



SMART ECO-CITY DEVELOPMENT IN EUROPE AND CHINA:

OPPORTUNITIES,
DRIVERS AND
CHALLENGES

smartecocities

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INTRODUCTION

A WORLD OF SMART CITIES, OR ECO-CITIES?

The policy pointers presented in this report are the result of a three-year (2015-18) research project led by Federico Caprotti at the University of Exeter. The project, **Smart Eco-Cities for a Green Economy: A Comparative Analysis of Europe and China**, was delivered by a research consortium comprising scholars and researchers in the UK, China, the Netherlands, France, and Germany. The aim of the project was to investigate the way in which smart city and eco-city strategies are used to enable a transition towards digital and green economies.

While previous work has considered smart cities and eco-cities as separate urban development models, the project considers them together for the first time. We use the term 'the smart eco-city' to focus on how green targets are now included in smart city development policies and strategies.

This report presents a summary of policy pointers, or 'lessons', learned through our work on the cities we studied in the UK, China, the Netherlands, France and Germany. Specifically, we studied, in depth, the cities of Manchester, Amsterdam, Hamburg, Bordeaux, Shanghai, Shenzhen, Ningbo and Wuhan. This work included interviews with policymakers, urban municipal authorities, tech firm executives, and grassroots and community representatives and stakeholders. Our work also included intensive and in-depth qualitative analysis of documentary sources including policy and corporate reports and other materials.

FEDERICO CAPROTTI

FRANS SENERS

MAY TAN-MULLINS

ROBERT COWLEY

ROB RAVEN

ALI CHESHMEHZANGI

IAN BAILEY

PHILIPP SPÄTH

LINJUN XIE

SIMON JOSS

ERIC JOLIVET

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POLICY DIRECTIONS

BUILDING THE SMART ECO-CITY

POINT 1: BUILDING A SMART CITY MEANS EXPERIMENTING

Many city governments have set up smart city policy programmes, but are also involved with other stakeholders in setting up experiments and pilot projects for testing ICT solution use in real-life scenarios. More so than policy programmes, this hands-on experimentation – and the multi-stakeholder governance that emerges in this context – is the main component of smart city development.

In the project, we have identified a large amount of different experiments in each of cities we studied. For example, in Amsterdam we found many small-scale experiments on a variety of topics, and in Ningbo we found relatively fewer but larger scale experiments on a more focused range of topics. However, a focus solely on experimentation brings with it its own issues – see the final section below, titled **What are the challenges for smart eco-city development in China and Europe?**



CHINA TELECOM'S SMART CITY DEMONSTRATION CENTRE IN NINGBO

POINT 2: SMART CITY PROJECTS ARE ONLY THE TIP OF THE ICEBERG

Governments lack a comprehensive overview of ongoing smart city related activities business and citizens. Some local policymakers view their governmental programmes as the core of smart city development (we found this in Ningbo, and to a lesser extent in Hamburg). Others, however, realize that off-the-radar activities by businesses and citizens without (or with limited) city or government support are at the heart of smart city development. The cases of Bordeaux and Amsterdam show that city governments find it difficult to steer this type of development effectively.

POINT 3: BUILDING A SMART ECO-CITY MEANS LEARNING

Learning – by policymakers, urban designers, technology corporations, and community groups – is crucial to the development of future cities. Some of the most active smart eco-cities researched in this project are those that have looked beyond their specific city and sought to learn from other cities, experiences, and ideas. This learning can take place in many ways, including (but not limited to) through:

A Formal mechanisms: such as city networks (e.g. the C40 Cities for Climate Change network), conferences, the hiring of consultants. This carries it with it great opportunities, as well as risks, such as that around the circulation of 'one size fits all' approaches to the development of smart eco-cities.

B Informal processes: these include ad-hoc and non-formalised visits by urban policymakers to other cities in the same country or internationally, and the establishment of informal networks of policymakers, corporate executives and community representatives in the same city.

POINT 4: URBAN MANAGEMENT OR INNOVATION ECO-SYSTEM?

Two key logics currently exist in smart eco-urban development:

A urban management. In Ningbo, for example, the smart city is based on the provision of ICT tools for effective management. This is a more conventional management model with more central guidance. Experts at government agencies are seen as capable of steering smart city experimentation and of exercising direct effective control over the implementation of new technologies. These city managers select best practices, which are then to be rolled out throughout the city.

B the innovation eco-system. The eco-system metaphor refers to a broad and loose yet symbiotic coalition of actors initiating a large chaotic set of small experiments. It is not clear in advance which experiments will be successful, but it is clear that this approach promotes entrepreneurial development, and provides the potential for scaling up innovative solutions throughout the city and beyond. Amsterdam has proved to be a key city in the promotion of a smart city innovation eco-system.



