



# Energy and Economic Growth

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**Abstract:**

This paper addresses the role of governance of urban areas in shaping energy use in LICs and MICs, from the perspective of the poorest and disadvantaged. Urban dwellers in LICs and MICs often access electricity through irregular, patchy and informal connections which are frequently considered illegal. This situation is closely linked to how urban areas develop in LICs and MICs, often with weak urban governance and little control, resulting in what is termed 'informal settlements' and slums. Studies of urban infrastructure in LICs and MICs have tended to concentrate on water and sanitation networks, with comparatively very limited attention being paid to access to electricity. The paper reviews the literature that exists on access to electricity in urban areas in the Global South, and draws on experiences in other urban infrastructures that may provide lessons towards improving such access for the poorest and disadvantaged.

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## **Powering the City in the Global South: Increasing Energy Access for all in a Context of Urbanisation and Changing Governance**

**Harry Smith, Marco Lorusso, and Fionn MacKillop**

### **EEG State-of-Knowledge Paper Series**

**Oxford Policy Management  
Center for Effective Global Action  
Energy Institute @ Haas**



**Oxford Policy Management**



The Applied Research Programme on Energy and Economic Growth (EEG) is led by Oxford Policy Management in partnership with the Center for Effective Global Action and the Energy Institute @ Haas at the University of California, Berkeley. The programme is funded by the UK Government, through UK Aid. Over the course of five years, EEG will commission rigorous research exploring the links between energy economic growth, and poverty reduction in low-income countries. This evidence will be specifically geared to meet the needs of decision makers and enable the development of large-scale energy systems that support sustainable, inclusive growth in low income countries in South Asia and Sub-Saharan Africa.

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# Powering the city in the Global South: Increasing energy access for all in a context of urbanisation and changing urban governance

(Originally proposed title: 'Municipal reforms, urbanisation, land use and energy access')

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## Introduction

This paper addresses the role of governance of urban areas in shaping energy use in low-income countries (LICs) and middle-income countries (MICs). Focusing on the urban context, and taking the perspective of how the poorest and disadvantaged access energy, this paper seeks to answer the following research questions:

1. What have been the historical experiences in successful cities/in LIC–MIC transition countries? Is there a menu or mix of options for cities with constrained supplies? How can this energy provision be delivered to the poorest and disadvantaged?
2. What are the legal, institutional and coordination arrangements needed to scale up energy efficiency in developing countries, and ensure energy access in urban contexts, and at what level (national, regional, municipalities)? What are the barriers including from a political economy perspective?
3. What is the role of municipality reforms and decentralisation in ensuring energy efficiency and energy access? City planning could also play an important role; are there case study examples that are replicable in the sub-Saharan context?

The key issue this paper engages with is what the state of knowledge is in relation to how to ensure energy access in urban areas in LICs and MICs, with some reflections also on energy efficiency. It does so with a focus on electricity, which was predetermined in the overarching theme this paper responds to: electricity supply and energy efficiency measures in supporting sustainable urbanisation. It does, however, engage to a limited extent with other forms of energy where relevant, although not with energy requirements for transport.

Definitions used in assessments of the levels of energy access have tended to be based on certain indicators. Typically, these are: access to electricity, measured as the percentage of people that have a household electricity connection for powering appliances and light; access to modern fuels for cooking (and heating), including electricity, liquid fuels and gaseous fuels; and access to mechanical power, normally linked to productive activities (United Nations Development Programme (UNDP)/World Health Organization (WHO), 2009; Pachauri *et al.*, 2012). However, it is acknowledged that understanding energy access is much more complex than simply percentages of people with connections to electricity supply, etc. There are additional factors to take into account such as the quality and quantity of energy provided (reliability, quality and adequacy), the type of energy supply (e.g. grid-connected or off-grid electricity), the services provided by energy end-use appliances and equipment, and the socio-economic profile of energy users and energy affordability (UNDP/WHO, 2009; Pachauri *et al.*, 2012). Sovacool and Drupady (2012) highlight that 'energy poverty', understood as lack of access to electricity and dependence on solid biomass fuels for cooking and heating, has received comparatively little attention in energy planning discussions and academic publications until recent years despite it being a global problem – 1.4 billion people did not have access to electricity in 2009.

Although this paper focuses mostly on access to electricity, it is acknowledged that improving access to modern fuels for cooking is still a priority for low-income urban households particularly in India and sub-Saharan Africa (SSA) – nearly 60% of urban households in the latter still used traditional biomass for cooking in 2009 – and that the fact that very few developing countries have set targets for

improving access to modern cooking fuels and improved cookstoves is an area of concern (International Energy Agency (IEA) *et al.*, 2010).

According to IEA, by 2030 urban populations will account for around 75% of global energy demand, with non-OECD countries accounting for 80% of the projected increased demand above 2006 levels. In many parts of urban areas in LICs and MICs, residents and local businesses often access electricity through irregular, patchy and informal connections that are frequently considered illegal, in contrast to other areas where electricity supply is of good quality, reflecting the gross inequalities and failure of the state to provide a regular connection to the poor. The latter often rely on connections that tend to be undersized, with constant voltage variations and frequent supply interruptions. The consequences of this include damaged domestic appliances and hazards such as fires, etc. (Luque-Ayala and Silver, 2016), as well as disruption to domestic life and livelihood-supporting activities. This situation is closely linked to how urban areas have been developing, and continue to develop, in LICs and MICs, often with weak urban governance and little control over urban development, resulting in what is termed 'informal settlements', as well as slums (the two not being coterminous). Studies of urban infrastructure in LICs and MICs have tended to concentrate on water and sanitation networks, with comparatively very limited attention being paid to access to electricity. In particular, given the central contribution of energy production, distribution flows, management and use to nearly all aspects of urban functioning and urban metabolism, the extent to which this has, until recently, been under-researched in the urban studies field is surprising. This paper reviews the literature that does exist on access to electricity in urban areas in the Global South, and also draws on experiences in other urban infrastructures that may provide lessons for improving such access for the poorest and disadvantaged.

