individuals' behaviours and the governance system, such as by means of voting behaviour, could represent a valuable avenue for future research.

Finally, cultural differences between Great Britain and Denmark may affect how easily transferrable some of the lessons from Denmark may be. The research shows that Denmark has a long tradition of investing in energy efficiency measures, therefore it is possible that the general population may be more accepting of high standards and stringent policies in this area than the British population. Similarly to individuals' behaviours, the impact of culture was not closely considered. This could be achieved either by means of an additional international comparison to examine if lessons learned in Denmark are replicated elsewhere, or if Denmark is a truly unique case. Alternatively, carrying out a sociological study among a sample of the population in Denmark to establish attitudes to energy efficiency could also offer some insight into the role that Danish culture plays in energy policy.

8.6 - Concluding Remarks

This thesis has demonstrated how energy is simultaneously an essential good, a highly-politicised issue, and a serious concern for millions of people. A number of the governance-level barriers to improving the affordability of energy in the domestic sector in Great Britain have been highlighted, and possible solutions to address them have been proposed. Ultimately however, there is no escape from the fact that in 2016, in the fifth largest economy in the World, with one of the most developed literatures on fuel poverty, such a thesis should not be necessary. Millions of people face the daily choice between feeding their children, or keeping them warm. Something has to change.

Appendices

Appendix A - History of the Energy System

Electricity

For much of its history, the electricity industry in Britain was owned and operated by the state. However, it was privatised in 1989 by the Electricity Act (HMG, 1989) among the wave of widespread privatisation that defined the eighties. This made way for the first incarnation of an electricity market in a privatised system, The Pool. The Act also established licenses for the new suppliers and generators, created a new regulator, OFFER (now OFGEM) (Helm, 2003), and created the electricity consumer committees (precursors to energy watch) (HMG, 1989).

The Pool was a compulsory day-ahead market. This was operated by National Grid, whereby generators would bid to supply National Grid for each settlement period the following day. Bids were stacked in price order (merit order) and the last unit taken set the clearing price for all generators that were selected (Newbery, 1998; Helm, 2003). Regional monopolies for supply – the Regional Electricity Companies (RECs) were initially maintained, with competition introduced gradually, starting with larger consumers, but by 1998 the whole market, including domestic consumers, was open to competition (CMA, 2015e). When Labour came to power in 1997 there was a clear ambition to make the system 'work better', to better serve social objectives, and it's dedication to competitive markets as a means to doing that were clear (Pearson and Watson, 2010). In 1999, a report on pool prices was published concluding that the current trading arrangements facilitated the exercise of market power. This led to the 2000 Utilities Act (HMG, 2000a) which eventually led to the replacement of The Pool with the New Electricity Trading Arrangement (NETA) in 2001, featuring 'fully liberalised bi-lateral contracting and voluntary spot trading' (Karakatsani & Bunn, 2008).

NETA was designed, as far as was possible, to treat the trade of electricity like that of any other commodity (Helm, 2003)**.** NETA was based on the principal of bilateral trading arrangements where suppliers contract with generators to cover the demand of their consumers. The designers of NETA were worried that there would not be sufficient motivation for suppliers to do this, and so introduced the balancing mechanism - a punitive charging system to ensure that this was carried out. This in turn acted as an incentive to vertically integrate (CMA, 2015k; Karakatsani and Bunn, 2008), the implications of which are explored below. NETA was later extended to cover Scotland in 2005, leading to its relabelling as the 'British Electricity Trading and Transmission Arrangements'

(BETTA) (Energy and Climate Change Committee, 2011). BETTA is the market arrangement which is in place today (DECC, 2015h).