THE MAIN HALL IN BORDEAUX'S DARWIN PROJECT

POINT 3: BUILDING A SMART ECO-CITY MEANS LEARNING

A lot of smart eco-city strategies and policies are quite diffuse and non-specific in terms of the actual **location** of smart city innovations and projects. Some cities, such as Amsterdam, have a strong focus on building networks and dynamic relationships between corporations and policymakers. However, the project has revealed that delimitating a specific **space** and **place** for developing experimental approaches to the city can be a great asset in developing successful projects. In China, the Sino-Singapore Tianjin Eco-City is an example of a city-scale eco-city project, while in the UK, Manchester's smart city ambitions are expressed in the Manchester Corridor project. This is delimited by the Oxford Road Corridor, and functions as an experimental space within which future-focused strategies can be trialed.

A RE-PURPOSING OF A FORMER MILITARY SITE INTO A TECH START-UP INCUBATOR, COMMUNITY SPORTS & ECO FACILITIES SITE

DRIVERS

WHO DRIVES THE SMART ECO-CITY?

POINT 1 : CITIES ARE KEY PLAYERS

Our work shows that cities themselves play a key role in rolling out smart city and eco-city policies at the local level. This is carried out through processes of:

A Competition.

Cities compete for award of smart city or eco-city projects and state and corporate funding. In so doing, city governments become important players in the development of urban futures. Examples of cities competing for funding include:

In China: cities are key players in competing in national urban development competitions and challenges, and are responsible for delivering on goals and aims set by the central government. At the same time, cities themselves have power and latitude to translate national aims into a local context, which makes Chinese cities dynamic stakeholders in national urban development.

In the UK: the 2013 Future Cities Demonstrator competition, funded by the UK Government. Although only a few cities received government funding through this scheme, the competition stimulated city authorities to develop smart city strategies nationwide.

In France: cities like Bordeaux and Lyon, in France, have won central state funding through the development of smart city policies and projects that are not simply focused on the digital economy but on a raft of eco-city priorities, such as renewing declined industrial areas, or rejuvenating polluted or less attractive districts, rather than developing greenfield sites.

In Germany: Berlin, Munich, and partly also Hamburg, are competing to host the headquarters and development departments of big international technology and service providers (IBM, Siemens, CISCO, Microsoft etc.). This is an example of competition not simply for economic development, but competition focused on attracting the technology corporations that will be key to developing the technical backbone to future urban systems.

POINT 2 : NATIONAL GOVERNMENTS MATTER

The national framing of urban policy priorities remains a very important driver and barrier to shaping urban development priorities. This may seem more obviously to be the case in China, where multiple national policies and competitions mean that much local activity is directly relatable to strong incentives from Beijing, even if local authorities have some room for manoeuvre. But in Europe too, national competitions and strategies have been key to shaping urban development directions. The UK's Future Cities competition, mentioned above, set the scene for the development of specific smart city strategies at the level of individual cities: the national government had a role in setting the boundaries and opportunities for future smart urban development.

BRISTOL'S DATA DOME

A BIG DATA
VISUALISATION
CENTRE HOUSED
IN THE CITY'S
PLANETARIUM

POINT 3 : TECHNOLOGY IS AN ENABLER, NOT AN OBJECTIVE

The most vibrant smart eco-cities are the ones that successfully use technology, but don't focus exclusively on technological development as a single aim of policy. An example of this is the city of Bordeaux, where the city's urban development strategy included discussions with citizens and with neighbouring suburbs to establish a negotiated, joint agreement on urban development directions for the next 20-30 years.



CHALLENGES

WHAT ARE THE CHALLENGES FOR SMART ECO-CITY DEVELOPMENT IN EUROPE AND CHINA?

CHALLENGE 1 : SCALE AND INTEGRATION

In Europe, it is clear from on-the-ground research that there are many smart city and eco-city initiatives and projects in existence. However, the majority of European initiatives remain relatively small-scale. It is more difficult to detect signs of major investment or other actions directed at the larger-scale roll-out of technologies.

CHALLENGE 2 : DEFINING AIMS

Many cities, especially in Europe, heavily rely on the promotion of innovation and 'innovation ecosystems', and on support for start-ups, as ways of claiming that they are smart cities. This, however, means that there is often little sense of a clear strategy, goal or ambition with regards to smart and eco aims in a specific city. While recognising that future development is necessarily uncertain and indeterminate, it is key to develop clear visions of where a city is headed.

