

Executive summary

It is within the powers of local governments to influence the energy choices of their citizens. Several leading and progressive cities and towns¹ have already taken innovative decisions to enhance the deployment and use of renewable energy resources within their geographic boundaries. Since the beginning of this decade, and for the first time ever, over 50% of the world's population now live in urban environments. This proportion will continue to grow over the next few decades. The energy infrastructure that every city and town depends on will therefore need to be continually adapted and upgraded if it is to meet the ever-increasing demands for energy services. This provides the opportunity for local government leaders to encourage increased deployment of renewable energy systems and hence gain the multi-benefits they offer.

In OECD countries, many cities have already taken initiatives to reduce their energy demand through improved efficiency and conservation in an endeavour to reduce their dependence on imported energy and reduce their carbon footprints. Analysis confirms that, in many cases, the increased uptake of renewable energy technologies can also be an economically viable solution to energy security and climate change mitigation, especially when all the other co-benefits are taken into account. Several cities with strong leadership in both OECD and non-OECD countries have developed policies to encourage renewable energy use. For cities in developing countries, this has been encouraged by the additional drivers of reducing local air pollution and moving towards sustainable development and growth. Overall however, only a small proportion of local governments worldwide have developed policies and projects specifically to better utilise their local renewable energy resources and capture the benefits.

Therefore this report aims to:

- inspire the target readership of city mayors, councillors, local captains of industry, managers of small and medium enterprises, and indeed, all members of an urban community, to gain a greater understanding of the potential for renewable energy and to comprehend how its enhanced deployment could benefit local citizens and businesses;
- provide guidance to national, state and regional government policy-makers as to how to best incentivise their local communities in order to help meet national and international objectives relating to energy use; and
- enable policy-makers to appreciate the roles that local municipalities might play in increasing the deployment of renewable energy and moving further towards the desired transition from a fossil fuel future to a sustainable energy future.

The wide range of renewable energy technologies continues to evolve as improved performance, efficiency and reliability, at lower costs, are sought by researchers and manufacturers. The potential offered by distributed energy systems, that usually involve a significant share of renewable energy, is becoming clearer as smart meters and intelligent grids are deployed. This report analyses such technology developments, with emphasis on their application in urban environments.

Policies already instigated by leading local governments around the world, with large and small populations, are reviewed. The policies of cities that have successfully achieved a significant uptake of renewable energy could be easily adopted by other local governments wishing to achieve a similar goal. Case studies from cities and towns, with populations ranging from 12.4 million to 1 500, are presented to illustrate how policy development can impact on the deployment of renewable energy within territorial boundaries.

1. In this report the term “city” refers to urban conglomerations, administered by local municipalities and ranging from small towns (urban settlements of several thousand people), up to mega-cities (each with populations of several millions).