In relation to the key questions set out above, the literature review suggests that:

1. There are clear positive correlations between national GDP and urban populations' access to electricity and modern fuels for cooking. Cities that are successful in providing energy to high percentages of their population therefore tend to be in successful economies, but important factors particularly in MICs and LICs are also institutional capacity and political will. Cities with constrained supplies display a variety of mixes of options that vary depending on geographic contexts and historical path dependencies. These mixes of options have been considerably expanded through experimentation in transitioning to sustainable low-carbon economies, becoming more diverse. Prerequisites for the poorest and disadvantaged to benefit from these include political and formal recognition of their living conditions and dwelling places, as well as facilitation of community involvement in addressing energy access and energy efficiency.
2. Key institutional arrangements required to ensure energy access in urban areas in developing countries include the recognition of informal settlements and putting in place policies, programmes and mechanisms that ensure closer coordination between the different service and infrastructure agencies involved in urban management as a whole, and in upgrading of informal settlements and slums in particular. In addition, this offers opportunities to improve energy efficiency. Barriers at this level include: lack of political and/or institutional willingness to recognise non-formal parts of the city (with all their related location-specific problems); lack of proper planning, coordination and cooperation between the institutions involved; lack of policies, plans and programmes that consider energy efficiency in low-income households; affordability and funding; trust between institutions and low-income populations; and lack of awareness.
3. The role of urban administrations in ensuring energy access has been growing in parallel with decentralisation but without sufficient devolution of resources and strengthening of institutional capacity at the local level. There is a need to strengthen capacity at the urban level, including from local administration all the way down to community, as well as to

strengthen links between the local level and higher levels such as provincial and national, and cross-departmental including city planning, which by its nature engages across sectors. This, together with developing technology and stronger exploration of the socio-institutional aspects of distributed and renewable generation systems, offers scope to improve urban energy efficiency and energy access for all, as well as to improve urban energy efficiency.

The paper arrives at the preceding conclusions through exploring in sequence the literature on three topics related to the above:

- empirical evidence on how the urban poor and disadvantaged access electricity in LICs and MICs;
- the recent evolution of urban governance in LICs and MICs and its interaction with electricity distribution; and
- experiences in improving access to electricity, and lessons from successful provision of other urban infrastructure.

### **Empirical evidence on how the urban poor and disadvantaged access electricity in LICs and MICs**

This section describes how land and shelter are accessed by urban dwellers and the implications of this for their access to energy. It focuses particularly on so-called informal settlements – which increasingly account for urban growth in LICs and MICs, especially in SSA – and on how access to services including electricity is achieved as part of such informal urban development processes.

The level of access to electricity in urban areas tends to be higher than to other services. For example, 720 million urban residents do not have access to a piped water supply (UN-Habitat, 2015b), whereas 131 million urban residents do not have access to electricity (World Development Indicators 2015). In addition, access to electricity happens at a much faster rate in urban areas than in rural areas, because energy companies are often required to provide electricity services in urban areas and it is more profitable to do so than in rural areas (IEA *et al.*, 2010). However, it has been found that while ‘poverty alleviation and urban development policies have a component on urban poverty that aims at provision of basic needs services like housing, water supply etc. to the urban poor... clean energy is not recognised as a basic urban service in these policies’ (Global Network on Energy for Sustainable Development (GNESD), 2014: 6), though it is included sometimes in slum-upgrading projects. In addition, ‘electricity distribution companies do not expand the capacity of the distribution grids, in response to the rising population in the slums, improvements in income levels and the subsequent increase in electricity consumption per household’ (GNESD, 2014: 20), thus leading to major power interruptions and lowered quality of service.

While data on energy production and consumption are available across the world, UNDP/WHO (2009) noted the insufficient information on energy access, particularly among the poor, and set out to address this gap particularly for the least-developed countries (LDCs) and SSA. It found that while only 10% of the urban population in developing countries did not have access to electricity, this figure rose to 56% for LDCs and 46% for SSA. In comparison, for rural areas such figures were 41%, 87% and 89% respectively (UNDP/WHO, 2009: 12). More recent figures indicate an increase in urban electrification in SSA, at 68.8% (IEA, 2014), although this region is experiencing the fastest rate of urbanisation, with significant urban service shortfalls and high poverty rates (Silver and Marvin, 2016). Clear positive correlations between national GDP and urban populations’ access to electricity and modern fuels for cooking have been found, thus highlighting the close link between access to energy and economic development (UNDP/WHO, 2009; Global Energy Assessment (GEA), 2012).

However, there is great diversity in access to energy within urban areas, which is very poorly documented in statistical terms in LICs and MICs. Drawing on several sources, GEA (2012: 1340) provides a useful classification of housing submarkets used by low-income dwellers and their energy-

use implications. This ranges from households living in rented rooms in tenements, often with electricity available but usually too expensive to use for cooking and space heating, to pavement dwellers on very low incomes and consequently demonstrating very low fuel use. This categorisation includes urban dwellers in two types of informal settlements: squatter settlements where there is usually reliance on dirtier fuels and lack of electricity, to a higher degree in LICs than in MICs; and housing in illegal subdivisions, with better provision of infrastructure including electricity. Energy networks emerge around flows of energy sources including electricity, charcoal, firewood, gas and so forth, which are 'vital to sustaining the everyday urban life of sub-Saharan Africa' (Silver and Marvin, 2016: 3) and other developing regions.

In LICs and MICs, much urban expansion takes place through such 'informal' means (i.e. not through the established regulatory channels regarding land ownership and subdivision or planning and building standards). According to UN-Habitat (2015a: 1), 'Slums are the most deprived and excluded form of informal settlements characterised by poverty and large agglomerations of dilapidated housing often located in the most hazardous urban land'. The proportion of urban populations residing in slums varies across LICs and MICs, ranging from 61.7% average across Africa, through 30% in Asia, to at least 24% in the Latin America and Caribbean region (UN-Habitat, 2015a). The prediction is that by 2020 the world's slum population will reach 889 million people (UN-Habitat 2008). The terms 'informal settlements' and 'slums' encompass a variety of forms of access to land and shelter, with varying implications for access to services including electricity. Informal settlements range from land invasion (which can be spontaneous or organised) through to illegal subdivisions by landowners, and include 'customary' forms of managing and developing land usually linked to rural traditions and social structures such as in SSA (Jenkins, 2004; Jenkins, Smith and Wang, 2007; Gouverneur, 2016). Slums, on the other hand, may include 'formal' settlements that have degraded physical and environmental conditions, as well as social problems.

