

# Executive Summary

*Urban Efficiency: A Global Survey of Building Energy Efficiency Policies in Cities* is a resource for city officials around the world as they design new policies for building energy efficiency, or review existing ones. The research should help close the evidence gap regarding city-level activity in building energy efficiency. As such, it is designed to be accessible to those working in the field in general, including researchers.

The *Urban Efficiency* report's specific objectives are:

- to begin to capture the range of different policies being implemented in cities around the world;
- to obtain detailed information on the necessary conditions, opportunities and potential challenges when introducing and implementing such initiatives; and
- to analyse what approaches have been successful in which context and why.

This research is not an exhaustive study of all cities promoting building energy efficiency policies. Instead, it focuses on a readily available selection of pioneering cities that are active members of the C40 Cities Climate Leadership Group's Private Building Efficiency Network. C40 is a unique coalition of large cities around the world committed to addressing climate change locally and globally. Within the C40 are smaller working groups – or networks – of cities focused on specific topics.

A combination of methods was used to produce this research: literature review, written questionnaires, semi-structured telephone interviews and analysis of key documents. The report is organised into chapters focusing on broader trends followed by specific city case studies.

**Chapter 1, 'A macro view of city-level policies'**, provides an overview of global trends in building energy efficiency among C40 cities, illustrated with findings from C40's landmark research report, *Climate Action in Megacities 2.0*.

**Chapter 2, 'Objectives and methodology'**, sets out more detail regarding the rationale of this research, and how it was executed.

**Chapter 3, 'Policy maps and global trends'**, identifies global trends in city-led initiatives for building energy efficiency as highlighted in case studies from Chicago, Hong Kong, Houston, Johannesburg, London, Melbourne, New York City, Philadelphia, Portland, San Francisco,

Seattle, Singapore, Stockholm, Sydney, Tokyo, and Toronto. Twelve ‘policy elements’ are documented in two policy maps, one for new buildings and one for existing buildings. See **Table 3.1** *Definition of policy elements* for more information. The key conclusions are as follows:

### **Building energy codes**

Many cities around the world develop their own codes for new buildings and major renovations that are broader or more stringent than national or state codes. In the US, for example, some cities set codes that are stricter or wider in scope than the state codes. Australian cities follow state codes, while European cities implement the national energy codes required by European Union (EU) directive requirements or stricter energy codes. For instance, when building on city-owned land, Stockholm applies stricter energy codes through civil contracts between the City and the builders. In Japan, as the national code has yet to be mandated, Tokyo has its own more ambitious requirement of submitting a plan with minimum energy efficiency performance specifications for large facilities. Energy code application and enforcement is still rare for existing buildings, with the exception of those undergoing major renovations. However, some cities set minimum standards for building equipment to help bridge the gap.

### **Reporting and benchmarking of energy performance data**

Reporting and benchmarking is a rather new but increasingly popular area of activity in city programmes, with the majority of initiatives targeting large buildings. Disclosure policies vary from city to city. A number of US cities are implementing reporting and benchmarking legislation, whereas Tokyo is undertaking reporting efforts aimed at smaller buildings on top of mandatory reporting required of large buildings under its Emissions Trading Scheme. In European cities, Energy Performance Certificates required by EU directives are playing a similar role. Some cities are also encouraging benchmarking without reporting obligations.

### **Mandatory auditing and retro-commissioning**

Many cities require periodic auditing and/or retro-commissioning every three to ten years, mainly for large commercial buildings (with some exceptions). The coverage varies from an exclusive focus on the building cooling systems to one that addresses the entire building, including both tenant and common areas. It is noteworthy that audits and retro-commissioning are often mandated along with reporting and benchmarking schemes.

### **Emissions trading schemes**

The pioneering emissions trading scheme in Tokyo is a mandatory cap-and-trade programme with an emissions reduction target. Tokyo's cap-and-trade scheme is unique in that it was developed by and is managed by the city, being focused on buildings<sup>1</sup>.

### **Green building rating and energy performance labelling**

A number of cities incorporate green building and energy performance standards into planning or permitting processes, adopt them as prerequisite for financial or non-financial incentives, and utilise them in the design of new developments or the renovation of municipal buildings.