Gas

Much like electricity, privatisation of the gas sector began in the 1980s with the 1986 Gas Act (HMG, 1986), as in electricity this established both the licences required for industry activities, and the gas consumers council. Initially British Gas was responsible for both the supply of gas and for gas transmission around the UK, however a 1993 report from the Monopolies and Mergers Commission (now the Competition and Markets Authority) highlighted this as a conflict of interest. This led to a separation of duties of supply and transmission and creation of one business handling supply - Centrica (still operating in the supply market as 'British Gas') and another for transmission - Transco (now National Grid Gas plc) (CMA, 2015e). Competition in the gas supply market was introduced in stages, which concluded was concluded in 2000 with all domestic consumers being able to switch gas supplier (CMA, 2015e). Initially, as in electricity, price caps were put in place to protect consumers while competition developed. These were removed by OFGEM in 2002 (CMA, 2015e).

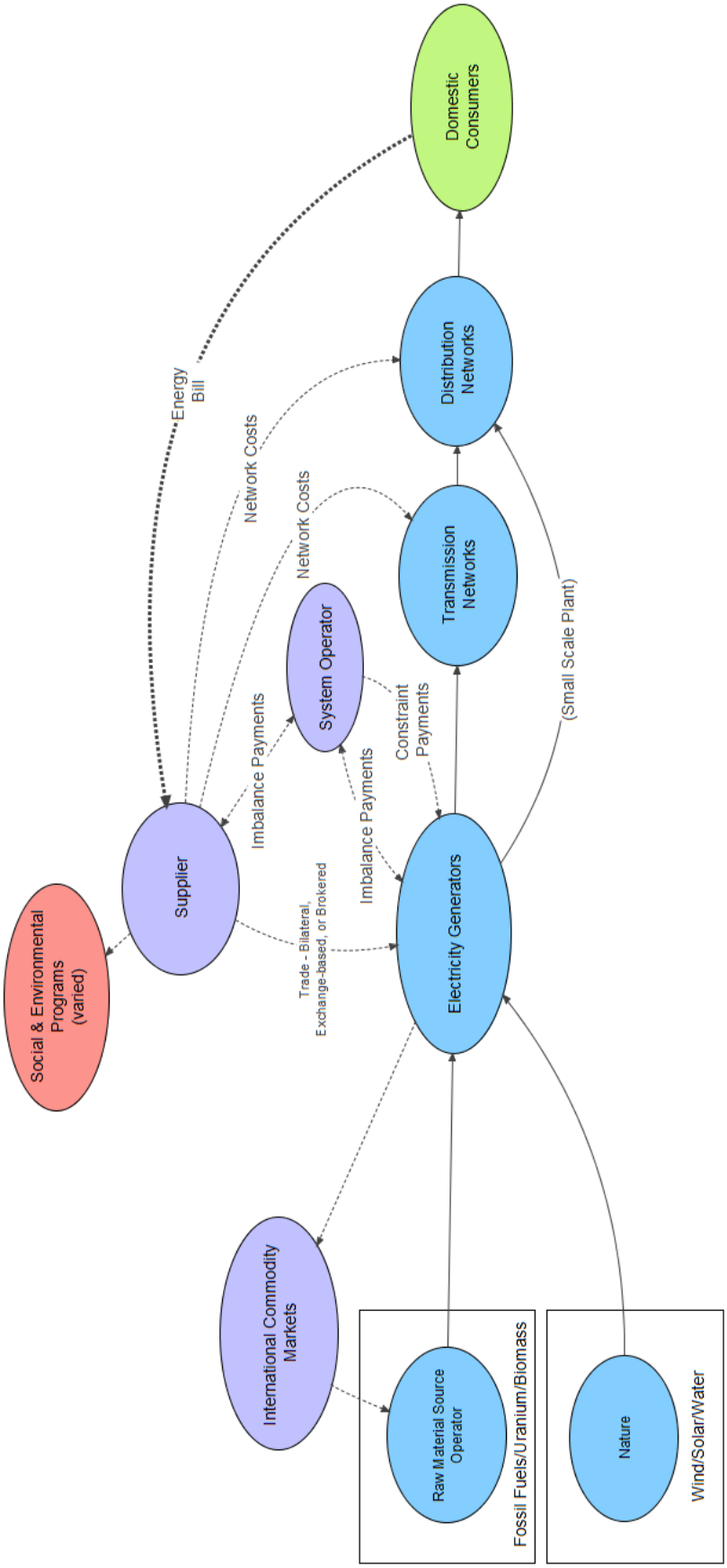
Appendix B – Targeting and Eligibility

Table 4 - The existing fuel poverty policies, the types of eligible households and the data used to determine eligibility, Source: (NatCen Social Research and CSE, 2014)

