Global Status Report
on Local Renewable Energy Policies

Working Draft, 12 June 2009 Updated September 2009

Comments and Additional Information Invited

A Collaborative Report by:
REN21 Renewable Energy Policy Network for the 21st Century
Institute for Sustainable Energy Policies (ISEP)
ICLEI–Local Governments for Sustainability

This report complements the REN21 *Renewables Global Status Report* by providing more detailed information at the city and local levels about policies and activities to promote renewable energy. It is intended to facilitate dialogue and illuminate pathways for future policies and actions at the local level. This "working draft" version is intended to solicit comments and additional information. Data in this draft are not necessarily complete or accurate.

Additions and corrections: please address to Eric Martinot, martinot@isep.or.jp
New researchers, contributors, and reviewers will be acknowledged in the next edition.

ABOUT REPORT COLLABORATORS

REN21 convenes international multi-stakeholder leadership to enable a rapid global transition to renewable energy. It promotes appropriate policies that increase the wise use of renewable energies in developing and industrialized economies. Open to a wide variety of dedicated stakeholders, REN21 connects governments, international institutions, nongovernmental organizations, industry associations, and other partnerships and initiatives. REN21 leverages their successes and strengthens their influence for the rapid expansion of renewable energy worldwide. See www.ren21.net.

I**SEP** is an independent, non-profit research organization, founded in 2000 by energy experts and climate change campaigners. ISEP aims to provide resources and services to realize sustainable energy policies. Activities include promotion of renewable energy, improvement of energy efficiency, and restructuring energy markets. ISEP provides policy analysis and advice for national and local governments, brings together stakeholders worldwide, and facilitates renewable energy activities by local groups. See www.isep.or.jp.

ICLEI is an international association of local governments and locally-oriented organizations at national and regional levels that have made a commitment to sustainable development. Established in 1990, ICLEI works with its members and other local governments through performance-based, results-oriented campaigns and programs, such as the Cities for Climate Protection Campaign, the Local Government Climate Roadmap, and the Local Renewables Initiative. See details on all initiatives at www.iclei.org.

ACKNOWLEDGMENTS

Lead Author and Research Director
Eric Martinot (Institute for Sustainable Energy Policies)

Collaborating Authors
Risa Irie (ISEP and Columbia University); Maryke van Staden (ICLEI European Secretariat); Noriaki Yamashita (ISEP); Monika Zimmermann (ICLEI International Training Center).

Researchers
Andy Belen (Meister Consultants Group), Katie Burns (Town of Markham), Woodrow Clark (Clark Strategic Parnters), Jose Etcheverry (York University), Francesco Francisci (Ecosoluzioni), Shota Furuya (ISEP), Emmanuel Gómez, Daniele Guidi (Ecosoluzioni), Ryan Hodum (David Gardiner & Associates LLC), Coreen Jones (York University), Kei Kawaguchi (ISEP), Sandi MacPherson (York University), Ana Maria Gómez (National Autonomous University of Mexico), Noriko Nakao (ISEP), Lynda O'Malley (ICLEI Europe), Viive Sawler (Town of Markham), Patrick Schroeder (Victoria University), Laura Serrano Mendoza (ICLEI Europe), Erin Shapero (Town of Markham); Donald van den Akker (Urgenda).

Contributors and Reviewers
D.H. Brahmbhatt (City of Rajkot), Stuart Conerly (ISEP), Emani Kumar (ICLEI South Asia), Lee Yujin (Green Korea), Christine Lins (EREC), Jan Logie (Otago University), Monica Oliphant (ISES), Lily Riahi (ICLEI Europe), Wilson Rickerson (Meister Consultants Group), Holger Robrecht (ICLEI Europe), Ian Schearer (ICLEI New Zealand), Jonas Tolf (City of Stockholm).

CONTENTS

TABLES

1. THE PROMISE OF LOCAL ACTION FOR RENEWABLE ENERGY

City and local governments can play a key role in encouraging renewable energy at the local level. The multiple roles of these local governments–as decision-makers, planning authorities, managers of municipal infrastructure, and role models for citizens and businesses–are crucial to the global transition to renewable energy now underway. It is their political mandate that makes local governments ideal drivers of change–to govern and guide their communities, provide services, and manage municipal assets.

Most significantly, local governments have legislative and purchasing power that they can use to implement change in their own operations and in the wider community. With such capacity, local governments can become beacons for change in their region or country, demonstrating the effectiveness of policies and local action. And as early leaders among local governments take initiative, others can follow and improve upon the early efforts, replicating and scaling-up good-practice and successful examples.

Local governments can also play a key role as facilitators of change, particularly in terms of raising awareness and facilitating community and business actions by a range of stakeholders. Often the participation of many different local, regional, and even national stakeholders is important to achieving planned outcomes. For example, “model cities” in India and Brazil have been designed to involve local craftspeople, schools, scientists, and regional and national agencies.

While cities are beginning to include renewable energy in urban planning, there are still relatively few explicit local renewable energy policies. Rather, renewable energy is often addressed indirectly, within other themes such as sustainability, climate change, clean transportation, and “green” or “eco” programs. Often, energy savings and energy efficiency are the main priorities, which makes sense due to the enormous opportunities for reducing demand. Reduced demand also enables renewables to meet a larger share of the remaining demand. However, it is also true that the potential for renewable energy is often overlooked, shortchanged, or needlessly postponed within these broader themes and programs.

The “energy system of tomorrow,” a system that could enable the realization of a 100% renewable future, will consist of a partially distributed, decentralized energy system with embedded energy storage, demand side management, and modern communications technologies. It also will likely include a large role for electric vehicles charged from local renewable energy sources. The role of local governments in shepherding and managing these transitions is highly significant. The future will likely reveal an interesting and multi-faceted interplay between local policies and these future energy transitions.

Local renewable energy targets and policies across the globe vary extensively. One common theme for many communities, whether metropolitan regions, cities, towns, villages, or counties, is the importance of renewable energy in local climate action plans–from both mitigation and adaptation perspectives. This is particularly true for many developed countries, where the importance of climate action at the local level is translating more and more into action to promote renewable energy. In developing countries, access to energy, energy security, and industrial development can be key motivators for renewable energy policy and action. In all communities, a focus on local job creation often shapes policies.

This report makes clear that there are many different approaches to renewable energy policy. Many factors influence the approaches that local governments choose. Some of these include geographic resource availability, financing availability, relationship to state and national governments, local regulatory authority and legal jurisdiction, social and cultural conditions, existence of stakeholder groups, local business interests, climate, type of building stock, and housing density and transport patterns. Since there are large variations in the types of local targets and policies, both within and between countries, it is difficult to generalize trends for renewable energy policies. Yet this report attempts to portray an overall "policy landscape."

More and more cities and local governments are addressing renewable energy in some way, and are also becoming more ambitious in their targets and in policies designed to meet these targets. Local leaders increasing look to renewable energy to produce energy locally; to secure the local energy supply and improve community resilience; to save energy and money; to create local jobs; to involve local stakeholders; to contribute to climate protection; to support national and international CO2 reduction goals, and to promote sustainable urban development. Among many local leaders, there is broad agreement on these benefits and the promise of renewable energy.

2. INTERNATIONAL, REGIONAL AND NATIONAL INFLUENCES ON LOCAL RENEWABLES

In recent years, international, regional, national, and state/provincial policies for energy and climate have been increasingly affecting local government policies and actions for renewable energy. Europe is a good example at the regional level. European Union (EU) regional policy and national policies have fostered local renewable energy goals and actions, particularly among a number of local governments in Austria, Finland, Germany, Sweden, and the United Kingdom. Since 2007, many European cities have been considering renewable energy targets and policies in support of the 2008 European Climate and Energy package. That package established an EU-wide target for 20% share of final energy consumption from renewables by 2020 and 10% share of transport energy, with individual national targets contributing to the EU-wide target. Also in 2008, the Covenant of Mayors was launched by the European Commission to bring together interested

Box: Emerging Lessons from Implementing Local Renewables

The experience of ICLEI in working with cities on a variety of projects is beginning to illuminate some emerging lessons for implementing local renewables.

1. *Community size determines approaches and possibilities.* There are clear differences between the policies enacted and implemented by smaller versus larger communities. Smaller communities are enacting targets for 100% renewable energy, or have even reached this level already, whereas larger cities would find this impossible in the short and medium term. Smaller communities also tend to be motivated and supported in a regional context and cooperate with other municipalities in their region. Among those pioneers, many see a "early adopter" advantage and aim at competitive advantages from innovation. Larger cities, in contrast, tend to start by targeting specific renewable energy opportunities, such as solar, wind, or bio-energy. Larger cities may then use these opportunities to portray the city as progressive (for example, as a "solar city") and to explore business ventures that will benefit the city.

2. *Mid-sized cities can start easier then large cities.* As observed in other local policy sectors as well, cities and towns of between 100,000–-500,000 inhabitants tend to be pioneers and among the most active. Innovation and implementation is often much easier for these mid-size cities than for larger cities, although international attention may focus more on the larger cities.