Although according to the UN-Habitat definition informal settlements 'usually lack, or are cut off from, basic services and city infrastructure' (UN-Habitat, 2015a: 1), again there is a range of possible conditions with regard to accessing services. Research (e.g. Smith 1999) has shown that provision of services in these areas tends to be incremental, often with self-produced and 'clandestine' forms of access to water, sanitation and electricity being put in place through a combination of community leader, community organisation and individuals' actions, with 'formal' provision coming later as a result of community lobbying or governmental initiatives. While provision of certain services is awaited, residents often find themselves in a position of having to pay for these at above standard prices (e.g. having to pay for water provided by vendors) or living in inadequate and potentially health-threatening conditions (e.g. when potable water and appropriate sanitation are lacking). This in many ways exacerbates the condition of poverty many urban dwellers find themselves in. As with other services, in informal settlements the means of connection to electricity supply ranges from individual clandestine connections, through community meters as a result of community-led negotiations, through to standard individual formal connections (Smith, 1999; Criqui and Zérah, 2015). It has been found that unmetered and unregulated informal connections can lead to high consumption patterns, such as has been seen in the favelas of São Paulo (Luque-Ayala, 2016). The specific processes whereby informal settlement residents access electricity vary from country to country and from city to city, depending on local socio-economic, institutional and even political structures. Lipu *et al.* (2016), for example, have documented how in four case study urban slums in Dhaka City (Bangladesh), local leaders take responsibility for the provision of shared and/or pole electric meters, for which slum dwellers may pay based either an agreed sum or on equipment type and duration of use, the latter being the predominant form of payment. The same study showed that firewood is the primary fuel used for cooking, followed by natural gas (depending on access to connections), with some slum households using residues, leaves and branches, and none using LPG (Lipu *et al.*, 2016).

The GNESD highlighted the wide gap in understanding of the urban poor's access to clean energy, and contributed to addressing this gap by identifying barriers to energy access by this sector of the population in case study countries including Argentina, Brazil, India, Kenya, Senegal, South Africa and Thailand (GNESD, 2014; Singh *et al.*, 2015). In terms of supply barriers, based on interviews with suppliers, GNESD identified the following barriers to access to electricity in the study areas: lack of tenureship and location-specific barriers; lack of proper planning and coordination at the institutional level; and lack of policies, plans and programmes that consider energy efficiency in low-income households. In terms of demand barriers, based on household surveys the main barriers to access to electricity in the study areas were: lack of affordability; lack of trust toward authorities; and lack of awareness on energy-efficiency practices and government programmes and subsidy policies. Regarding access to LPG, the identified supply barriers were: lack of proof of address; safety hazards related to lack of compliance with standards; and inefficient supply and distribution. Finally, demand barriers related to access to LPG included: lack of affordability; perceived and real safety hazards; low quality of service; and lack of willingness to shift from traditional cooking fuels (GNESD, 2014; Singh *et al.*, 2015). GEA (2012: 1346) highlights that: 'The constraints on supporting the shift to clean fuels and providing all urban households with electricity are less in energy policy and far more in government policy and daily practice in regard to those who live in informal settlements and work in the informal economy.' GEA (2012) goes on to state that clean energy and electricity reaches urban poor groups where relationships between local government and informal settlement residents are not antagonistic, with public support for slum and informal settlement upgrading.

Electricity distribution companies are often the first utilities to provide formal services in informal settlements (Criqui and Zérah, 2015). However, '[p]ower distribution utilities are sometimes hesitant to operate in these communities due to the potential of non-payment of bills, electricity theft, and the additional costs and risks of working in areas outside of planned urban environments' (World Bank/ Energy Sector Management Assistance Program (ESMAP), n.d.). As an example we can mention the case of Delhi (Criqui and Zérah, 2015), where the three private distribution companies commissioned to distribute electricity to the city have extended coverage to officially 99% of the city, but have: a) used a varied range of technical tools to address particular issues, such as maintaining safe distances between high-tension lines and homes in dense irregular neighbourhoods; b) responded differently to social concerns in poorer neighbourhoods; and (c) applied distinctive internal management choices and corporate cultures ranging from a positive 'people factor' and empowerment approach to disapproving bourgeois approaches to informal settlements.

Providing access to energy to the urban poor is not the only issue in LICs and MICs, as there are also growing middle classes intensifying energy usage, which pose a challenge to energy generation and supply (Silver and Marvin, 2016). Indeed, the twentieth-century ideal of universal access to electricity is far from being reached in urban areas, which are increasingly fragmented or 'splintered' through parallel socio-technical and socio-political processes (e.g. the rise of neoliberalism and gradual death of the 'modern infrastructural ideal' of universal, affordable networked systems/services for the majority or all the population). These have involved the increasing connection of favoured and powerful socio-economic groups (known as 'cherry-picking') and the constitution of 'premium networked spaces' (i.e. socio-technical and socio-political enclaving) in urban technical networks, bypassing less favoured and less powerful groups (Graham and Marvin, 2001). In LICs and MICs in particular, cities 'have always been characterised by fragmented urban fabrics and infrastructures in a permanent state of disrepair and improvisation' (Luque-Ayala and Silver, 2016) as the modern infrastructural ideal was never rolled out in these locales, in contrast with Global North cities. Luque-Ayala and Silver (2016) highlight that the multiplicity of formal and informal electricity provision mechanisms, which create 'islands' of networked supply, are the result of socio-political processes and decisions involving a variety of interest groups (see, for example, MacKillop (2005) and MacKillop and Boudreau (2008) for a historical analysis and discussion of the role of municipal 'oligarchies' and

'urban regimes' in the rolling out of urban technical networks and associated issues of poor/non-coverage of certain social groups). The tensions and complexities in relationships among these groups are much more difficult to address than technical issues such as installing infrastructure in order to achieve just and equitable infrastructure provision (McFarlane and Rutherford, 2008, cited in Luque-Ayala and Silver, 2016). Understanding these relationships is essential to be able to respond in an effective way. Gandy (2006), for example, demonstrates the importance of applying a historical perspective in order to understand how structural factors during both the colonial and post-colonial periods have led to the worsening infrastructure crisis in Lagos, Nigeria.

With regard to how this fragmentation affects the urban poor, Pilo' (2016a) reports that in Rio de Janeiro electricity supply from the local electricity distribution company (Light) is divided into 'electrical sectors' – i.e. geographic areas – among which there is great variability in quality of service, for example in terms of maximum number of hours without supply allowed. The quality level allocated to the sectors covering *favelas* is closer to that observed in rural areas and on the periphery of Rio than in other areas of the city (Pilo', 2016a). However, providing more universal service does not necessarily benefit the poor if this is linked to cost recovery. For example, Duque Gómez and Jaglin (2016) have documented the experience of poor households who had been transferred from informal settlements and other more precarious living conditions to state-built housing estates in Medellín, Colombia, where they felt increased economic pressure because of going from situations where they paid no or only small fees for electricity to a situation where the regular payment of utility bills led some households to have to prioritise these over food.

In summary, although the urban poor in LICs and MICs tend to be comparatively better provided with electricity than with other services, such provision tends to present a multiplicity of problems in relation to quality and reliability for the consumers, and in relation to theft and losses for utilities. In addition, territorial differences in electricity distribution exacerbate urban fragmentation and inequalities. Against this background, there is evidence that where relationships between local government and informal settlement residents are not antagonistic, and where there is public support for slum and informal settlement upgrading, clean energy and electricity reaches urban poor groups.