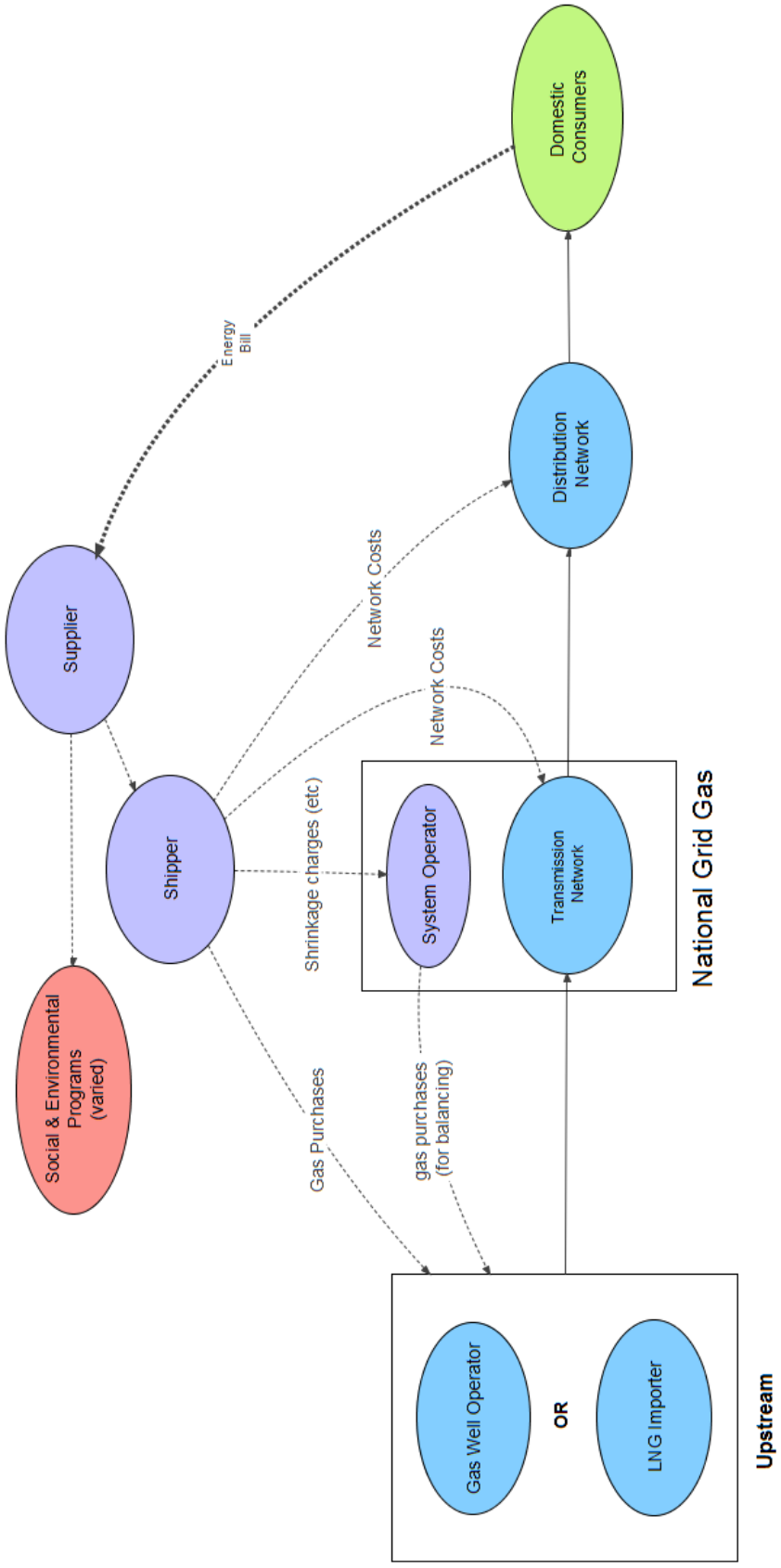
Scheme	Target Households	Data/Proxies Used
Warm Home Discount (Core Group)	• Old age pensioners • Low income pensioners	• Pension Credit
Warm Home Discount (Broader Group)	• Vulnerable low income • Vulnerable disabled • Vulnerable with children	• Varies across suppliers
Cold Weather Payment	• Low income pensioners • Low income disabled / family with a disability • Low income family with children	• Pension Credit • Income Support, • Income-based Jobseeker's Allowance • Income-related Employment and Support Allowance • Universal Credit • Child Tax Credit • Pensioner and Disability Premiums
ECO Affordable Warmth Group (AWG) **and** **ECO Carbon Saving Communities Obligation (CSCO) –Rural Element**	• Low income pensioners • Low income disabled / family with a disability • Low income family with children	• Pension Credit • Income Support • Income-based Jobseeker's Allowance • Income-related Employment and Support Allowance • Child Tax Credit • Working Tax Credit • Pensioner Premium • Disabled Child premium • Disability premium