3. *Renewable energy policies often follow sustainability goals.* Among the advanced local governments in developed countries (especially among the cities), there are many governments that have started some type of sustainability policy, sometimes following past "Local Agenda 21" programs. Promoting renewable energy can become a natural continuation of past sustainability policies, as understanding and policy sophistication increase.

4. *Early innovators can produce a "snowball effect."* In some countries, pioneering local governments have taken initiative and then other local governments have followed. This is why "model cities" are so relevant and why city-to-city transfer of information and motivation are key. One of the best examples is Barcelona's Solar Ordinance mandating solar hot water in new construction, which was then copied by dozens of local governments in Spain and elsewhere.

5. *Local governments react to national enabling (framework) conditions.* National and state/provincial energy policies and mandates create enabling (framework) conditions to which local governments react. Such enabling conditions could be national or state targets for renewable energy, incentive programs, funds for demonstrations, electric utility policies like feed-in tariffs, competitions and awards, or funding for urban development that explicitly incorporates renewables, to name some.

6. *Awards and competitions motivate and create practitioner-communities.* In some countries, awards are given for "solar cities", "solar towns" and "solar villages," often on a regular or annual basis. This creates communities of motivated and like-minded individuals and local officials, who can then serve as mentors and resources for those who wish to start similar activities in their own community.

7. *Renewable energy demonstration centers provide training and "critical mass."* Come, see, touch and learn – this is the best way for people to acquaint themselves with new technologies. Many "model cities" have established information and demonstration centers for renewable energy and energy efficiency to provide training and expertise, and to bring together a critical mass of experts, small businesses, and stakeholders to move local innovation.

European cities in a voluntary effort to go beyond those EU targets. By April 2009, the Covenant involved almost 500 local governments, and continues to grow.

At the international level, local governments are increasingly involved in climate change discussions and meetings associated with the United Nations Framework Convention on Climate Change (UNFCCC). Local governments expanded their participation at the 13th Conference of the Parties (COP-13) in Bali in December 2007 and at COP-14 in Poznan in December 2008. In Bali, an association of local governments launched the "Local Government Climate Roadmap." This roadmap calls for greater recognition of the crucial role that local governments play in achieving energy and climate goals, explicitly recognizes the role of renewable energy, and also highlights the need for proper enabling (framework) conditions for local governments. The roadmap also is mobilizing local governments towards preparations for COP-15 in Copenhagen in December 2009. Plans for COP-15 feature a decision "Cities and Climate", which has been brought to UNFCCC negotiations by local governments. Also coming from COP-13 is the World Mayors and Local Government Climate Protection Agreement, in which signatories agree to measure and report on annual reductions of greenhouse gas emissions and act to reduce emissions consistent with a 60% global reduction in greenhouse gas emissions by 2050 (from 1990 levels).

At national levels, groupings of cities and local governments continue to form, expand, plan, and take collective action, sometimes through a national initiative. For example, India is establishing 60 "solar cities" that would reduce conventional energy demand by at least 10 percent with renewables and efficiency by 2012. National funds are supporting urban planning and policy development in these 60 cities to establish policy roadmaps and local resource centers as catalysts for change. In the United States, the U.S. Mayors Climate Protection Agreement grew to include over 930 mayors from all 50 states in 2008, representing an urban population of over 83 million people. That agreement targets a 7% reduction in greenhouse-gas emissions by 2012 from efficiency and renewables (from 1990 levels). The U.S. Department of Energy's Solar America Partnership likewise grew in 2008, doubling to 25 participating cities in 2008. In Germany, a publicly-funded research and facilitation network is working with over 50 small municipal governments around the country to develop and implement plans for becoming "100% renewable energy regions." In Australia, there are six "solar cities" supported by a national government program. And in Japan, more than 300 municipalities continue to provide solar photovoltaic (PV) subsidies and support green power purchasing and other renewables policies in concert with a national policy and networking platform "Japan Regional New Energy Vision."

State/provincial level policies and targets for renewable energy are also affecting local governments. By early 2009, there were over 55 states/provinces worldwide with renewable energy targets, mostly in the United States and Canada based on renewable portfolio standards, and also in India and other sub-national jurisdictions like Scotland. Canada is a good example of targets and policies at the province level that encourage local action. As such "enabling conditions"

improve at state/provincial levels, local communities find more support to become active toward renewable energy.

Finally, there are a number of international collaborative associations that support local action. Most well-known are several initiatives by ICLEI that bring together local stakeholders from around the world, including a local renewables "model communities" network linked to ICLEI's Local Renewables Initiative. Other examples include the C40 Cities Climate Leadership Group (which has focused on energy efficiency improvements in 40 major cities); the European Green Cities Network (which provides analysis and training on sustainable urban housing); and the International Solar Cities Initiative (which convenes biennial conferences). There are also national and regional awards and recognition programs emerging, such as the European Commission's "European Green Capital" awards, which have already recognized cities as "capital of the year" for 2010 and 2011. (Note: a comprehensive list of associations, programs and resources is planned for future editions of this report.)

3. TYPES OF LOCAL POLICIES AND ACTIVITIES TO PROMOTE RENEWABLE ENERGY

Local policies and activities to promote renewable energy can be grouped into five main categories (see Table 1 and indicated policy example tables P1–P16). (Note: Only some policies in Table 1 may be relevant to a given situation, depending on local jurisdiction. And not all possible policies are shown in Table 1.) These five categories are:

1. Target setting. The local government establishes a target (goal) for some future level of renewable energy. The target can be for government-only consumption or investment, or apply to all or some classes of energy consumers within the local government's jurisdiction. This is a voluntary activity that is often the starting point for adopting policies and actions. There are many different types of targets that cities can adopt. Many targets are for future emissions reductions of CO2, to be met by a combination of energy conservation, energy efficiency, changes in energy demand patterns (such as transport modal shifts), and investment in or purchase of renewable energy. (Note: most commonly, the proportion of the CO2 reduction to be met by renewables is unspecified, so CO2 reduction targets are considered "partial" targets for renewable energy. In most cases, CO2 reduction targets alone, without a corresponding explicit renewable energy target, imply a larger proportion of reductions from energy savings and efficiency than from renewable energy.)

2. Regulation based on legal responsibilities and jurisdiction. These policies and activities are regulatory in nature, based upon the legal responsibilities and jurisdiction of the local government that are provided by charters or similar articles of incorporation, and by national and state laws. Primary examples are urban planning, building codes, and local taxes.

3. Operation of municipal infrastructure. These policies and activities modify the ongoing operation of municipal infrastructure to incorporate renewable energy, for example government energy purchases or infrastructure investment, or policies or activities by public utility companies (particularly electric utilities) that can be controlled or regulated by the local government. (Note: public utility policies may depend upon utility infrastructure being under local control or jurisdiction.) This category also includes renewable energy policies by private local utilities that may be enacted independently of government control.

4. Voluntary actions and government serving as role model. These policies and activities go beyond legal responsibilities and jurisdiction to take advantage of the various possible roles of a local government as market facilitator, promoter, and role model. Many of these policies and activities may also contribute to raising general awareness.

5. Information, promotion and raising awareness. These policies and activities target the general public, specific stakeholders or groups, and/or private businesses, with the aim of facilitating or enabling support for renewable energy. Activities may also include informational and media campaigns, support for education and training programs, analysis of renewable energy potentials, building-specific audits, and geographic information system (GIS) databases.

Table 1: Local Government Policies/Activities that Can Influence Renewable Energy

Policy/ Activity Category	Key for Tables 2–8	Descriptions of Policies/Activities by Sub-Category	Policy Tables
1. Target setting	Target setting	(a) CO2 reduction targets	P1
		(b) Future shares/amounts of renewable electricity or energy for all consumers in city	P2–P4
		(c) Future shares/amounts of renewable electricity or energy for government operations and/or buildings	P5
		(d) Future shares or absolute numbers of buildings or homes with renewable energy installations	P6
		(e) Future shares/amounts of biofuels for the government vehicle fleet and/or for public transport	P10
		(f) Other types of targets, for example to become fossil-fuel free or "carbon neutral"	P1
2. Regulation based on legal responsi-bilities and jurisdiction	Urban	(a) Urban planning and zoning that encourages and integrates the local generation, distribution and use of renewable sources of power in the local jurisdiction--including planning and zoning for public transportation and electric vehicle infrastructure.	P7
	Building	(b) Building codes and/or permitting that applies to, or incorporates renewable energy in some manner. Examples: mandates for solar hot water and solar PV installations, zero-net-energy homes, shading legislation, and mandated design review/scoping of opportunities and potentials for renewable energy.	P8
	Taxes	(c) Tax credits and exemptions within tax systems: for example, sales, property and fuel taxes, permitting fees, and carbon taxes.	P9
	Other	(d) Other regulation, including municipal departments mandated to promote or plan for renewable energy, mandates for biofuels use in vehicles or biofuels blending, and mandatory carbon cap-and-trade.	P10–P12
3. Operation of municipal infrastructure	Purch	(a) Local government purchasing (and joint-purchasing with other municipalities or with private sector) to integrate renewable energy into government operations. Includes renewable electricity, biofuels, and bulk purchasing for market transformation programs.	---
	Invest	(b) Local government investment in renewable energy for government buildings, schools, vehicle fleets, and public transport.	---
	Utility	(c) Public utility regulation, including tariff regulation, renewable energy targets, feed-in tariffs, interconnection standards, net metering, and portfolio standards; also designates private utility policies of these types.	P13
4. Voluntary actions and government serving as a role model	Demo	(a) Demonstration projects, including participation in national pilot and demonstration projects. Often done with private sector.	---
	Grants	(b) Grants, subsidies, and loans for investments in renewable energy by homeowners or businesses	P14
	Land	(c) Using local government land/property for renewable energy installations (leasing/selling/permitting). Can also include deals that require developer promises for renewables and efficiency.	---
	Other	(d) Examples: joint ownership of private projects, city-financed investment funds, bond issues, and green certificates and trading.	P15–P16
5.Information promotion, and raising awareness	Info/ promo	Includes public media campaigns and programs; recognition activities and awards; organization of stakeholders; forums and working groups; training programs; enabling access to finance by local stakeholders; enabling stakeholder-owned projects; removing barriers to community participation; energy audits and GIS databases; analysis of renewable energy potentials; information centers; and initiation and support for demonstration projects.	---

4. SURVEY OF LOCAL RENEWABLE ENERGY POLICIES AROUND THE WORLD

Policies and activities to promote renewable energy at the local level by 180 selected cities and local governments worldwide are shown in Tables 2–8. Columns correspond to the categories and sub-categories from Table 1.