### **Financial incentives**

Although financial incentives for energy efficiency in new buildings are rare, many cities operate schemes focused on existing buildings, with a wide array of choices offered from city governments or national or state agencies. Additionally, utilities often provide energy efficiency grants and rebates, sometimes in response to regulation.

### **Non-financial incentives**

Common forms of non-financial incentives include an expedited permit process and allowances for extra floor area in the case of new green building developments. As a further trend, cities often use existing green building certifications as a criteria for minimum levels of energy efficiency.

### **Awareness raising programmes**

Apart from extensive online information focused on green buildings, energy efficient operations or energy efficiency retrofits, many cities offer information via free or subsidised energy audits or assessments, guidebooks or seminars. Also, many US cities have developed 'weatherization' programmes targeting low-income households, which cover not only low-cost weatherization improvements to the building envelope but also heating, cooling and electrical system upgrades and appliances.

### **Promoting green leases**

Some cities promote green leases to tackle the split incentive problems separating

<sup>1</sup> Since 2013, some Chinese cities not surveyed in this report have been targeting buildings (amongst other sectors) through pilot emissions trading schemes.

building owners and tenants. The standard approach of cities has been to promote toolkits that recommend certain green lease provisions in order to improve the environmental performance of the building.

### **Voluntary leadership programmes**

Cities encourage voluntary action amongst city businesses and residents in a wide variety of ways, including voluntary design guidelines, flagship development projects, friendly competitions, and voluntary projects developed in partnership with the commercial or residential sector. Competitions and voluntary projects are often coupled with energy assessments or recommendations and advice on available financial incentives. Participants are expected to lead by example and share their experiences with the wider public.

### **Government leadership**

City governments can also lead by example, and many are. The most common approach includes requiring compliance with green building standards for the construction or renovation of government buildings. The disclosure of energy performance data from government buildings is also occurring in several leading cities. In addition, cities are using municipal buildings as testing sites for innovative technology, inviting industry to trial new green building technology on city buildings before marketing it more broadly.

### **Other**

Cities are engaged in a number of other initiatives related to building energy efficiency, such as the demarcation of low-carbon zones, the promotion of energy services companies (ESCOs), and the development of Better Buildings Partnerships. These have been grouped together in their own category because they were only recently developed, are rare, or represent more of a coordination role rather than active implementation role for cities.

**Chapter 4, ‘Experiences from Frontrunner Cities’**, presents detailed case studies from ten pioneering C40 cities implementing various kinds of programmes to drive energy efficiency and sustainability in existing commercial and residential buildings. The cities and programmes are:

Hong Kong: *Buildings Energy Efficiency Ordinance (BEEO)*

Houston: *Houston Green Office Challenge (HGOC)*

Melbourne: *1200 Buildings programme*

New York City: *Mandatory benchmarking scheme*

*in the Greener, Greater Buildings Plan*

Philadelphia: *Building Energy Benchmarking Ordinance*

San Francisco: *Existing Commercial Buildings Energy Performance Ordinance*

Seattle: *The Seattle Building Energy Benchmarking and Reporting Program*

Singapore: *Existing Buildings Legislation*

Sydney: *Smart Green Apartments programme*

Tokyo: *Tokyo Cap-and-Trade Program*

More detail on elements of the programmes surveyed appears in **Table 3.1, *List of programmes surveyed***. Each case study focuses on one key programme from each city, and includes the following details:

- Programme context: key components of the programme and its relevance to localised challenges, existing climate and building targets, and other initiatives;
- Inputs for the programme: the process by which it was designed and implemented, including timeframes, resources, background research and stakeholder engagement;
- Programme results: results and impacts on the retrofit market and greenhouse gas emissions, etc.;
- Lessons learned: successes and challenges encountered in the design and implementation phases;
- Reference list.