ECO Carbon Saving Communities Obligation (CSCO)	• Households living in 25% most deprived areas	• Index of Multiple Deprivation

Appendix C - Electricity & Financial Flows - Enlarged



Appendix D - Gas and Financial Flows - Enlarged



Appendix E - EDF Energy PPA Paper-trail

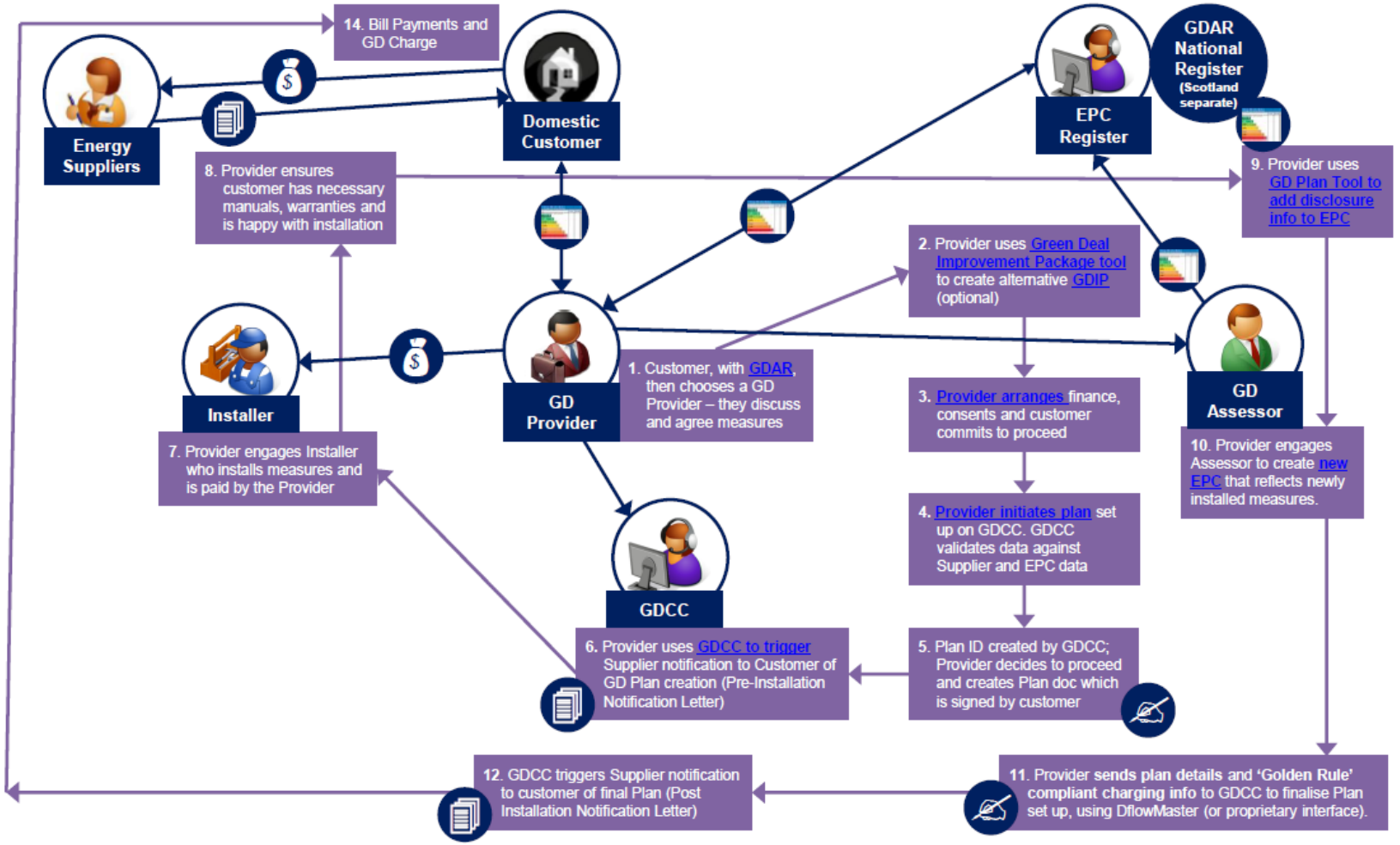
EDF operates a range of retail tariffs called the 'blue' tariffs. For customers on these tariffs, EDF will 'make sure we buy enough electricity generated from a low-carbon nuclear source to match every unit of electricity we estimate our Blue customers use' (EDF, 2015).