(Notes: There are many more cities and hundreds of smaller local governments that could be shown in these tables. The cities and local governments shown in these tables are based on data availability and well-known cases, but have not been selected according to any formal criteria. Check-boxes for specific policies in specific cities are based on judgment of the lead author, given available information. Further drafts of this report will include more cities and local governments and may establish criteria for inclusion in some categories. For details of state and national policies for renewable energy that often underlie and support local policies, see the global "Policy Landscape" section of the REN21 *Renewables Global Status Report*, available at www.ren21.net, and also links to a wide variety of policy references and databases at www.martinot.info/policies.htm.)

The most common type of policy is **target setting**. (See examples in Tables P1–P6.) Almost all cities working to promote renewable energy at the local level have established some type of renewable energy or CO2 reduction target. Of the 180 cities and local governments in Tables 2–8, at least 140 have some type of future target for renewable energy and/or CO2. Often, cities set targets based on analysis of energy consumption and reduction potentials. Some of the pioneering cities in target setting have even met their goals, or are now setting stronger targets based on accumulated experience.

CO2 or greenhouse-gas reduction targets are common for the years 2010–2012, similar to Kyoto Protocol targets at the national level, and typically for 10–20% reduction of emissions from 1990 levels. CO2 targets for 2020 and beyond have appeared in recent years and are typically for 20–40% reductions by 2020, with some CO2 targets now even extending to 2050. Other cities have targets to become fully or partially "carbon neutral" (zero *net* emissions) by a future year. One novel type of CO2 target is emissions per-capita, with several cities targeting a reduction in this indicator over time.

There are several types of renewable-energy-specific targets. One type is for the renewable share of total electricity consumption, with several cities in the range 10–30%. Some cities target the share of electricity consumed by the government itself, for its own buildings, vehicle fleets, and operations. Such "own-use" targets can range from 10% to 100%. Another type of target is total share of energy from renewables (e.g., including transport and heating, not just electricity), or share of energy just for a specific sector like buildings. Some targets are for total amounts of

installed renewable energy capacity, such as megawatts of solar PV or wind power, or the number or total surface area of solar hot water collectors.

Another common policy is **urban planning** that incorporates renewable energy. (See examples in Table P7.) Urban plans take many forms and titles, ranging from "vision" to "strategy" to "plan" but the essential feature is that a plan call for integrating renewable energy in some systematic and long-term fashion into city development. The first element of a plan is often the targets mentioned above, followed by elaboration of specific policies or activities. Some plans are relative short-term, for example 5 years or less, while many others extend to 2020, 2030, or even 2050. Of the 180 cities and local governments in Tables 2–8, at least half have some type of urban planning that incorporates renewable energy.

One type of policy emerging in recent years is incorporation of renewable energy in **building codes or permitting**. (See examples in Table P8.) Barcelona, Spain, was one of the pioneers with this type of policy, and mandated solar hot water in all new construction above a certain size threshold (the threshold was later eliminated). Barcelona's ordinance was then followed by over 70 other municipalities in Spain, and also by the national government. (See Barcelona case description in Section 5.) Other types of mandates are for design reviews prior to construction that reveal the opportunities for integrating solar into building designs, or for building designs to include "stub-outs" or other features that allow for future installation of renewables. A number of cities in China have mandated solar hot water in new multi-family apartment buildings, and 12 stories in height appears to be the cut-off point for such mandates (with more stories, roof area becomes inadequate). Of the 180 cities and local governments in Tables 2–8, at least 35 have some type of building code or permitting policy that incorporates renewable energy.

In contrast to renewable energy policy at the state and national levels in many countries around the world, **tax credits and exemptions** for renewable energy at the local level are not very common. (See examples in Table P9.) Of the 180 cities and local governments in Tables 2–8, only 15 were found to have some form of these policies. Property tax credits or abatement for residential installations appear to be the most common.

Many other **regulatory measures** for renewable energy are possible. There are just a few examples identified so far, however. One example is a mandate for blending biofuels with all gasoline and/or diesel fuel sold within city limits (see Portland example in Table P10). Another example is mandating that all taxis use biofuels (see Betim example in Table P10). A third example is mandating a carbon cap-and-trade system on large businesses within city jurisdiction (see Tokyo example in Table P11).

Related to regulatory measures are a number of cases where local governments have established **city departments or public market-facilitation agencies** that are planning, regulating, and/or promoting renewable energy. (See examples in Table P12.) These agencies may have a

regulatory function, or they may be "market facilitation" agencies that provide information, training, finance, stakeholder convening, public outreach, etc. (The later are best categorized under the "information/promotion" policy category #5 of Table 1.) Often, government departments or agencies tasked with promoting renewable energy take both roles.

Incorporation of renewable energy into **municipal infrastructure and operations** takes many forms. A number of cities have decided to purchase green power for municipal buildings and operations (see examples in Table P5). Others are purchasing biofuels for municipal fleet vehicles and/or public transit vehicles (see examples in Table P10). Associated with biofuels purchases may be investment in alternative-fuel vehicles that may use richer mixtures of biofuels than is possible with conventional vehicles. Many cities also invest in renewable energy installations for municipal buildings, schools, hospitals, recreation facilities, and other public facilities. Cities with community- or district-scale heating systems may also invest in renewable heating infrastructure, for example biomass co-generation plants. Of the 180 cities and local governments in Tables 2–8, at least 90 have some type of policy related to municipal infrastructure and operations.

For **electric utility operations**, there are few local governments worldwide that have direct jurisdiction over the electric utility that serves their populations. But in case where full or partial jurisdiction exists, or where local regulation can be achieved indirectly through regional or state government, a number of electric utility policies for renewable energy are possible. (See examples in Table P13.) These include feed-in tariffs, renewable portfolio standards, net metering, a carbon tax on fossil-fuel electricity purchases, and green power sales by the utility. (Note: the "Utility" category in Tables 2–8 also includes cases where a private or non-mandated utility adopts one or more of these policies voluntarily, motivated by its own interest to promote renewable energy.) Feed-in tariffs are very common around the world at national levels and in a few cases at state/provincial levels, but not at local levels (see REN21 *Renewables Global Status Report* for 2007 and 2009 for more details). However, a new trend in 2008 was for cities and local governments to consider electric utility feed-in policies and explore how to implement these policies. The first city to adopt a local feed-in tariff in the United States was Gainesville, Florida, in 2008; Sacramento, California, will start a feed-in tariff in 2010.

Many cities undertake **voluntary actions** to promote renewable energy and to serve as a role model for the private sector and other groups. Demonstration projects are very common; of the 180 cities and local governments in Tables 2–8, more than 50 have conducted demonstrations, although the number is probably higher. Subsidies, grants, and loans for end-users to install renewable energy are very common in some specific countries or regions; of the 180 cities and local governments in Tables 2–8, at least 50 have these policies (see examples in Table P14). Other voluntary actions include government investment funds that often solicit proposals and invest in public or private projects (see examples in Table P15), and a wide variety of ways to support or facilitate private and community initiative (see examples in Table P16). Also in the category of voluntary actions, a few cities provide municipal land or building rooftops for projects, or sell land

with sustainability conditions for its development. Finally, some cities choose to subsidize public-access biofuels stations, including conversion costs for conventional tanks and pumps, and also biofuels production and distribution (see examples in Table P10).

Voluntary **information and promotion activities** are very diverse. Activities among many of the 180 cities and local governments in Tables 2–8 include public media campaigns and programs; recognition activities and awards; organization of stakeholders; forums and working groups; training programs; enabling access to finance by local stakeholders; enabling stakeholder-owned projects; removing barriers to community participation; energy audits and GIS databases; analysis of renewable energy potentials; information centers; and initiation and support for demonstration projects.