### **Urban governance in LICs and MICs and its interaction with electricity distribution**

This section reviews the main recent trends in urban governance in LICs and MICs, exploring the implications of these for electricity distribution and access to electricity across the entire urban area, and by the urban poor and disadvantaged in particular. The latter is approached through looking at *urban energy governance*, as described by Rutherford and Jaglin (2015). The section focuses not only on the municipal level of urban governance but also on the various levels of government (municipal, provincial, state, central) and their interactions. Of course, the impact of each of these levels on electricity supply, distribution and widening of access to electricity will vary from country to country, depending on the wider governance and institutional arrangements.

Since the 1980s and 1990s, there has been a shift from 'government' to 'governance' that has affected the delivery of urban services. Moretto (2014: 31–36) traces the evolution of public responsibility for social services such as health, education, water and sanitation. Her study dates direct public ownership or state management becoming the norm from the 1930s to 1950s in Europe and Latin America and from the 1950s and 1960s in South Asia and Africa (citing Batley and Larbi, 2004). She notes, however, how the public sector in many of the LICs and MICs was unable to maintain and efficiently manage the infrastructure network, thus resulting in production and service provision shortages. Two waves of structural adjustment programmes from the 1980s, promoted by the World Bank and the International Monetary Fund, and geared toward urban productivity and efficiency, have underpinned a shift from government as 'provider' to government as 'enabler' (Jenkins, Smith and Wang, 2007). This opened up the involvement of a wider range of stakeholders in the actual delivery of formal urban

services, as well as, to some extent, increasing recognition of other forms of delivery that may be termed 'informal'. In the formal system, the transition from government to governance in countries in the LICs and MICs has included: (a) decentralisation of service provision from national to local governments; (b) the New Public Management approach to service delivery applying private sector approaches in the public sector; (c) privatisation of service delivery; and (d) public-private partnerships (Jenkins, Smith and Wang 2007).

More recently there has been increasing interest in the literature, and to an extent in policy, in the concept of co-production, which 'consists of citizen involvement or participation (rather than bureaucratic responsiveness) in the delivery of urban services' (Brudney and England 1983: 63). This stems from the emergence and evolution over the last few decades of the concepts of 'community involvement' and 'governance' in the production and management of the built environment. With reference to the notion of governance, Devas *et al.* (2001: 5–6) highlighted that it 'includes the whole range of actors within civil society, such as community-based or grassroots organizations, NGOs, trade unions, religious organizations and businesses, both formal and informal, alongside the various branches of government and governmental agencies, both national and local'. Since the 1970s there has been advocacy for community involvement in the provision and management of shelter and human settlements, including key pioneering author and lobbyist John F.C. Turner (1967, 1968, 1976), whose work influenced international agency shelter policies in the 1970s and 1980s, bringing about the *sites-and-services* and *informal settlement upgrading* approaches to producing and/or improving low-income urban residential areas (Jenkins, Smith and Wang, 2007). More recently, there has been a revival of the concept of 'co-production', which was originally developed in the 1970s as 'an alternative response to policy recommendations promoting strong centralisation for public service delivery and to the necessity of reducing state expenditures' (Moretto, 2014: 45). Building on Brudney and England's definition above, Ostrom (1996: 1073) notes that 'co-production implies that citizens can play an active role in producing public goods and services of consequence to them'. Within this concept, a specific form of co-production is 'institutionalised co-production', which brings together community and state organisations in service delivery. According to Moretto (2014: 47), "Institutionalised co-production" concentrates thus on new forms of democratic governance and shared decision-making in which power, authority and control are redistributed between government agencies and citizens'.

So, how does this relate specifically to the provision and distribution of electricity in urban areas in LICs and MICs? It is noteworthy that many of the published studies on the above trends and processes, insofar as they relate to urban services, focus on water, sanitation and waste disposal (also for the very good reason that these give the biggest return in terms of increasing public health and limiting spread of infectious diseases), with comparatively very limited attention to electricity (and energy in general). Rutherford and Coutard (2014: 1357), reflecting on a survey of publications on energy in urban studies journals and on cities in energy studies, note that:

Urban sustainability policies are being implemented on the basis of an insufficiently robust research base about energy use and planning. And given the central contribution of energy production, distribution flows, management and use to nearly all aspects of urban functioning and urban metabolism, it remains highly surprising the extent to which this has, until recently, been under-researched in the urban studies field.

The explanation Rutherford and Coutard (2014) offer is that the production and supply of electricity is seldom a competency of urban actors and local authorities, despite cities being major energy consumers, but rather of other actors that see cities simply as supply end points (a top-down, centralised approach typical of Fordism, and illustrative of the path-dependency of socio-technical approaches to networked systems). However, after a long period of increasing integration of initially locally controlled gas and electricity utilities to ever-larger national systems during the twentieth

century, in recent decades there has been an increasing re-engagement of local authorities in energy policy matters, focusing on land use planning and building regulations, energy conservation policies, market or behaviour change programmes, and support for technical innovations – if not necessarily getting involved in actual energy supply (Hammer *et al.*, 2011). Nevertheless, energy policy competencies and regulatory control powers still tend to sit with state- or national-level authorities, and a central issue is ‘to what extent it is possible for urban governance actors to develop energy-related priorities and interventions when they are often not part of the formalised, socio-political organisation of the wider energy system’ (Silver and Marvin, 2016: 2). It is important to remember that such centralisation of energy supply infrastructure was part of the political projects of modernisation and consolidation of national states (Bridge *et al.* 2013), very visibly so across the nation states that emerged following decolonisation. The ‘territoriality’ of energy infrastructure therefore has a political dimension, and the level of centralisation and connectivity of energy networks cannot be seen independently from the configuration of actual political power. Energy is typically scaled as a national issue because no government wants to risk the domestic political consequences of a failure in supply – ‘keeping the lights on’ is a powerful political imperative (Bridge *et al.*, 2013). After a couple of decades of widespread political decentralisation of government responsibilities across many parts of the developing world without concomitant decentralisation of resources, many municipalities lack the capacity and the resources to engage in energy planning, implementation and technology development (Silver and Marvin, 2016). This notwithstanding, there are examples of municipal ownership of energy utilities around the world. In addition, in recent years there have been significant changes in the ownership and operation of urban energy systems, with supply and distribution being separated as part of energy market liberalisation (Hammer *et al.*, 2011) Graham and Marvin (2001) see this as a process of ‘unbundling’ of infrastructure and service provision, typical of, and prerequisite to, advancement of a neo-liberal approach to networked service provision, especially the elimination of cross-subsidies — often favourable to the poorest — and full cost recovery. Against this background, there has been an increasing role for ‘informal energy networks, heterogeneous configurations and unintegrated systems in meeting energy requirements’ (Silver and Marvin, 2016).