To support this claim, EDF contracted PWC to carry out an independent audit on these tariffs (EDF and PWC, 2014) which showed that under the terms of a power purchase agreement, EDF Energy plc is entitled to receive 80% of the electricity produced by EDF Energy Nuclear Generation Ltd. EDF energy plc is EDF's UK supply arm, and EDF Energy Nuclear Generation Limited is the firm that owns and operates all of EDF's nuclear plants in the UK - formerly British Energy (London Stock Exchange, 2011).

The reason that it is only 80%, is because the holding company 'Lake Acquisitions' which owns 'EDF Energy Nuclear Generation Limited' is a part ownership share between EDF (80%) and Centrica (20%) (Centrica, 2009).

The fact that this PPA alone is sufficient to more than meet the demands of EDF's domestic customers, and all but meet the needs of the business consumers is demonstrated in EDF's consolidated segmental statement (EDF, 2013). This shows EDF's share of the nuclear output for 2013 to be 48 TWh, and demand from domestic consumers to be 15.2 TWh, and demand from non-domestic customers to be 37.6TWh (totalling 52.8TWh). Output from EDF's non-nuclear generation is shown to be 24.9 TWh but no PPA information could be found relating to this plant.

Appendix F - Green Deal Institutional Arrangements



Source: (GDORB, 2012, p.26)

Appendix G - Supplier Obligations Timeline

- 1994-1998 - EESOP1 - Energy Efficiency Standards of Performance
- 1998-2000 - EESOP2
- 2000-2002 - EESOP3
- 2002-2005 - EEC1 - Energy Efficiency Commitment
- 2005-2008 - EEC2
- 2008-2012 CERT - Carbon Emissions Reduction Target
- 2009-2012 CESP - Community Energy Saving Program
- 2013 - 2015 - ECO1/1.2
- 2015-2017 - ECO2
- Post-2017 - ECO: Help to Heat

Above is a timeline of the evolution of the supplier obligations in Great Britain. The Energy Efficiency Standards of Performance (EESOP) were the first supplier obligations in Great Britain and were initially developed and managed by OFFER and the Energy Saving Trust. This was replaced by the energy efficiency commitment (EEC), and later the Carbon Emissions Reduction Target (CERT). The Community Energy Saving Program was introduced alongside CERT slightly later. Both of these were finally replaced with the ECO in 2012.