Table 2: Europe – Selected Local Renewable Energy Policies

	Target setting	Regulation based on legal responsibility and jurisdiction				Operation of muni infrastructure			Voluntary actions and government as role model				Info/ promo
		Urban	Building	Taxes	Other	Purch	Invest	Utility	Demo	Grants	Land	Other	
Barcelona	X	X	X				X					X	X
Berlin	X	X								X	X		X
Bologna	X	X	X										
Bristol	X	X				X	X		X		X		X
Copenhagen	X												
Cremona							X			X			
Edinburgh	X	X							X				
Frederikshavn	X	X		X								X	X
Freiburg	X					X			X		X		X
Gelsenkirchen		X							X			X	X
Göteborg	X	X							X				
Grenoble	X			X						X			
Hamburg	X	X					X		X			X	X
Heidelberg	X	X	X			X			X			X	X
Languedoc reg		X								X		X	
Lausanne		X					X			X			
Leister	X												
Linz							X					X	
London	X	X	X			X						X	
Madrid	X	X			X	X							X
Milan	X	X	X				X						
Malmö	X	X					X						
Milagro												X	
Münster	X				X								
Oslo	X	X					X			X		X	
Oxford	X	X								X			X
Paris	X	X											
Ponferrada			X			X				X			
Rhône-Alpes r.	X											X	
Rome	X						X	X	X				
Rovigo prov.	X	X					X			X			X
Samsø	X						X					X	
Seville	X												X
Stockholm	X	X				X	X					X	X
The Hague	X	X							X				
Växjö	X	X											X
Walloon region	X						X					X	X
Woking Boro.	X	X	X		X	X			X			X	X
Zaragoza	X	X	X									X	X

Table 3: United States – Selected Local Renewable Energy Policies

	Target setting	Regulation based on legal responsibility and jurisdiction				Operation of muni infrastructure			Voluntary actions and government as role model				Info/ promo
		Urban	Building	Taxes	Other	Purch	Invest	Utility	Demo	Grants	Land	Other	
Ann Arbor	X	X			X	X				X	X	X	X
Anne Arundel				X									
Aspen										X			
Austin	X				X	X		X		X			X
Berkeley	X		X	X					X	X			X
Boston	X					X	X		X	X			X
Boulder			X	X						X			
Chicago	X					X						X	
Denver	X	X							X				X
Gainesville								X					
Honolulu						X				X		X	
Houston					X	X		X	X				X
Howard Cty.				X									
Knoxville							X		X	X			X
Los Angeles	X					X	X					X	
Madison	X	X				X	X		X			X	X
Marin Cty.										X			
Milwaukee	X				X	X			X			X	X
Minneapolis	X					X		X	X			X	X
New Orleans	X	X				X						X	X
New York	X	X		X		X	X		X			X	X
Orlando	X									X			X
Palm Desert										X			
Philadelphia	X	X			X	X			X				X
Pittsburgh	X					X			X				X
Portland	X	X			X	X				X		X	X
Sacramento	X	X				X	X	X					X
Salt Lake City	X	X				X							X
San Antonio		X				X	X		X				X
San Diego					X	X	X				X	X	X
San Francisco	X	X	X			X	X		X	X		X	X
San Jose	X						X					X	X
Santa Monica	X	X				X	X						
Santa Rosa	X				X	X			X				X
Seattle	X		X	X					X			X	X
Sonoma Cty.										X			
Southampton										X			
Tucson	X	X	X	X		X			X				X

Table 4: Canada – Selected Local Renewable Energy Policies

	Target setting	Regulation based on legal responsibility and jurisdiction				Operation of muni infrastructure			Voluntary actions and government as role model				Info/ promo
		Urban	Building	Taxes	Other	Purch	Invest	Utility	Demo	Grants	Land	Other	
Caledon ON	X			X		X			X			X	X
Calgary AB	X	X				X							X
Craik SK			X						X				X
Edmonton AB	X												X
Guelph ON	X	X				X							X
Halifax NS	X	X				X							X
Hamilton ON	X	X				X							X
Markham ON	X					X			X			X	X
Mississauga ON						X			X				X
Montreal QC	X											X	X
Oakville ON	X							X					X
Okotoks AB						X	X			X		X	X
Ottawa ON	X	X				X							X
Richmond Hill ON	X	X					X						X
Sudbury ON	X												X
Surrey BC		X											X
Toronto ON	X	X			X	X			X	X		X	X
Vancouver BC	X		X									X	X
Winnipeg MB	X												X
Whitehorse YT	X									X			X

Table 5: Japan – Selected Local Renewable Energy Policies

	Target setting	Regulation based on legal responsibility and jurisdiction				Operation of muni infrastructure			Voluntary actions and government as role model				Info/ promo
		Urban	Building	Taxes	Other	Purch	Invest	Utility	Demo	Grants	Land	Other	
Chiba	X									X			
Fukuoka	X												
Hamamatsu	X									X			
Hiroshima	X									X			
Hokuto		X					X			X			X
Iida	X	X				X				X	X	X	X
Kanagawa pr	X	X				X	X			X		X	X
Kawasaki	X	X				X	X			X			X
Kitakyushu	X	X								X			X
Kobe	X	X								X			
Kyotango		X								X			
Kyoto	X	X							X	X		X	X
Matsuyama							X			X			
Nagoya	X	X											
Niigata	X	X											
Osaka	X												
Saitama	X	X											
Sakai	X	X								X			
Sapporo	X	X				X			X	X			X
Sendai	X												
Shizuoka	X												
Tokyo	X	X	X	X	X				X	X	X	X	X
Tsuru		X				X				X		X	
Yokohama	X	X			X		X			X	X	X	X

Table 6: Australia and New Zealand – Selected Local Renewable Energy Policies

	Target setting	Regulation based on legal responsibility and jurisdiction				Operation of muni infrastructure			Voluntary actions and government as role model				Info/ promo
		Urban	Building	Taxes	Other	Purch	Invest	Utility	Demo	Grants	Land	Other	
AUSTRALIA													
Adelaide	X	X				X	X		X	X			X
Alice Springs		X						X	X	X		X	
Ballarat	X		X			X							
Blacktown									X			X	X
Brisbane	X		X										X
Clarence Vly.	X		X										
Hepburn Sh.	X					X	X						X
Melbourne	X	X				X			X			X	
Moreland	X											X	X
New Castle	X					X						X	X
Perth	X				X						X		X
Sydney	X					X	X					X	X
Townsville		X							X			X	X
NEW ZEALAND													
Christchurch	X	X			X	X	X		X	X		X	X
Dunedin						X				X			X
Nelson	X	X					X					X	X
Waitakere	X						X		X	X		X	X
Wellington	X	X							X				X

Table 7: China, India, and Asia/Other – Selected Local Renewable Energy Policies

	Target setting	Regulation based on legal responsibility and jurisdiction				Operation of muni infrastructure			Voluntary actions and government as role model				Info/ promo
		Urban	Building	Taxes	Other	Purch	Invest	Utility	Demo	Grants	Land	Other	
CHINA													
Baoding									X			X	X
Beijing	X	X					X		X	X			
Dezhou		X					X		X				
Kunming	X	X		X			X			X		X	X
Lianyungang			X										
Rizhao		X	X				X						X
Shanghai	X	X							X		X	X	
Shenzhen			X										
Taipai City	X	X								X			
Tianjin				X					X	X		X	
Wuhan			X										
INDIA													
Bhubaneswar	X	X							X				X
Delhi		X	X							X		X	X
Coimbatore													X
Nagpur	X	X	X	X					X				X
Rajkot	X	X	X						X			X	X
KOREA													
Busan	X												
Daegu	X	X							X			X	X
Gwangju	X	X											X
Jeju prov.	X												
Seoul	X												
OTHER ASIA													
Kuala Lumpur										X			
AFRICA/MIDDLE EAST													
Abu Dhabi	X						X		X			X	
Cape Town	X		X										
Dubai		X			X								

Table 8: Latin America – Selected Local Renewable Energy Policies

	Target setting	Regulation based on legal responsibility and jurisdiction				Operation of muni infrastructure			Voluntary actions and government as role model				Info/ promo
		Urban	Building	Taxes	Other	Purch	Invest	Utility	Demo	Grants	Land	Other	
BRAZIL													
Belo Horizonte				X									
Betim					X	X	X		X			X	X
Curitiba						X							
Porto Alegre		X							X	X			
Rio de Janeiro			X										
São Paulo			X										
MEXICO													
Cuautitlán Izcalli		X											
Mexico City		X	X					X					
Toluca							X					X	

5. LOCAL POLICY CASE SUMMARIES FOR 40 CITIES

Note: the following local policy case summaries are unedited and many are not yet reviewed by local experts or officials. In contrast to the policy lists and examples in Tables 2–8 and P1–P16, these cases are intended to show integrated pictures of local policy and action for individual cities. Case summaries from more countries and regions will be included in future editions. Additional cases and reviews of these existing cases are invited.