Rutherford and Coutard (2014) identify a growing literature on energy in urban studies that has contributed to recognition of: a) the mutual influence between energy provision and urbanisation; b) the importance of space in the supply and use of energy within urban regions; c) the rising capacity of urban actors to govern or influence energy-related change; and d) the importance of infrastructure as powerful instruments for energy or low-carbon policies. An example of this emerging literature is Rutherford and Jaglin (2015), who in their introduction to a special issue of *Energy Policy* put forward the notion of *urban energy governance* as a way ‘to capture the multitude of ways in which urban actors engage with energy systems, flows and infrastructures in order to meet particular collective goals and needs, as framed or expressed in policymaking processes, but also in debates, contestations and conflicts over policy orientations, resources and outcomes’ (Rutherford and Jaglin, 2015: 174).

This mirrors reflections and insights that have emerged within a broader literature around the urban governance of climate change over the best part of two decades, within which energy efficiency in particular plays a part (rather than energy access). Drawing on research and examples mostly from the Global North, but also some from LICs and MICs, Bulkeley (2010) refers to multi-level governance, within which she notes the importance of transnational city networks (which, again, are not so focused on energy access but are more relevant to energy efficiency) and ‘vertical’ relations between local, regional and national state authorities. Bulkeley (2010) highlights several factors that structure such multi-level governance: formal competencies, autonomy and financial incentives offered to local government. But she also highlights two institutional barriers identified by the research: lack of institutional capacity and political conflicts that are encountered locally. The problem of institutional capacity includes the degree of autonomy that local authorities have in relation to higher levels of government, the lack of ‘fit’ between the scale of issues and municipal boundaries, and the availability

of resources (financial and human). Bulkeley (2010) also notes how the usual prescriptive responses to such barriers tend to focus on addressing these directly in a neutral way (i.e. ceding more autonomy to local authorities, providing more resources, and so on), ignoring the second type of barrier, which can be defined as the 'political conflicts' that take place within specific political economies.

An example is Jaglin's (2013) study of multi-level (national and local government) energy policy-making in Cape Town, which shows that rather than 'smooth co-operative governance' with nested hierarchical structures, there are different patterns of relations. For example, electricity distribution as a municipal function in South Africa since the late nineteenth century had evolved into a vertically integrated national utility and 187 municipal utilities by the end of the twentieth century. When the national government tried to achieve efficiencies through amalgamating these two levels into regional electricity distributors, there was strong opposition from the local level and the process was discontinued (Jaglin, 2013).

Issues of coordination and power relationships do not affect only inter-institutional links over the specific issues of energy efficiency and energy access, but in a context of increasing activity in low-carbon experimentation are also becoming increasingly complex as they become more cross-sectoral. For example, both São Paulo and Cape Town have been experimenting with low-carbon interventions in housing infrastructure, the former through the use of solar hot water systems in social housing and the latter through insulation retrofits in existing social housing (Bulkeley *et al.* 2014). On the one hand, this illustrates the opportunities that arise in terms of accessing different sources of funding through cross-sectoral initiatives, such as climate change-related funding and poverty-reduction and environmental justice-focused subsidies and aid. The particular comparison of these two initiatives also illustrates the different modes of cooperation between local government and other actors in pursuing such initiatives (with private utilities companies being involved in São Paulo and local government being the lead agency in Cape Town), and the different drivers that may be specific to a location (with the national crisis in the electricity system in Brazil being a key driver in São Paulo, and the developmental mode of urban governance strongly influencing Cape Town's initiative).

The potential of cross-sector coordination is further illustrated by an aspect of urban governance that, by its nature, cuts across disciplines and has traditionally fallen within the remit of local government: urban planning. It has increasingly been argued that urban planning is inextricably linked to urban energy planning and that there should be integrated urban planning addressing both spatial and energy planning together (International Renewable Energy Agency (IRENA), 2016; Madlener and Sunak, 2011; UN-Habitat, 2012). A key issue is land use and transport integration, which holds the potential to reduce the need to commute and promote a modal shift toward lower energy forms of transport. This has been the rationale for planning and transport initiatives such as Curitiba's (Brazil) high-density transit corridors providing the core infrastructure for the city's development and growth (Smith and Raemaekers, 1998), which has been emulated and developed elsewhere, particularly in Latin America, where there has been considerable experimentation with transport (Castán Broto and Bulkeley, 2013). Focusing on energy access and energy efficiency at the building and household level, key relevant issues controlled by planning are density, urban design and built form. These can affect energy efficiency through regulation that promotes built form providing shading, minimising heat loss (together with building regulations), etc. Building orientation and form can also affect the scope for local power generation using renewables. Higher density building will typically help reduce heat loss in cold climates and direct solar gain in hot climates, but there is a balance to be struck in avoiding overshadowing of possible solar panels, passive solar systems, etc. On the other hand, higher densities lead to more efficient and viable district heating and power systems, and therefore offer more scope for that form of decentralised heat and power provision. However, implementing such integrated urban planning is 'most challenging in developing country contexts, with often weak institutional capacities and limited resources, especially in small- to medium-sized cities where the majority of

urban growth is projected to take place in the coming decades' (IRENA, 2016: 41). In addition, informal settlements, where many of the urban poor live, are by definition areas where urban planning in its present form is already either very weak or non-existent, thus presenting a further challenge in terms of urban governance and implementation of integrated urban planning. The challenge is compounded by the fact that there would be much to be gained in terms of lowering energy consumption for lighting and cooling from ensuring better access to daylight and ventilation in the dense and unregulated built fabric of informal settlements in some areas (e.g. in Brazilian *favelas* – Luque-Ayala, 2016). Indeed, the socio-economic benefits to be reaped from integrated urban planning are the greatest in MICs and LICs (IRENA, 2016), and it has been argued that the high building densities often found in informal settlements can actually offer an opportunity to provide electricity connections at lower cost than in lower density areas (Madlener and Sunak, 2011).