Appendix H - ECO Target Calculation - Calculating a Supplier's Obligation

$$\left(\frac{A}{2}\right)\left(\frac{Tx}{T}\right)$$

A = Total value of sub-target in period[36]

T = Total amount of electricity or gas (as applicable) supplied during the notification period by all suppliers and calculated using the 'Tx' Formula Below, excluding volumes supplied by suppliers with a zero obligation.

Tx = Amount of electricity or gas supplied during notification period, (calculated using below formula)

(1) Tx - If the amount of electricity supplied = 400<E<800 GWh, or volume of gas = 2000<G<4000 then use formula:

Tx = (C-D)*2

C = Amount of electricity or gas notified by the supplier or group

D = In the case of an electricity supplier, 400GWh of electricity; or in the case of a gas supplier, 2000 GWh of gas.

(2) Tx - the amount of electricity supplied >800 GWh, or volume of gas >4000 then use figure as notified.

(OFGEM, 2014a)

[36] 'A' is divided in two to reflect both gas and electricity licences.

Appendix I - History of Consumer Representation

With the privatisation of the electricity industry, The Director General of Electricity Supply (DGES) established 12 regional Electricity Consumer Committees (ECCs), with boundaries that mimicked the boundaries of the Public Electricity Suppliers (PES), each with a chair, also elected by the DGES. These bodies represented the rights and concerns of the electricity consumers in their region. The chairs of the ECCs met together on a regular basis on the National Consumers' Consultative Committee (NCCC). This was a statutory body which reviewed issues in the electricity sector affecting consumers. Here the chairs of the ECCs were able to exchange views with each other, and with the Director General of Electricity Supply (DGES). The chairs of the ECCs also formed the National Electricity Consumers Council (NECC), a non-statutory body which allowed the chairs of the ECCs to discuss and respond to national issues affecting electricity consumers, without the presence of the DGES (Simmonds, 2002).

Consumer representation in the Gas industry at the time was established by the secretary of state for Trade and Industry in the form of the Gas Consumer Council (GCC). Owing to the national structure of the privatised gas industry (i.e. it was privatised almost completely whole, rather than into pieces like the electricity sector), most of the work of the GCC happened at a national level, although regional offices were created (Simmonds, 2002).

The 2000 Utilities Act (HMG, 2000a) replaced the ECCs and the GCC with The Gas and Electricity Consumer Council (Energywatch), a central body representing consumer interests. This was a national body with a series of regional offices (albeit fewer than under previous incarnations) and within each regional office operated area teams. Energywatch had greater powers to demand information that in predecessors, both from industry firms, and from OFGEM itself. Any refusal to provide information by firms was referred to OFGEM, and any refusal by OFGEM to supply information was referred to the secretary of state. The Utilities Act also reclassified OFGEM's primary responsibility as to protecting the interests of consumers - this gives rise to inherent overlap between the responsibilities of OFGEM and Energywatch, this required the drawing up of a memorandum of understanding between the two bodies as to how areas of overlapping responsibility would be handled (Simmonds, 2002).

In 2008, Energywatch was combined with Postwatch and the National Consumers Council to become Consumer Focus (Consumer Futures, 2014), however just three years later BIS began consulting on its combination with the Citizen's Advice Bureau, suggesting that multiple consumer advocacy organisations was both inefficient and confusing for consumers (BIS, 2011). In 2012, it was announced that this would go ahead. In 2013 the advice-giving services that formerly existed under

consumer focus were transferred to CAB, leaving behind the restructured Consumer Focus (under the new name Consumer Futures) as a temporary Regulated Industries Unit, which was then absorbed into CAB a year later (Consumer Focus, 2013).