Adelaide, Australia (population 1.2 million). Adelaide's sustainable development planning dates back to the early 2000s when visionaries engaged the community and the city adopted its "green city program" with many new policies. Adelaide also became one of six cities participating in Australia's national "solar cities" program. The Adelaide City Development Plan promotes green buildings and renewable energy technologies. The plan includes targets to make the entire transport sector carbon-neutral by 2012 and the entire building sector carbon-neutral by 2020. There is also a greenhouse-gas emissions reduction target for municipal own-use operations of 20% by 2010, compared to 1994. Many renewable energy projects are underway. The city offers $1000 subsidies for solar PV systems larger than 1-kilowatt (kW), and subsidies of $1/watt up to $3000 to install solar PV for lighting in common areas of apartment buildings. In transportation, the city plans to operate solar-electric public buses charged with 100% solar power. Adelaide's green-city program takes place within the context of a ten-year sustainability plans at the state level.

Austin TX, USA (population 774,000). Austin's 2007 Climate Protection Plan targets 30% of total city energy needs from renewable energy by 2020, including 100 MW of solar power. Municipal facilities are also targeted to become carbon neutral by 2010. Austin Energy, the energy department of the city government, has been very active in renewable energy. Austin Energy has been purchasing private wind power since 2001, receives electricity from several solar installations in the city, and also purchases power from landfill gas in San Antonio. Austin Energy's GreenChoice Program allows residents and businesses to voluntarily purchase green power through 5-year and 10-year subscriptions; by 2009, subscriptions represented 750 GWh in green power sales. Austin Energy also provides rebates of $3.75/watt for solar PV and $1500-2000 per system for solar hot water.

Barcelona, Spain (population 1.6 million). Barcelona enacted a city ordinance in 2000 that required solar hot water in all new buildings and major renovations above a size threshold (typically all commercial buildings, and residential buildings of 16 or more households). In 2005, the city eliminated the size requirement so the ordinance now applies to all construction. The ordinance requires 60% of hot water energy to come from solar. This ordinance proved very popular and Barcelona's model was followed by over 70 municipalities and cities throughout Spain enacting similar ordinances. Then, following the local ordinances, Spain enacted a national building code requiring both solar hot water and solar PV in new construction and renovation for larger buildings. Barcelona promotes renewable energy through its 2002–2010 "Plan for Energy Improvement in Barcelona," which aims to reduce CO2 emissions by 20% by 2010 (compared to 1999), reduce per-capita CO2 emission to 3.15 tonnes/person, and increase renewable energy to 1.1% of total energy consumption. The plan is being implemented and monitored by the Energy Agency of Barcelona. There are also informational and public awareness programs.

Beijing, China (population 17 million). Beijing's 11th Five-Year Plan (2006-2010) targets a 4% share of electric power capacity from renewable energy by 2010, up from 1% in 2005, and a 6% share of heating capacity by 2010. To achieve these goals, the city allocated 13 billion RMB ($2 billion) over the five-year period. The city is promoting geothermal heat pumps and provides subsidies of 35 RMB/m2 for water-source pumps and 50 RMB/m2 for ground-source pumps. The

city has also been installing renewable energy in municipal infrastructure, including 57,000 solar street lamps. The 2008 Beijing Olympic Games boosted renewable energy development with a number of projects—during the games, one-quarter of all energy consumed at event venues was renewable. And Beijing is also supporting renewable energy development in surrounding rural districts. In 2008, Beijing received 2% of its total energy consumption from renewables, and had 3.8 million m2 of solar water heaters and 1.2 megawatts (MW) of grid-tied solar PV installed. There were also biogas digesters in use by 50,000 households, 113 small hydro power plants, and 10 million m2 of heating capacity from water-source geothermal heat pump facilities.

Berlin, Germany (population 3.4 million). Berlin has been active in setting and implementing renewable energy policy for decades. In 1989, the city created an energy planning unit, the Energy Task Force, to coordinate policy and increase the share of renewable energy. In 1994, the Energy Concept Berlin targeted a 25% reduction in CO2 emissions by 2010 (baseline 1990). In practice, actual emissions were reduced by 26% as of 2009, and a new target of 40% by 2020 was set. That reduction achievement was due to a number of action plans, first in 1995, then in 2000, and again in 2005. In 2000, the city launched a "Berlin Solar Campaign" together with four outside agencies to raise public awareness. The campaign created an "International Solar Centre," a multi-purpose information and promotion center. Following that, the city also developed a "Solar Master Plan" to assess solar energy potential for different types of city buildings and infrastructure, a grant fund, subsidy programs for solar PV and solar hot water, and a program to offer rooftops of public buildings to private developers for solar PV installations. Along with strong national support for solar PV through feed-in tariffs, the number of solar PV installations in Berlin climbed from 400 in 1998 to 1600 in 2008 with capacity of 10 MW. Under the most recent action plan (2006-2010), Berlin will continue to promote renewable energy. Berlin's success can be attributed to the creation of institutions and partnerships within the framework of energy planning, including the Council on Energy (1990), Berlin Energy Agency (1992), Berlin ImpulsE (2000), and Climate Protection Expert Council (2007).

Betim, Brazil (population 440,000). Betim is one of Brazil's first "model communities" for renewable energy, as part of a six-cities network that also includes Belo Horizonte, Porto Alegre, Salvadore, São Paulo, and Volta Redonda. Betim has established a number of policies to promote biofuels use in transportation. The city mandates biofuels in public buses and taxis, and also gives preference to flex-fuel vehicles for municipal vehicle fleet purchases. The city is also facilitating the addition of solar hot water systems to a low-income housing project being built under a national program. A number of demonstration projects on municipal buildings have been carried out. Betim has also established a "Renewable Energy Reference Center" that raises public awareness; provides information; brings together diverse stakeholders from local, state, and national levels; conducts training and workshops; and conducts outreach to other local communities in Brazil to share Betim's experience.

Boston MA, USA (population 610,000). In 2007, Boston committed to reduce greenhouse gas emissions 7% by 2012 and 80% by 2050 (base 1990). Also in 2007, an executive order required the city to purchase 11% of its own-use electricity from renewables by 2007 and 15% by 2012, also required all new municipal motor vehicle purchases to be alternative fuel vehicles, and committed to reduce the city's own-use transportation fuel use by 5% by 2012. The city also targets 25 MW of solar PV by 2015, and has adopted a number of regulatory measures, including zoning regulations for utility-scale and small-scale wind power projects, and requirements that new housing under its Green Affordable Housing Program be "solar ready." The city also maintains an online GIS tracking system that features every renewable energy installation in the city, and allows building owners to calculate the available solar irradiance on their rooftop, taking shading into account. From 2007 to mid-2009, renewable energy capacity in Boston grew from 500kW to almost 2MW.

Bristol, UK (population 420,000). Bristol has three targets in its carbon reduction strategy: (1) to reduce the city government's own-use energy consumption by 10% by 2010 (base 2003/2004); (2) to purchase 15% of the government's own-use electricity from renewable sources by 2010; and (3) to reduce total CO2 emissions 60% by 2050, starting with 3% reductions per year through 2020. The city purchases 14% of its own-use electricity from renewables, operating 34,000 street lamps and ten public buildings with green power. The city has installed three biomass boilers in a community building, a nursery, and a school, and will install biomass boilers in four new schools. The city will also install solar PV and solar hot water systems in 21 non-residential city-owned buildings such as nursery schools and nursing homes. The city is also allowing construction of wind turbines on city-owned land.

Christchurch, New Zealand (population 370,000). Christchurch has committed to a 70% reduction in government own-use CO2 emissions by 2011 and carbon neutrality beyond 2015, and to a 20% reduction in community CO2 emissions by 2020. The city government purchases 100% of its own-use electricity from a certified carbon-neutral electricity supplier and from a small local wind farm. The city has a number of projects supporting renewable energy, including the "Clean Heat" project which provides grants for efficient wood-pellet stoves, use of landfill gas for heating government buildings and a public swimming pool, a biodiesel-fueled bus, and a carbon-neutral demonstration home. Other policies include consideration of passive solar design for new government buildings and reduced permit costs and faster permitting for residential solar water. A city-support agency "Target Sustainability" provides advice on renewable energy to businesses and residents.

Daegu, Korea (population 2.5 million). Daegu declared itself a "solar city" in 2004 and pledged to integrate renewable energy into city development and gradually reduce per-capita greenhouse-gas emissions by 2050 "consistent with long-term climate stabilization." The original plan called for 5% of total energy consumption to come from renewables by 2012. Following that, the city adopted energy-reduction targets for 2015 and 2030. There have also been a number of demonstration projects in public buildings, schools, and universities, and public information campaigns. The city was working on a comprehensive "solar city" ordinance that would establish policy approaches.

Edinburgh, UK (population 470,000). Edinburgh aims to achieve a carbon-free economy by 2050 and has launched a Climate Change Fund totaling £18.8 million to develop local carbon-free communities. The city intends to boost community-led activities for CO2 emissions reduction through this fund. The city will also establish a carbon management plan for its own operations. The city already purchase green power for its own-use operations, including 100% green power for large buildings, 75% green power for smaller buildings, and 20% green power for other uses such as street lighting. In the Old Town portion of the city, the project "Renewable Heritage" is improving energy efficiency and integrating several forms of renewables into traditional buildings (which are a designated UNESCO World Heritage Site).