A key trend that has run in parallel to the shift toward decentralisation and the emergence of urban governance has been the privatisation of electricity supply and distribution. The power sector reform that gathered pace across the world from the 1990s onwards – involving a combination of restructuring, regulation, commercialisation and privatisation – has been driven in developing countries mainly by macro-economic structural adjustment programmes imposed by the multilateral financing institutions that have been the traditional source of finance for the sector (Wamukonya, 2003). In different parts of the developing world there have been other additional specific drivers, such as government's inability to meet growing demand for electricity in Latin America, and lack of capital for domestic power supply in China and Asia Pacific countries (Wamukonya, 2003). Mixed results from this experience include some positive outcomes such as reduction in technical losses and more reliable supply to connected consumers, but also negative ones such as job losses as a result of financial efficiency measures, higher consumer tariffs due to loss of subsidies, and limited extension of electrification to non-serviced populations such as in peri-urban areas – with a rising awareness that universal electrification requires targeted strategies (Wamukonya, 2003). Power sector reform outcomes vary with the specific political economy context and characteristics of reform implementation in each country. Jaglin and Verdeil (2013), for example, identify almost complete coverage and optimal service quality as one of the benefits from the privatisation of the Peruvian electricity sector in 1994. However, focusing on the impact on informal settlements, they also identify a political framework supportive of the improvement of access to urban services and technical innovations in network engineering as important factors in this achievement, i.e. privatisation *per se* was not the only reason for the improvement.

In the Philippines, privatisation since the 2000s initially led to the state having a diminished role in promoting access to electricity in informal settlements. Whereas in the 1990s central government had led important programmes aimed at promoting access to electricity, including settlements located on contested land – whether public or private – following privatisation such programmes disappeared. Mouton (2015) documents an increasing role for city governments, which by law have the responsibility to provide power and electricity and an adequate power distribution system. Urban poor organisations were found to be channelling their demands and concerns more easily through city governments, and thus could potentially influence the implementation of energy policy at the local level. On this basis, Mouton (2015), recommends that local governments be given tools and resources to support the implementation of policies toward access to electricity for the urban poor, and that incentives be created for utilities to be more engaged in urban electrification and in its social dimension.

Criqui and Zérah's (2015) study of energy transition as implemented by the three companies that took on electricity distribution in the State of Delhi when it was privatised in 2000 also shows that urban development policies – with their focus on regularising and servicing informal settlements – were

more influential on the utilities' strategies than the environmental agenda. Criqui and Zérah (2015: 188) conclude that:

...urban public policies in emerging cities, beyond privatization reform and through indirect parallel orientation-setting, can and do shape utilities' strategy shifts towards social objectives that go beyond economic considerations, and follow political priorities in implementing energy transition.

Coming back to governance in relation to energy access and efficiency (not only electricity), and looking at the case of SSA, Brew-Hammond (2010) emphasises the need to increase the actors involved and to develop effective institutions, summarising their role and potential at each level as follows: at the macro level, ministerial multi-sectoral committees developing energy for poverty-reduction strategies and programmes; at the mezzo level, specific institutions such as energy/utilities regulatory commissions to ensure a level playing field, and electrification/energy agencies with specific remits to ensure oversight of policy implementation – the latter has been successful in rural electrification in places such as Senegal and Mali, and offers scope as a model to tackle electrification in peri-urban areas, where informal settlements and the poorest urban dwellers are often located; and at the local level engagement of consumers through community committees, etc.

The types of relations around electricity distribution between different levels of government and other stakeholders will very much depend on the socio-political context, as well as other factors such as scale, etc. For example, Smith's (2003) in-depth comparative study of five low-income settlements (ranging from formal to informal) in Costa Rica – a small country where until recently the form of government budgeting fostered clientelist relations between members of parliament and community leaders at the neighbourhood level – showed that in informal settlements community leaders and organisations played a key role in the initial stages of securing water, sanitation and electricity connections through negotiation with parastatals and contacts in central government, rather than with local government.

In summary, the provision of electricity to the urban poor in LICs and MICs has been affected in various (both positive and negative) ways by the changes in electricity distribution models (tending toward privatisation) and in urban governance (tending toward decentralisation), with urban actors having an increasing role in the implementation of energy policy at the local level, although not necessarily in energy supply and distribution. Urban energy governance is becoming increasingly complex and there is scope to achieve improved energy access and energy efficiency through coordinating across this complexity, but it is also an arena for political struggle and readjustment of political power, both between different levels of government, among different sectors within local government, and between competing interests within urban areas – factors that should be given adequate consideration when identifying strategies, policies and institutional vehicles to scale up energy efficiency and ensure energy access.

### **Experiences in improving access to electricity, and lessons from innovative energy transition projects**

The literature offers examples of initiatives aimed at improving access to electricity by the urban poor and disadvantaged in LICs and MICs, as well as in transitions to cleaner energy in urban areas in these countries – which overlap with provision of basic services (Jaglin and Verdeil, 2013). These respond to both changes in urban governance as described above and to broader actions related to tackling climate change.

A key means to increase energy access for the urban poor has been electricity regularisation programmes. The urban electricity retrofit of São Paulo's *favelas* illustrates typical approaches and

issues that may emerge in such programmes. According to Luque-Ayala (2016), although São Paulo had nearly full electricity coverage only 70% of *favela* and tenement dwellers had formal access to the electricity grid. Regularisation required an Act from Brazil's federal government, in 2002, mandating the deregulated electricity sector achieve 100% electricity coverage. Common features of the socially and technically 'integrated' approach to slum electrification rolled out by utilities companies in São Paulo include the installation of electricity meters in dwellings, anti-theft cables to prevent further illegal connections, and the redeployment of the neighbourhood grid via transformers and other equipment for electricity distribution. This programme also places a strong emphasis on lowering consumption levels to increase payment capacity, and assessment of the initial pilot scheme showed a 40% reduction in electricity consumption and a reduction in non-payment from 98% to 32% (Luque-Ayala, 2016). A critical view of the programme, however, notes that it is largely political in nature, characterised by its concern with an expansion of energy markets, turning informal, unmetered and unregulated consumers into metered and regulated customers with monthly payment obligations (Luque-Ayala, 2016).

Another approach to improving access to electricity among the poor in LICs and MICs is prepaid systems, which are increasingly popular in the delivery of urban services (such as electricity and water) in SSA. Baptista (2013) reviews the arguments for and against this approach, identifying a generally positive assessment among energy specialists, economists and development scholars, who report advantages in this system in situations where governments are weak or when there is a lack of infrastructure planning with unclear land tenure and extensive poverty. In these cases, prepayment is seen as facilitating the expansion of access to utilities in low-income areas, empowering customers and generating revenue for service providers. However, urban scholars tend to be critical of three aspects: '(a) prepayment as a proxy for neoliberalism; (b) prepayment as a disciplining technique; and (c) prepayment as de-politicizing state–society relationships' (Baptista, 2013: 7). Baptista's (2013) own field study of prepaid electricity practices among low-income households in Maputo, Mozambique, concludes that prepayment has a positive effect on forms of sociability and social ordering, giving users more certainty, a sense of control and 'disciplined autonomy' over their lives, and higher energy literacy, as well as helping them 'organize [their] relationship with urban services in ways that are also political' (Baptista, 2013: 22). The author advocates the use of ethnographic approaches to research on access to urban services in specific urban contexts in order to gain more grounded understanding.