Appendix J - Detailed Breakdown of Bill Costs

Outlook for Costs That Make Up Domestic Electricity Bills, Period: March 2014 - April 2015

Source: After OFGEM, 2015a

Wholesale costs	
- Electricity	£ 227
- Unbilled volumes	£ 7
- Electricity imbalance costs	£ 1
TOTAL	**£ 235**
Network costs	
- Electricity network (transmission)	£ 34
- Electricity network (distribution)	£ 111
- Balancing (BSUoS)	£ 6
TOTAL	**£ 151**
Environmental and social obligation costs	
- Renewable Obligation Certificates (ROCs)	£ 40
- Energy Companies Obligation (ECO)	£ 20
- Feed in Tariffs (FiTs)	£ 10
- Warm Home Discount	£ 6
- Government-funded rebate	-£ 12
- CfD	
TOTAL	**£ 65**
Supplier Costs	
- Operational (inc. meters and smart meters)	£ 76
- Depreciation and amortisation	£ 4
- Supplier Pre-tax margin	**£ 49**
TOTAL	**£ 129**
VAT	**£ 29**
Total (average customer bill)	**£ 609**

NB. This is the most recent data available of its sort, this is because in May 20125, Ofgem suspended publication of the supply market indicator data.

Outlook for Costs That Make Up Domestic Gas Bills, Period: May 2014 - April 2015

Source: After OFGEM, 2015a

Wholesale costs	
- Gas	£ 342
- Unbilled volumes	£ 9
- Gas reconciliation by difference	£ 16
- Demand forecast error	£ 16
TOTAL	**£ 383**
Network costs	
- Gas network (transmission)	£ 13
- Gas network (distribution)	£ 138
- Total	**£ 151**
Environmental and social obligation costs	
- Gas Energy Companies Obligation (ECO)	£ 20
- Warm Home Discount	£ 6
TOTAL	**£ 27**
Supplier Costs	
- Operational (inc. meters and smart meters)	£ 93
- Depreciation and amortisation	£ 4
- Supplier Pre-tax margin	£ 67
TOTAL	**£ 164**
VAT	**£ 36**
Total (average customer bill)	**£ 761**

NB. This is the most recent data available of its sort, this is because in May 20125, Ofgem suspended publication of the supply market indicator data.

Outlook for Costs That Make Up Domestic Dual Fuel Bills, Period: April 2014 - March 2015

Source: After OFGEM, 2015a

Wholesale costs	
- Gas	£ 342
- Electricity	£ 226
- Unbilled volumes	£ 16
- Gas reconciliation by difference	£ 16
- Demand forecast error	£ 16
- Electricity imbalance costs	£ 1
TOTAL	**£ 617**
Network costs	
- Gas network (transmission)	£ 13
- Gas network (distribution)	£ 138
- Electricity network (transmission)	£ 34
- Electricity network (distribution)	£ 111
- Balancing (BSUoS)	£ 6
TOTAL	**£ 302**
Environmental and social obligation costs	
- Renewable Obligation Certificates (ROCs)	£ 41
- Energy Companies Obligation (ECO)	£ 40
- Feed in Tariffs (FiTs)	£ 10
- Warm Home Discount	£ 12
- Government-funded rebate	-£ 12
- Electricity CfD	
TOTAL	**£ 92**
Supplier Costs	
- Operational (inc. meters and smart meters)	£ 170
- Depreciation and amortisation	£ 8
- Pre-tax margin	£ 93
TOTAL	**£ 269**
VAT	**£ 64**
Total (average customer bill)	**£ 1,346**

NB. This is the most recent data available of its sort, this is because in May 20125, Ofgem suspended publication of the supply market indicator data.

Appendix K – Codes for Interviews

Reference List

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