Frederikshavn, Denmark (population 25,000). This city plans to be 100% renewable by 2015, including the transportation sector. The target emerged in 2006 with national plans to make Frederikshavn a model demonstration city for Denmark, to showcase a diversity of renewable energy technologies, energy management practices, and distributed energy system models. Currently, the city receives 24% of its energy from renewables. The city established the Energy City Frederikshavn Foundation to be responsible for implementing the 100% target, in partnership with major stakeholders (companies, educational institutions, energy planners, and key industry players like steel mills). The expected investment cost to achieve the target is 1 billion Danish kroner. Funds will come from investors, and the city has established a fund for this target with private sector investment. The city also plans to adjust some taxes.

Freiburg (i. BR), Germany (population 220,000). Support for renewable energy and climate protection dates back to the 1970s in Freiburg when opposition to nuclear power emerged as a public issue. In 1986, Freiburg developed a new energy supply concept that incorporated renewables, along with energy saving and efficient technologies. The first climate protection concept was established in 1996, which resulted in a number of initiatives. One example of an early policy was the sale of municipal land to developers with the requirement that housing built on the land incorporate renewable energy and exceed national energy efficiency standards–which led to several renewables-intensive low-energy housing districts. In 2007, a new climate protection action plan was created including energy saving, energy efficiency, and renewables. As part of the new plan, an on-line database has been established listing all building roofs in the city and their size and suitability for solar panels. By 2008, all public trams were running entirely on renewable energy, and there existed five wind turbines, a biomass co-generation plant for one city district, 12.3 MW of solar PV, and 15,000 m2 of SHW. Success with renewable energy has been attributed to a shared vision of sustainable development, a multi-stakeholder network, participation and commitment of citizens, and political consensus across parties.

Göteborg, Sweden (population 500,000). The city of Göteborg has established a long-term commitment to sustainable energy, including energy-efficient buildings, renewable energy, energy-efficient urban planning, and local energy storage. The project "Göteborg 2050" is developing long-term visions of a future city and region. The project is a collaborative effort between universities, the city government, and the city's energy utility (Göteborg Energi AB). It includes research, scenario development, support for strategic planning, dialogue with the public, and demonstration projects. Göteborg has also pioneered the design and construction of a number of demonstration homes that use only solar energy for heating and hot water, even in the winter.

Hamburg, Germany (population 1.8 million). Hamburg was designated by the European Commission as “European Green Capital” of the year for 2011. Hamburg has committed €25 million for new climate change programs and aspires to become a “model region” for climate action. Hamburg’s targets are for 40% reduction in CO2 emissions by 2020 and 80% reduction by 2050 (relative to 1990). Hamburg’s policy includes several programs, including a solar PV roof-space exchange program; a public-private solar hot water/heating program; designation of additional locations for wind turbines; repowering of existing wind turbines, funding for use of biofuels; and a new university-level research and training program designated “competence cluster renewables.” The city is also planning to develop a model urban district (Wilhelmsburg) that will be supplied entirely from renewable energy by converting existing infrastructure.

Heidelberg, Germany (population 140,000). In 1992, Heidelberg created a climate protection program focusing on the use of locally available renewable energy sources as a key strategy. Over 20 of the 100 specific measures in the program concerned renewable energy, including demonstration projects, subsidy programs, and information campaigns. Many measures are being implemented by Heidelberg’s Bureau of the Environment and the municipal utility. In 2001, the city targeted at least 25% (7 GWh) of its own-use electricity from renewables, and purchases green power from the local utility. An energy efficiency regulation for buildings also promotes renewable energy in new and retrofitted buildings. Public awareness and engagement in renewable energy has been facilitated by the Heidelberg Climate Protection and Energy Circle, which evolved from a public forum in 1997. This Circle brings together stakeholders to discuss and develop strategies, projects, and city policy. The city also organizes education and training for craftsmen and architects, encourages youth “energy teams” to promote the issues of energy, environment and climate, and gives advice to citizens on the installation of solar thermal water heaters and helps with the application for federal grants and loans. Heidelberg has cut CO2 emissions by over 15,000 tons per year in municipal buildings, and 225,000 tons per year in households, industry and transportation. In 2004, the city established a 20% CO2 reduction target by 2015.

Iida, Japan (population 110,000). Selected as an "Eco Model City" in a national competition, Iida plans to reduce its greenhouse gas emissions in the commercial and residential sectors by 40-50% by 2030 and by 70% by 2050 (base 2005). The city also plans to increase the share of households with solar PV from 2% in 2006 to 30% by 2010, and is providing solar PV subsidies of 70,000 yen/kW (maximum 3 kW) through February 2010. The city also provides residential solar hot water subsidies of 20% (maximum 30,000) and biomass equipment subsidies of 20% (maximum 75,000 yen for a wood stove and maximum 50,000 yen for a pellet stove or pellet boilers). The city's environmental plan was revised in 2007, and the revised plan established a four-year program employing public-private partnerships for biodiesel use in public vehicles, business models of wood pellet operation, use of micro-hydropower in small urban areas and farming districts, and construction of a biomass town as a sustainable recycling community model.

Kitakyushi, Japan (population 1.0 million). Kitakyushu has a long history of environmental policy, and was selected #1 among environmentally-advanced cities in Japan for both 2006 and 2007, according to a non-governmental competition. The city has also been selected as an "eco-model" city in Japan. In 2007, the city adopted a "Low-Carbon City Vision" that calls for a 50% reduction in greenhouse-gas emissions by 2050 (base 2005). The vision focuses on urban structure and sustainable energy and transport. Plans are being developed for a low-carbon city district and future development of the energy system, as well as policies to implement the vision. Currently, subsidies are provided for household solar PV.

Kunming, China (population 4.7 million). Kunming aspires to be a "solar capital" of China. In 2008, the city adopted a policy framework "advice on renewable energy development and use" which calls for a 50% share of all buildings in the city to have solar hot water and solar PV by 2010. The framework also established a designated development zone within the city to reach a 70% share, and for new construction to reach a 90% share. Further targets for 2015 include 6 million m2 of solar panels city-wide (both hot water and PV), and solar PV capacity of 100 MW. Other policies to promote renewable energy include low-interest loans, tax exemptions, and a special fund to encourage private investment. The city has also incorporated solar investments into its own procurement. And the city is providing support for R&D, industry development, university education, and a solar hot water equipment testing center. Outside the city, construction of the 166-MW Kunming Shilin solar PV power plant began in late 2008 and will become the largest such plant in China, at a cost of almost $1.5 billion.

Linz, Austria (population 190,000). The "Linz Solar City Project" is an integrated solar village for 1300 households on the outskirts of Linz. Construction was to be completed in 2005 and was to include other infrastructure, including shops, schools, and a 7-km tram rail line to the city center. The solar village is made of 2-4 storey buildings with south-facing facades, energy-efficient construction, passive solar heating, and solar electricity. The village includes a network of pedestrian and cycle paths, open space, and underground parking to keep cars separate from living areas. The village design has won several awards and was a joint effort between the city and 12 separate building constractors. Energy heating intensities for the residential buildings in the solar village were expected to be 37 kWh/m2/year, below other low-energy construction in Austria (44 kWh/m2/year) and well below the average in Austria (65 kWh/m2/yr). Similarly, heating intensities for the school buildings were expected to be 30 kWh/m2/yr, much less than the 125 kWh/m2/yr average for other schools in Linz.

London, UK (population 7.6 million). London's renewable energy objective is to generate at least 665 GWh of electricity and 280 GWh of heat annually from renewables by 2010. This will contribute to the city's greenhouse gas emissions reduction target of 60% by 2050 (base 1990). The city currently purchases green power for public lighting and city buildings. In past years, a number of initiatives have been launched, including the 2004 London Energy Partnership, which created a "London Renewables" program to promote renewables in new buildings and other

infrastructure, and a “Mayor’s Energy Strategy” which proposed to adopt green electricity tariffs in the municipal administration.

Madison WI, USA (population 220,000). Madison launched the Mpowering Madison Campaign in 2008 to reduce city-wide CO2 emissions by 100,000 tons by 2011. The city has undertaken a number of activities toward that goal, such as renewable energy installations on municipal infrastructure, including solar hot water systems on all fire stations and solar PV systems on community facilities. The MadiSUN Solar Energy Program, supported by the U.S. Solar American Cities Program, offers free consultations for installations of solar PV and solar hot water by residences and businesses, and intends to double the number of such systems city-wide by 2011. The electric utility serving Madison, Madison Gas and Electric, has a number of cooperative initiatives with the city, including joint operation of a wind farm, green power purchasing, and solar PV production credits. Madison aims to purchase about 20% of its municipal own-use power from renewables by 2010, including green power purchases of wind, biomass, and hydro from the utility.