Taking such an approach, Pilo' (2015) analysed a regularisation project in favelas in Rio de Janeiro that was aimed at ending clandestine hooking into the grid and reducing losses for the energy company, in a context of gang-controlled neighbourhoods and gang-mediated relationships with urban services. A key component of this project was to provide individual households with meters that were located in the public space, in order to provide social surveillance and deter fraud, thus also addressing a sense of social justice and fairness at the neighbourhood level.

These schemes are an effort to extend universal access to electricity, but authors such as Silver and Marvin (2016) argue that it makes little sense to use models from western urbanisation and apply these to the spread of electricity networks in developing countries in, for example SSA, as there never was a 'modern infrastructural ideal' (Graham and Marvin, 2001) in this region or, if there was, it was in the form of 'archipelagos' rather than widespread integrated networked service provision. However, rather than seeing this as purely negative, Silver and Marvin (2016) show that this opens opportunities for experimentation in the arena of low-carbon transition, allowing the developing of renewable energy solutions and energy efficiency-related options. Indeed, cities are seen as key sites of the current energy transition, offering opportunities to reverse the trend whereby energy had increasingly been produced elsewhere and imported to urban areas. They represent an opportunity to develop more decentralised energy systems as well as demand-side management aimed at improving the energy efficiency of their built fabric (Coutard and Rutherford, 2014). Such transitions

are seen to be as significant as earlier historical energy transitions (from wood to coal, and then to electricity) linked to broad social changes such as industrialisation, urbanisation and the growth of the consumer society (Bridge *et al.*, 2013). Bridge *et al.* (2013) argue that in the developing world in particular, limited 'lock-in' around fossil fuels can create opportunities for the rapid uptake of renewables. Coutard and Rutherford (2014) and Silver and Marvin (2016), however, note that urban energy transition in the Global South means something very different from that in the North, combining issues around governance, access to finance, trade and supply chains with everyday concerns of, among other things, very low basic household incomes, availability of cooking fuel and indoor air pollution. In addition, Coutard and Rutherford (2016) recommend a more direct engagement specifically with urban energy, amidst the abundance of literature on cities, climate change and low-carbon transitions, taking into account both the materiality of energy flows and their socio-technical characteristics, as well as the political projects they underpin. This should help overcome the traditional conceptualisation of, and boundaries between, producers and consumers, which are increasingly blurred with new technologies and demand-side management.

Though studies of energy transition at an explicitly urban scale are still scarce (Silver and Marvin, 2016), there are specific case studies of experimentation and innovation within urban areas, particularly but not only in developed countries, as well as a few overviews and collections of good practice in transition initiatives in general (see Castán Broto *et al.*, 2013; and UN-Habitat and ICLEI, n.d.). Sovacool (2012) provides a specific focus on renewable energy programmes in developing countries, drawing on a study of these in rural (rather than urban) communities in Asia, including solar home systems, residential wind turbines, biogas digesters and gasifiers, micro-hydro dams and improved cookstoves, through collaborations between governments, businesses, non-profit organisations, banks and community-based cooperatives. Sovacool (2012) provides 12 lessons for policy-makers and practitioners, suggesting that effective and successful renewable energy programmes: (1) can lead to higher living standards, lower fuel consumption or fuel prices, improved technology and other benefits; (2) typically start with pilot programmes or feasibility assessments; (3) encourage community ownership and participation; (4) have strong promotion, marketing and demonstration efforts; (5) seek to protect consumers and provide after-sales service and customer support; (6) match energy services with generating income, direct employment and educational training; (7) allocate roles and responsibilities among different institutions and actors; (8) offer financial assistance including through microcredit financing, low-interest loans, etc.; (9) have robust capacity-building programmes; (10) are flexible in the technologies they include; (11) have independent evaluators; and (12) have political support and champions. Overall, he found that 'designed properly, renewable energy development programs can be effective at meeting national and programmatic targets for electrification and access, sometimes ahead of schedule and below cost' (Sovacool, 2016: 9161).

With a focus on sustainable urban energy planning, UN-Habitat and ICLEI (n.d.) provide examples of urban projects across the developing world focused on energy and housing (in South Africa, the Philippines, Cuba and Indonesia) and green energy sourcing (in Kenya, the Philippines, South Africa and China). They highlight the role of external dedicated energy agencies based on public-private partnerships in the implementation of such projects, under the steer of a board that may include the municipality, businesses, local universities, utilities and national government. Such projects not only engage with access to renewable energy but also with demand factors leading to improved energy efficiency, such as aspects of the built fabric affecting this (insulation, daylight access, etc.).

An example of such approaches that go beyond the energy sector, taking a more holistic view across services when addressing the needs of the urban poor, is the 'Light Recicla' scheme in Rio de Janeiro, which was implemented in 2011 initially as a pilot scheme in three *favelas* – later being extended to others on the basis of initial positive results. The scheme involved people recycling solid waste in

exchange for a discount on their electricity bills, and was aimed at regularising access to the electricity network, facilitating the payment of electricity bills and improving environmental sustainability. The scheme has exceeded expectations in terms of the number of people signing up and the volume of waste that has been recycled. Taking the notion of ‘co-production’ as an analytical lens (in this case looking at ‘co-production of affordability’), Pilo’ (2016b) explored the limitations of this approach for addressing disparities in access to services, which were identified as: lack of institutional commitment at multiple levels; failure of the municipality to adhere to rules; creation of territorial differentiation through not offering the scheme to all *favelas*; and de-politicisation of the user–utility relationship.

Communities have a role in experimenting with innovative practices not only at the local level, as ‘communities of place’, but also through their participation in social movements and civic society at urban and even national levels, as well as through transnational knowledge-sharing and solidarity networks (Silver and Marvin, 2016). Looking at community energy in the UK (i.e. locally owned renewable energy generation, community hall refurbishments, collective behaviour change programmes and so on) as a policy tool, Seyfang *et al.* (2013) identified five critical success factors: an organised group with key committed individuals to drive a project forwards; sufficient time, information, skills, money and material resources to drive the project forward; a community engaged in designing the project to meet its own needs; supportive partnerships and information-sharing networks; and a supportive national policy context. It would be useful to conduct similar research on community involvement in a range of energy-focused transition projects in developing countries such as those described earlier in this section, and explore commonalities as well as context-specific factors of success.