CHALLENGE 3 : QUESTIONING CURRENT SMART CITY BUSINESS MODELS

A lot of current smart eco-city development plans are based on economic development strategies that try to promote a 'survival of the fittest' model of economic development. These approaches, often found in the context of the promotion of high-tech start-up firms, accept and welcome high rates of business failure as the price to pay for the eventual emergence of a successful innovation or product. While this approach is very dynamic, it is only one type of model: city governments would do well to ask whether this model can be changed to suit their own needs and aims.

CHALLENGE 4 : THE IMPLEMENTATION GAP

While national governments can set the scene and direction of national urban development priorities, a key challenge remains: how to make sure that local authorities invest in national strategies while also translating these strategies into the local context. This challenge is perhaps best seen in China, where local urban authorities often act in highly entrepreneurial ways in translating the strategies developed by Beijing. Striking a balance between national aims and local context is key.

CHALLENGE 5 : FINANCE AND AMBITION

Many smart eco-city projects are currently exclusively state-funded and state-designed. There are some examples of dynamic corporations that develop and roll out innovative technologies in the city with little direct state support: see, for example, Uber or, in China, the rapidly expanding bike-sharing services in several cities. However, these are the exceptions. There still seems to be a lack of confidence, vision and perhaps ambition in developing plans for the urban future. Many cities seem content with creating business incubators and innovation spaces (such as the Amsterdam 'Makerversity' and Waag Centre) while not committing significant amounts of financial or human capital to smart eco-city projects. There is a need, therefore, to link up finance with ambitions to transform the city. This will require innovative financing arrangements, as well as innovative ways of working out strategies for the urban future.

CHALLENGE 6 : PUBLIC ENGAGEMENT

There is little evidence of a coherent model of engagement with the public in developing smart eco-city projects in Europe and China. Many smart city projects, in particular, remain largely invisible to the public, and what information is made available is highly technical. While China is often criticised for a lack of public engagement in urban development, it is clear that European cities can do a lot more to develop public engagement and more participatory approaches to urban economic and technological development.

At the same time, it must be recognised that the ambition of engaging the public more clearly may be hampered by the fact that many smart city activities are not coordinated and are very piecemeal. In the UK, for example, local promotional materials may lend apparent coherence to programmes of activities in individual UK cities. However, the projects which they describe are in fact often fragmented, short term, and reliant on short-term budgets. Bringing smart city projects more into municipalities' core set of activities may help provide a channel for engaging more closely with citizens.