Melbourne, Australia (population 3.9 million). Melbourne joined International Cities for Climate Protection in 1998 and Australia’s Greenhouse Challenge program in 2000. The City has been investing in demonstration projects for solar power, solar hot water, and green buildings. For example, solar panels installed on the Queen Victoria Market in 2003 generate 250 MWh per year, making this project the largest urban grid-connected solar PV project in the Southern Hemisphere. In 2003, the city adopted the goal of carbon neutrality in its “Zero Net Emissions by 2020” strategy. The intermediate goal is a 20% reduction over 1996 levels by 2010. The strategy plans to achieve carbon neutrality through green building design, energy efficiency, renewable energy, and sequestration through tree planting. The strategy calls for halving energy use in residential and commercial buildings, achieving 45% renewable energy, and halving emissions from non-renewable power generation, all by 2020. In the shorter-term, the “Greenhouse Action Plan 2006-2010” calls for 25% renewable energy in the building sector and 50% of public lighting by 2010. The City Council has also set goals for its own operations: 50% emissions reductions over 1996 levels by 2010 and net zero emissions by 2020. As of 2004/2005, the City Council’s operations had reduced emissions 26% over 1996 levels, with the bulk of the reductions achieved in the public lighting and buildings sectors.

Münster, Germany (population 270,000). Münster established a climate action plan and advisory council in the early 1990s, along with a CO2 reduction target of 25% by 2005. Through various measures, the city achieved a 21% reduction by 2006. Most of the reduction was from various energy efficiency measures in buildings and in heat and power generation (including district heating), with small contributions from renewables (20 MW of wind power, 4 MW of solar PV, and 13,000 m2 of SHW). In 2008, two new targets were introduced: 40% reduction in CO2 by 2020 (relative to 1990), and 20% of total energy consumption from renewables by 2020. The “Department of Green Spaces and Environmental Protection” was given the mandate to establish activities to meet these targets.

Nagpur, India (population 2.1 million). Nagpur participated in a local renewables “model communities” program from 2005–2008, paid partly through foreign donor assistance. In 2008, Nagpur was selected as one of the first cities in India’s national Solar Cities Program. (Nagpur has also been one of the leading cities implementing the national government’s “Jawaharlal Nehru National Urban Renewal Mission.”) Nagpur prepared a city energy report as the baseline for urban energy policy and planning, which analyzed the energy and emissions balance. The city also issued an ordinance mandating solar water heaters for all new residential buildings with more than 1500 m2, with a 10% rebate on property tax as an incentive. Various demonstration projects are underway or planned. And a Renewable Energy Resource Center was established to facilitate dialogue with local stakeholders, to identify and collect various forms of information, and to publish newsletters and brochures. Awareness campaigns include a mobile van, formation of “energy

clubs" in schools, and training for students and school teachers. Nagpur is actively seeking political support for policy changes, engaging citizens in awareness activities and consulting diverse stakeholder groups with an interest in local renewables, and aims for further policies to increase the use of renewable energy and energy efficiency. The city is targeting a 20% reduction in conventional energy consumption of municipal buildings and services by 2012.

Nelson, New Zealand (population 59,000). Nelson aims to become New Zealand's first "solar city" and is engaged in a range of activities for solar hot water and renewable electricity. The city's overall goal is to reduce greenhouse-gas emissions by 40% by 2020, relative to 2001. Starting with a pilot phase for solar hot water as a collaboration of businesses and non-profits with the city, at least 1400 installations are targeted over four years. The program benefits from national solar hot water subsidies of NZ$1000/system for households and $500/m2 for public buildings. The city plans to involve local banks in end-user financing, and is also hoping to establish a revolving fund for household credit and to engage in bulk purchasing with tenders to lower costs. The city is promoting renewable energy in public buildings and in urban design protocols, and further efforts are planned to develop the local market for distributed solar power.

New York City, USA (population 8.3 million). New York City launched its sustainability PlaNYC in 2007 and aims to reduce CO2 emissions by 30% by 2030. The city government currently purchases 6% of its own-use electricity from renewables, and since 2008 has contracted with private developers to purchase power from a 20 MW wind power project. To support solar PV installations, the city established a property tax abatement program, which provides a rebate of 8.75% of installation costs each year for four years, up to $62,500 per year, resulting in a total rebate of 35%. The net-metering capacity limit was also raised from 10kW to 2 MW in late 2008. And the city plans to install 2 MW of solar PV on city-owned buildings through private tendering. The city's first carbon-neutral building, Solar Two, received assistance from the city. New York currently has 1.1 MW of existing solar PV capacity.

Oslo, Norway (population 580,000). In 2005, Oslo adopted a 50% CO2 reduction target by 2030. Oslo plans to increase use renewable energy in its transport system and to entirely phase-out fossil-fuels for heating buildings by 2020. It plans to procure vehicles for municipal use that will be low-carbon or electric, and to improve facilities and incentives for electric vehicles, such as free parking and exemption from road tolls. An energy-efficiency fund operated from 1997-2007 and provided up to 20% of capital costs, including replacement of oil-fired heating boilers with renewable energy, and installation of wood-pellet heaters. A new project plans to produce biogas from organic household waste and sewage sludge. (In 2008, 62% of public transport journeys were made by rail using renewable energy.)

Oxford, UK (population 150,000). Oxford's Low Carbon Buildings Program (LCBP) was launched in 2006 with two planned phases. During the first phase, the city provides subsidies for solar PV, solar hot water, and small-scale wind power in public, commercial, and residential buildings. Households can receive up to £2,500 per property. The second phase provides grants to community groups and non-governmental organizations for renewable energy in public buildings such as schools and churches, up to 50% of the total installation cost and maximum £200,000. By 2009, the city had allocated £45 million to LCBP including £10 million to phase one and £35 million to phase two. The city jointly operates the Community Sustainable Energy Program (CSEP) with a private research organization called the Building Research Establishment (BRE). This program will provide community-based organizations with £8 million to install renewable energy systems and £1 million to develop renewable energy projects. In 2005, Oxford enacted a Climate Change Action Plan that aims to reduce the city's own-use CO2 emissions by 25% by March 2011.

Portland OR, USA (population 580,000). Portland has an extensive history of land-use and transportation planning dating back 30 years. Portland first adopted a local energy policy in 1979,

the first in the United States. Portland's first greenhouse gas reduction plan was adopted in 1993 (also a U.S. first), and then updated in 2001 with a goal of reducing greenhouse gas emissions to 10% below 1990 levels by 2010. The plan also calls for 100% of the municipal government's electricity to come from renewable energy by 2010. In 2006, the city adopted the first local renewable fuels standard in the United States, which mandates 5% biodiesel and 10% ethanol blending with all diesel and gasoline sold within the city limits. The city purchases biofuels for municipal fleet vehicles and also established a $450,000 Biofuels Investment Fund that supports various biofuels production and distribution projects, including projects to install or convert fueling equipment. The city also launched a five-year $2.5 million Green Investment Fund with private partners that is investing in renewable energy projects, and the city facilitates business partnerships for renewable energy investment and green power sales. The Bureau of Planning and Sustainability oversees these efforts.

Rizhao, China (population 2.8 million). Rizhao, in Shandong Province, has been promoting solar hot water for the past 15 years. Currently, 99% of households in central Rizhao use solar hot water and most traffic signals, street lights, and park lights are solar powered. In the surrounding suburbs, more than 30% of households use solar hot water. The provincial government of Shandong has a policy to support research and development in the solar industry, and this policy helped lower the cost of a solar hot water heater to the level of an ordinary electric heater. The city capitalized on this development with policies to promote solar hot water among the public. All new buildings are required to include solar hot water, and the government oversees construction to ensure that this regulation is enforced and the panels are properly installed. The government has also run educational campaigns to encourage people to install solar in their homes, and some government bodies and businesses have provided solar installations to their employees for free. Partly due to the widespread use of solar energy, Rizhao is consistently among the top 10 cities in China in terms of air quality.

Samsø, Denmark (population 4,200). This off-shore island community has already become “carbon-negative” and 100% renewable-electricity powered. Wind turbines provide power, with three-quarters of the generated power sold to mainland Denmark. The exported power more than offsets vehicle emissions and a small number of furnaces burning fossil fuels. The community began the task in 1998 of becoming 100% renewable by 2008, inspired by a national competition by the Danish government. No funding was obtained from outside the community. Rather, local citizens invested in renewable energy projects by buying shares. The investments were marketed as business opportunities, secured by revenue guarantees based on the national feed-in-tariff policy.

San Francisco, USA (population 780,000). San Francisco’s Climate Action Plan aims to reduce greenhouse gas emissions 20% by 2012 (base 1990). The city has several initiatives supporting renewable energy and strives to be a “Solar San Francisco.” One of the first initiatives was a $100 million Solar Energy Bond in 2001. Soon after, the city’s 2002 Electricity Resource Plan targeted 50 MW of renewables by 2012, including 31MW solar PV. The city also requires that all new buildings over 100,000 square feet supply 5% of their energy with onsite solar. And the GoSolar program provides solar PV subsidies of $2,000-4,000 for residential installations ($7000 for low-income residents) and $1500/kW for installations by businesses and non-profit entities (maximum of $10,000). The city is investigating sites for wind power generation within city limits and on city-owned property outside city limits.

Stockholm, Sweden (population 810,000). Stockholm was designated by the European Commission as “European Green Capital” of the year for 2010. Stockholm has developed a series of climate action plans over time. The first plan, from 1995-2000, achieved a reduction in CO2 emissions per-capita to 4.7 tonnes. The second plan, from 2000-2005, further reduced per-capita emissions to 4.0 tonnes. A third plan is currently under development, with a target, established in

2008, for 3.0 tonnes/capita by 2015. Planning includes a wide range of energy efficiency and energy-related measures, including green electricity purchases, solar hot water, and use of biofuels in public transit buses. In transport, the city plans that 50% of all buses should run on biogas or ethanol by 2011, and 100% of buses by 2025. Metro and commuter trains already run on renewable electricity. Investments in additional biofuels filling stations are planned. The city is also promoting greater use of biomass for district heating and co-generation. And information campaigns are educating households, employees, and school children about their emissions.