Key findings

- Leaders and officials of local governments have started to become more involved in climate change policy-making by undertaking strategic planning; formulating, approving and implementing appropriate policies; evaluating their effectiveness; and disseminating successful actions that might be replicated elsewhere. National governments in some countries have encouraged this trend, for example by returning the revenue from the sale of carbon credits to the local municipality that invested in an accredited renewable energy project.
- Many cities already utilise their local renewable energy resources cost-effectively. Some smaller towns have even become fossil fuel free; although it is usually easier for a small community, located in rural surroundings, to achieve a high renewable energy contribution than it is for a mega-city trying to meet a similar objective. Cities located near the coast, or on islands, may be able to benefit from off-shore wind and also, in future, from ocean energy technologies currently under development.
- Cities tend to target a specific renewable energy resource that best suits their conditions. For example, solar PV systems suit cities in lower-latitude, high sunshine regions; geothermal power suits cities located near the tectonic plates; and bioenergy is most common in areas with a forest industry nearby. Cities with such a prime resource often try and develop, or attract, business ventures and investments relating directly to it.
- District heating schemes based on geothermal or bioenergy sources, have proven to be efficient and cost-effective in many cities. District cooling schemes are also maturing and good practical examples exist in several locations, including those using new solar sorption technologies.
- In larger cities, only a portion of the total energy demand is likely to be met by renewable energy projects located within the city boundary. These commonly include waste-to-energy combined heat and power (CHP) plants, geothermal heat systems, solar thermal collectors on roofs and building-integrated solar PV systems. Other forms of renewable energy carriers such as wind power, hydro power, concentrating solar power, solid biomass and liquid biofuels, usually need to be purchased from outside of the city and brought in by transmission lines, pipelines, road, rail or boats.
- Renewable energy could become a significant component of the total energy mix of a distributed energy system by employing new and improved small-scale technologies together with smart meters and intelligent grids. Such systems can be very complex but are developing rapidly. A sustainable energy future for many communities could depend on a wise combination of both centralised and distributed energy systems that utilise technological advances throughout the supply chain.
- Many local governments tend to follow early innovators rather than lead. The advantages for cities that lead in the design, investment and monitoring of renewable energy demonstration projects that can be easily replicated, include pride and the creation of a strong national and international interest. Training centres and industrial parks based around a demonstration project can help to educate citizens, attract outside interest, and provide a critical mass of skilled personnel.
- Local authorities can serve as a vehicle to implement top-down policies from national governments, deliver meaningful results, and ensure national mandates are carried out. They can design solutions to climate change that are adapted to the needs of local constituents and are consistent with local policy priorities. This process can help build resilience to climate change in the urban infrastructure. Experimentation on new forms of policy at the local level can provide learning and experience and, when successful and where appropriate, can lead to bottom-up diffusion of approaches between cities, as well as at the national and international levels.
- The local approach to renewable energy project deployment can help to demonstrate what is possible, at what costs and who the winners and losers might be. Social experimentation relating to

renewable energy deployment and climate change mitigation and adaptation can also be undertaken at the local level and, where successful, adopted nationally. National governments therefore need to stimulate action at the local government level in order to fully integrate renewable energy and climate considerations into urban development strategies.

Policy recommendations for local governments

- Development of renewable energy deployment policies should be undertaken in association with energy efficiency measures. In most countries, leading cities have attempted to reduce their energy demand through improved efficiency and energy management incentives, and this has been recognised as a key policy priority. Putting parallel policies in place to support the use of renewable energy by the local community usually makes good sense.
- An assessment of available energy resources, together with analyses of future energy demands and costs of alternative supplies to meet heating, cooling, electricity and transport demands, should be undertaken prior to promoting the use of renewable energy. The assessment should include the potential for renewable energy projects based around water supply, wastes, and land managed by the local authority.
- The evolution of decentralised energy systems will vary with the location, existing energy infrastructure, renewable energy resources available, and energy business ownership status. Local governments could take a lead role by developing policies that will help support the transition of the conventional energy sector to a less centralised system.
- A wide range of policies is already evident for councils to select from that will lead to greater renewable energy deployment. None of these would suit all cities and towns, so careful evaluation is required to determine those most appropriate to local conditions.
- Regardless of size, a city should undertake policy development to support renewable energy deployment in association with other policies, including national policies linked to sustainability goals and climate change, and local policies relating to energy security, energy access, health, employment, equity and reducing energy demands. Policies that are not directly energy-related, but could influence renewable energy uptake, can have direct or indirect impacts.
- Cities with relatively few policies in place to support and encourage the use of their renewable energy resources should evaluate the policies of leading municipalities and determine whether similar benefits could accrue. Any constraints set by their own specific set of circumstances would need to be identified.
- Support from citizens and local businesses for the greater deployment of renewable energy technologies is essential, based on a good understanding of the issues. The personal benefits that would result for individuals and businesses need to be identified and disseminated. Leaders can motivate residents, offer them enhanced pride in their community as a result of being an early adopter, as well as provide them with greater energy independence, energy security, employment and social cohesion. Strong leadership based on clear objectives is essential.

While there are many examples of cities that have already acted upon climate change and energy security issues by developing support policies to stimulate renewable energy activities, there are many more that have not yet appreciated the serious need for urgent action. The overall goal of this report is to help speed up the necessary transition to a sustainable energy future.

If each of the many successful renewable energy demonstration projects and innovative policies undertaken by leading cities as identified in this study, could be replicated one hundredfold during the coming decade, then cities could become facilitators of change in the energy sector.