CHALLENGE 7 : THE NEED FOR GREATER VISIBILITY

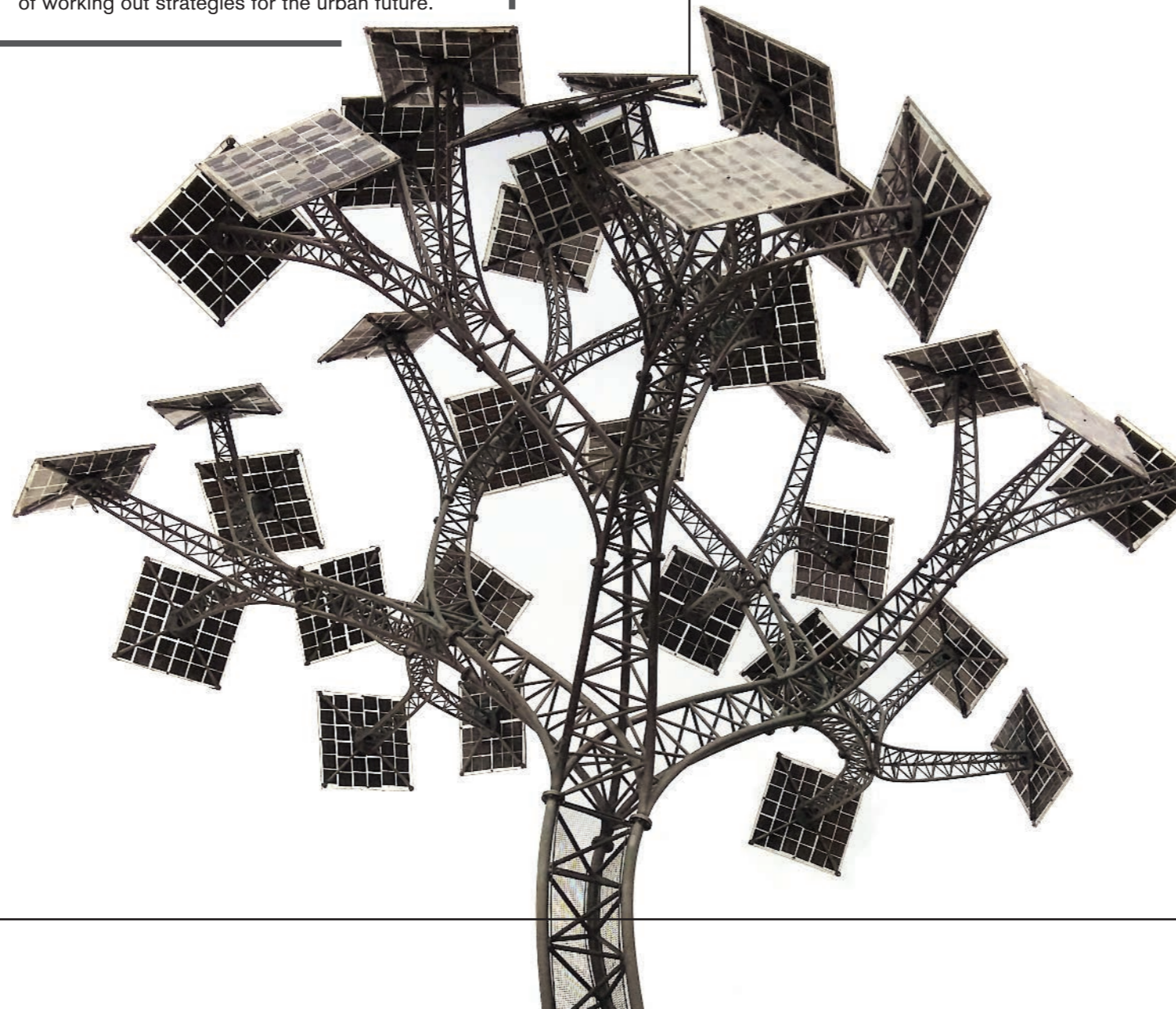
Realising the potential social, economic, and environmental benefits of smart city technology in future may depend fundamentally on public support and involvement. Currently, however, a straightforward lack of awareness is a significant barrier. Looking forwards, it seems unlikely that most citizens will engage with policies or glossy promotional materials; dedicated engagement activities, including supposedly 'grass roots'-driven ones, may only touch certain groups; there is no guarantee that 'city dashboards' will be consulted by more than a few; infrastructural upgrades may remain hidden from view. Encouraging more collective forms of deliberation and broader involvement may require particular tactics to give smart technology a higher profile in broader everyday civic life. One useful approach may be to prioritise making the smart city more visible in key public spaces, and in particular to mobilise its more 'playful' aspects. A useful example of this was Bristol's 'playable city' projects, which enabled citizens to playfully engage with smart technologies and data on Bristol's streets.

CHALLENGE 8 : RISK MANAGEMENT

Changing cities' infrastructures and governance and management systems carries with it a significant element of risk. The risks involve may be technical, resource-based, political, or security-based (as in the case of digital security). Developing a risk management and mitigation approach to the risks of developing cities' digital and ecological capabilities is key.

BRISTOL'S ENERGY TREE

A SOLAR-POWERED SMART
CITIES CHARGING POINT
AND WORK OF ART



THE SMART-ECO PROJECT: RESOURCES

FURTHER INFORMATION :

Please see the SMART-ECO project website at: www.smart-eco-cities.org

REFERENCES :

The results of our work on smart eco-cities in Europe and China over the past few years are being published in books, reports and research articles. Below, please find some of the project publications that are most relevant to this policy report.

REFERENCES : REPORTS

Several reports on smart eco-cities in the UK, the Netherlands, France, Germany and China can be found on the SMART-ECO project website at: www.smart-eco-cities.org

REFERENCES : BOOKS

Caprotti, F. (2015) *Eco-Cities and the Transition to Low Carbon Economies*. London, Palgrave.

Joss, S. (2015) *Sustainable Cities: Governing for Urban Innovation*. London, Palgrave.

REFERENCES : RESEARCH PAPERS

Caprotti, F. & Cowley, R. (2016). **Interrogating Urban Experiments**. *Urban Geography*. Advance online version: DOI:10.1080/02723638.2016.1265870

Caprotti, F., Cowley, R., Datta, A. Castán Broto, V., Gao, E., Georgeson, L., Herrick, C., Odendaal, N. & Joss, S. (2017). **The New Urban Agenda: Key Opportunities and Challenges for Policy and Practice**. *Urban Research & Practice*, 10(3): 367-378. Online version: DOI: 10.1080/17535069.2016.1275618

Cowley, R., Joss, S. & Dayot, Y. (2017). **The Smart City and its Publics: Insights from Across Six UK Cities**. *Urban Research & Practice*. Advance online version. DOI: 10.1080/17535069.2017.1293150

Joss, S., Cook, M. & Dayot, Y. (2017). **Smart Cities: Towards a New Citizenship Regime? A Discourse Analysis of the British Smart City Standard**. *Journal of Urban Technology*. Advance online version. DOI: 10.1080/10630732.2017.1336027



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