Supporters of decentralised initiatives under the umbrella of transition-related experimentation see opportunities for more community-led energy access and efficiency, but emerging in-depth assessments of these suggest this is not straightforward. Boyd *et al.*’s (2014) analysis of the results from Maputo’s involvement in both an international climate adaptation programme and urban regeneration projects without a climate change mandate revealed competition for international funding between national and municipal government, as well as delegitimisation of informal settlement dwellers and simplification of their complex worlds. This closed opportunities for cooperative action and shared learning. The experience highlighted the conflict often existing between prioritising large-scale infrastructure and empowering local communities through community action. It also illustrated the role of party politics in the distribution of municipal power.

It is clear that caution is needed in regard to the expectations built up around energy transitions. From a political economy perspective, Coutard and Rutherford (2014) highlight their political implications, with major investments historically sunk into centralised supply (state) infrastructure and major supply lobby groups seeking to influence policy potentially militating against decentralised supply. From an implementation and outcomes perspective, Silver and Marvin (2016) warn against expecting energy transition measures to lead to linear pathways to modern fuel consumption, referring to empirical evidence that has shown that households adopt multiple energy sources for specific purposes, without necessarily foregoing traditional sources completely. Similarly, in a developed country context (that of the UK), assessment of changes in consumer behaviour induced by smart meters as a demand-side management tool has shown that such changes are short-lived, with households soon reverting to what they see as ‘normal’ consumption levels (Hargreaves *et al.*, 2013). Interestingly, their work highlights the importance of socio-culturally driven consumption patterns, and Hargreaves *et al.* (2013) suggest a series of radical policy measures that address this directly – such as personal carbon allowances or alternative metrics of well-being, which may be more difficult to implement in developing countries. Cautions against making generalisations and seeking common solutions across the developing world are also raised by various authors (Coutard and Rutherford, 2014; Silver and Marvin, 2016; UN-Habitat and ICLEI, n.d.). Bridge *et al.* (2013) highlight the fact that

energy systems are spatially constituted, their components being embedded in particular settings, and the networked nature of the system itself producing geographies of connection, dependency and control. Transition toward a low-carbon economy will require re-appraisal of the form, function and value of urban landscapes, a clear example being the changes in space allocated to different transport systems.

Indeed, past experiences (such as the Indian case seen earlier) suggest that utilities have to adapt to specific spatial and social geographies, in contrast to conventional uniform public policies that usually overlook local implementation contexts. Thus, policy-makers in the energy sector should consider socially and politically sensitive issues and the multidimensional specificities of urban contexts. In addition, there is scope to explore approaches to access to other urban services and infrastructure in poor and disadvantaged urban areas in the Global South, and the potential relevance of these to the delivery of electricity in such areas. Examples may include community-based access to water (Cain, Daly and Robson, 2002), community education around sanitation, state–private sector–community partnerships, etc.

### **Conclusions and priority research questions**

Returning now to the questions set out at the beginning of the paper, we can draw some overall conclusions.

Regarding the historical experience of successful cities in LICs and MICs, if ‘successful’ cities are defined as those achieving full or high access to modern energy sources (mainly electricity and clean fuels), a key driver behind achieving such success has been political will in one form or another. Cities with constrained supplies display a variety of mixes of options that vary depending on geographic contexts and historical path dependencies. These mixes of options have been considerably expanded through experimentation in transitioning to sustainable low-carbon economies, becoming more diverse in three ways: the range of technologies available (renewable energy); the mix of supply and demand management, including engaging with other factors such as quality and design of the built environment, city form, etc.; and the range of actors involved, including the mechanisms and terms of engagement among these. Prerequisites for the poorest and disadvantaged to benefit from these include political and formal recognition of their living conditions and dwelling places, as well as facilitation of community involvement in addressing energy access and energy efficiency.

Regarding legal, institutional and coordination arrangements to ensure energy access (and to scale up energy efficiency) in urban contexts in developing countries, the multifaceted increase in options available calls for appropriate regulation (which acknowledges a diversity of forms of energy provision and actors providing this), promotion and awareness-building, capacity building, and suitable financing/funding models related to context-appropriate modern and clean energy options. Different levels of multi-scale urban energy governance seem particularly suited to different roles, though always in a context-dependent way. A key to ensuring access appears to be openness to the participation of a variety of actors, as well as the facilitation of links among them (e.g. via appropriate legislation and promotion at central government level, brokering of agreements and leadership at local government level, etc.). On the supply side, barriers to achieving this include the lack of political will as well as political struggles at various levels, including the reluctance of central government to transfer real responsibility for energy supply to local government, and the politicised nature of local government decision-making; and vested interests linked to sunk investment in existing major energy generation, supply and distribution infrastructure, lack of economic interest on the part of utilities in engaging in energy distribution in large areas of cities in developing countries where they see difficulties in recovering costs, avoiding energy theft and preventing safety hazards, and the reluctance of informal energy brokers and suppliers to have their income-generating activities harmed. On the demand side, innovative experiences in transitioning to low-carbon economies show potential to

involve poor communities in increasing their access to energy and energy efficiency, but in some contexts there may be resistance to replacing informal energy supply systems that are cost-free with more reliable but costly formal supply, as well as culturally embedded behaviours and expectations that militate against the adoption of new energy systems and forms of energy management.

Regarding the role of municipalities, the evidence shows that their role in developing countries is very much constrained by the historically established control of energy generation and supply by central government, in recent decades via legislation for and regulation of supra-urban utility companies. However, in certain places city governments have taken a proactive role in extending energy access to the urban poor, and a range of experimentation in climate change-related transition projects has shown their potential in improving both energy access and efficiency. A key factor underpinning local government's potential in this is the cross-sectoral nature of its competencies at the urban level, ranging from energy-conscious urban planning to the promotion and facilitation of energy demand-management schemes. A key barrier here is local government's weakness in many parts of the developing world, particularly in medium and small urban areas, which has been manifest for the last half century in the huge growth of informal settlements. Here lessons may be learned from how other services have been provided in such areas with organised community involvement and civil society/private sector/local government partnerships.

The above review of the existing literature provides some answers to the three questions that this paper set out to address, to different levels. Given the relatively recent emergence of research on urban energy governance, there is scope to learn from primary international comparative research to develop more comprehensive answers to these, a process that would benefit from additionally addressing the following more detailed questions:

- What potential do different forms of urban management have to ensure access to reliable and safe energy by the poor and disadvantaged in LICs and MICs in existing (and future) urban areas?
- What forms of urban planning (and regeneration) can help ensure access to reliable and safe energy in new (and regenerated) urban areas?
- What scope is there to draw further lessons for access to energy from the way in which other urban services and goods are made available and accessed in low-income areas in LIC and MIC cities?
- What spatial and institutional scales should be considered when designing strategies to improve access to energy by the urban poor and disadvantaged?

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