Chapter 4 then offers an overall analysis of the key characteristics and trends emerging from the various individual cases, also extracting key lessons on common success factors and challenges encountered. Many of the ten detailed case studies focus on new initiatives targeting large buildings in the commercial sector. Some have identified programme impacts on energy consumption and greenhouse gas emissions, the retrofit or energy efficient building market, or on awareness or capacity building, but most cities note that it is too early to see definitive programme results. Based on experiences to date, the key conclusions are as follows:

**Success factors reported**

The most widely reported key success factor is (1) stakeholder engagement, which was cited by almost all cities. Other important factors include (2) partner support, from key industry groups or utilities, for example; (3) buy-in and recognition from mayors and elected officials; (4) flexibility in the implementation timeframe; (5) uptake of targeted strategies for different segments; and (6) well-designed linkages between regulatory and voluntary programmes and financial incentives or capacity

building efforts.

As for stakeholder engagement, the participation of industry, civil society, academia and other government bodies during programme design and implementation was crucial for the success of virtually all initiatives. Stakeholder engagement allows for early identification of the needs and concerns of affected communities, which can be incorporated into programme design. This also allows for an early assessment of a proposed programme's feasibility, in addition to forging cooperative relationships with key industry players that can drive general acceptance of programmes and compliance with regulations during implementation.

### **Key challenges being faced**

Major difficulties noted by cities in the development and implementation of their energy efficiency programmes include: (1) moving from a focus on compliance with reporting regulations to an understanding of programme outputs such as energy use data; (2) data management in terms of accuracy and access to aggregated data for reporting programmes; (3) limited city staff capacity to implement programmes; (4) outreach and marketing of programmes; and (5) tenant engagement.

There is consensus that efforts are needed to shift building owners from merely complying with reporting requirements to appreciating the value of energy efficiency data and action, although the high levels of compliance with regulatory programmes generated by marketing and outreach efforts should not be dismissed. Continued stakeholder and public education is key to increasing broader public awareness about the benefits of improving building energy efficiency in order to influence broader market trends. Auditing and retro-commissioning, reporting, benchmarking and public or partial disclosure of benchmarking results can play key roles here, while voluntary efforts such as competitions, private leadership programmes or awareness raising programmes serve as excellent opportunities for increasing stakeholder knowledge of the benefits of building energy efficiency.

### **Future perspectives**

The wealth of experiences outlined in the ten case studies offer important insights into forthcoming challenges and opportunities for building energy efficiency. For example, cities with reporting and benchmarking programmes are considering how and if to publicly disclose this data to help influence the market. Experience suggests that a phased approach to public disclosure is key. Further efforts are needed to raise awareness amongst building owners and industry groups of the

value of benchmarking data and audit results.

Cities have noted that different strategies are required for targeting smaller buildings and many have developed specific programmes for this sector. One approach is to provide financial incentives and support to facilitate energy use reporting and retrofits of small and medium enterprises. Another approach is to encourage voluntary action through friendly competitions. Regulatory measures have also been successful, particularly those focused on gaining recognition for energy efficiency efforts through public disclosure.

Tenant engagement is one of the largest challenges that cities are facing and a number of cities have developed innovative strategies for overcoming the split incentive problem. City initiatives include development of an energy efficiency master plan, financial incentives, promotion of green leases, award programmes, and obligations for large tenants to report their energy use data and to cooperate with building owners.

**Chapter 5, 'Conclusions'**, reflects on the original objectives of the research. Initial feedback suggests that this research will be a valuable resource and the policy maps and hyperlinked matrix of programmes in **Appendix 2**, which synthesise vast amounts of information about policies in 16 cities, will be helpful tools for cities. *Urban Efficiency* is certainly not an exhaustive study and the selection of cities was limited. Data on programme inputs such as budgets and on evaluated impacts in general were difficult to capture. However, this report provides a foundation for future investigations, both in terms of the theoretical framework it sets out (the policy maps) and also in the policies it has documented (the case studies). Future research could build on this by increasing the number of cities, the range of policy elements, and the geographic scope of cities studied, which would build up a database of policies and also allow the theoretical framework of policy elements to be tested and refined. In particular, this piece of research could be extended and enhanced by a more detailed investigation into how cities identify and calculate the impacts of their building energy efficiency policies.

There is still work to be done to recognise and analyse the building energy efficiency policies that cities are implementing all around the world. *Urban Efficiency* makes an important contribution to this effort, showcasing the building energy efficiency programmes of leading global cities.

*November 2014 (updated May 2015)*