Tokyo, Japan (population 13 million). Tokyo's main targets are to reduce CO2 emissions by 25% by 2020, and to increase the share of renewable energy to 20% of total energy consumption by 2020. These targets were established in 2006 with the Tokyo Renewable Energy Strategy and a climate change action plan that called for emissions trading and was subsequently merged into the Tokyo Environmental Master Plan (2008). Those plans contained a further target for 1 GW of solar PV within city limits. The city provides subsidies to households for solar PV (JPY 100,000/kW) and solar hot water (up to JPY 33,000/m2), on condition that the resulting green-electricity and "green-heat" certificates become the property of the city government for trading. That trading is due to get a large boost starting in 2010 when a mandatory carbon cap-and-trade system will be imposed on large businesses. Obligated businesses will meet obligations by reducing emissions or by trading green-electricity certificates and green-heat certificates derived from solar hot water. The city is also facilitating a "Green Energy Purchasing Forum" for trading of green-electricity and green-heat certificates by all consumers and buyers that is designed to encourage "demand-pull" for renewable energy. The city also mandates that public and some other facilities must purchase green certificates equal to 5% of electricity use and also purchases biodiesel for public buses.

Toronto, Canada (population 2.5 million). Toronto currently has several municipal representatives and a mayor that campaigned to prioritize environmental protection. The city targets greenhouse gas emissions reductions of 6% by 2012, 30% by 2020, and 80% by 2050. The city also targets local pollutant emissions reductions of 20% by 2012. To help achieve these targets, the city plans to obtain 25% of electricity for municipal operations and buildings from renewable energy, by 2012. The city purchases biodiesel for its entire municipal vehicle fleet, and has established a $20 million Sustainable Energy Fund to provide low-interest financing for renewable energy projects. Toronto has installed solar PV on public buildings and is also facilitating "solar neighborhood" initiatives that promote innovative modes of community ownership.

Wellington, New Zealand (population 190,000). Wellington adopted a goal of reducing community CO2 emissions by 30% by 2020 and 80% by 2050, and reducing government own-use emissions by 40% by 2020 and 80% by 2050. One of Wellington's main strategies has been to promote wind power within it territorial boundaries by incorporating support for wind into land-use planning and consents. The city supported a major 143-MW wind farm being completed by 2009, including land-use consent, and support for community consultation and traffic management. Other policies and projects for renewable energy include a $300 rebate of consent fees for solar hot water and other renewable energy technologies, consideration of solar hot water in upgrades to city-owned housing, a landfill-gas partnership with a private company, and solar hot water in public facilities.

Woking Borough, UK (population 91,000). The borough has installed combined heat-and-power in city council offices, as well as scattered mini-power stations, solar rooftop PV, and district heating. The town centre is energy self-sufficient and exports any surplus power. Diurnal and seasonal differences in solar and combined heat and power (CHP) are managed comprehensively. The borough has mandated that 10% of the energy required by all commercial and residential development must be generated by on-site RE and if this development is large, CHP is required. The borough has developed 20–30 year business/investment plans for renewable energy, requiring minimum internal rate of return (IRR) of 8% and expected revenue from both energy sales and green certificates. Money from energy savings through energy efficiency investments is used for

further energy savings and renewable energy infrastructure development. Woking has partnered with the council energy company, Thamesway Energy Limited, and receives income from energy savings derived from the Council's Housing energy conservation, renewable energy, and CHP programs in the residential sector. Future priorities are to expand the number of CHP/renewable energy stations in the borough; to ensure that private power developers are connecting to Woking's local (private wire) distributed generation system, or supplying power for their own uses; and to build external partnerships and encourage private wire distributed generation systems elsewhere.

Yokohama, Japan (population 3.6 million). Yokohama adopted a comprehensive urban plan "Yokohama Energy Vision" in 2008 that includes promotion of renewable energy. Central to this plan are targets to reduce greenhouse-gas emissions by 30% by 2025 and by 60% by 2050 (base 2004). Two-thirds of the emissions reduction will come from energy efficiency and one-third from renewable energy, which implies a ten-fold increase in renewable energy use by 2025. To achieve the target, a number of renewable-energy-related measures have been adopted: a requirement that large commercial buildings formulate CO2 reduction plans; installations of solar PV on government buildings and schools; subsidies for household solar PV; promotion of green-power certificate trading and purchases; use of city building rooftops for private renewable energy installations; and implementation of city-owned renewable energy projects that are financed by businesses and citizen-investors. The city is also considering solar hot water requirements for new construction. In the transport sector, the city is promoting a long-term roadmap for electric vehicles and ultimately a zero-emission transport system.

6. FURTHER RESEARCH

This report is still a work in progress. The ultimate purpose of this report is to

- Give an understanding to the global energy/environment community of the importance of cities for renewables and show how much is being done.
- Inform and inspire people in cities (especially decision-makers and local government staff) to do more and give them basic knowledge to understand opportunities and possibilities.
- Show how communities are influenced by local governments (and vice-versa) in investing in renewable energy.
- Give insight into potentials -- how much renewables are possible at the local level given specific conditions and policies.

There are at least seven basic types of information that can be collected about local renewable energy around the world. This working draft report is only addressing type #1, but future editions should consider the other categories as well.

1. Policies and targets: Which policies exist? What are future targets?

2. Indicators: Which indicators best show the extent to which renewables are used or possible (actual and potentials), and what do those indicators show for cities worldwide?

3. Enabling (framework) conditions: What factors and conditions most influence (enable/inhibit) city action or inaction? For example:

- What legal authorities exist that allow city action?
- Do national or state policies help the city in its goals? Do they hinder?
- Have city policies keyed off the national or state policies?
- Who are key stakeholders in regard to renewable energy and how do they participate?
- Is there a “renewable energy champion” within the city government?

4. Influence on national policies: How are national policies affected by local policies? Are there mechanisms by which local policy initiative eventually translates into national policy?

5. Policy-making processes: What are the historical and ongoing policy-making processes related to renewables? Who has shaped, led, and/or hindered those processes?

6. Results: Have policies been effective? What are the impacts and outcomes? Evidence?

7. Associations: How does the city participate with national or global associations related to renewable energy or climate change? Which associations and what benefits result?

POLICY EXAMPLES

Table P1: Targets for CO2 Emissions Reductions	
Austin TX, USA	Zero net emissions ("carbon-neutral") by 2020
Adelaide, Australia	Zero net emissions in transport (by 2012) and buildings (by 2020), and reduce 20% by 2010 for government own-use emissions (base 1994)
Ballarat, Australia	Reduce 30% by 2010 (base 2000) and zero net emissions by 2020
Barcelona, Spain	Reduce 20% by 2010 (base 1999); also reduce per-capita emissions to 3.15 tonnes equivalent CO2/person by 2010
Berlin, Germany	Reduce 25% by 2010 (base 1990)
Berkeley CA, USA	Reduce 80% in government own-use emissions by 2050
Bologna, Italy	Reduce 6.5% by 2012
Boston MA, USA	Reduce 7% by 2012 and 80% by 2050 (base 1990)
Busan, Korea	Reduce 10% by 2015 (base 2005)
Calgary AB, Canada	Reduce 20% by 2020; 50% by 2050 (base 2005)
Chicago IL, USA	Reduce 25% by 2020; 80% by 2050 (base 1990)
Christchurch, New Zealand	Reduce 20% by 2020 (base 1994) for community; reduce 70% by 2011 for local government council and carbon-neutral beyond 2015.
Copenhagen, Denmark	Reduce 20% by 2015; zero net emissions by 2025
Edmonton AB, Canada	Reduce 20% by 2020 (base 1990)
Freiburg i. BR, Germany	Reduce 40% by 2030 (base 1992)
Guelph ON, Canada	Reduce 6% by 2010; 20% by 2010 for businesses (base 1994)
Gwangju, Korea	Reduce 20% by 2020 (base 1990)
Halifax NS, Canada	Reduce 20% by 2012 (base 1997)
Hamburg, Germany	Reduce 40% by 2020 and 80% by 2050 (base 1990)
Hamilton ON, Canada	Reduce 20% by 2020 (base 1990); 10% by 2012 and 20% by 2020 for businesses (base 2005)
Hepburn Shire, Australia	Reduce 20% by 2010 for government own-use
Iida City, Japan	Reduce 40-50% by 2030 for households and 70% by 2050 (base 2005)
Kawasaki, Japan	Reduce 6% by 2010 (base 1990)
Kitakyushu, Japan	Reduce 150% by 2050 (net negative emissions)
Kyoto, Japan	Reduce 10% by 2010
London, UK	Reduce 20% by 2010 and 60% by 2050 (base 1990)
Los Angeles CA, USA	Reduce 35% by 2030 (base 1990)
Madrid, Spain	Reduce 14% by 2012 and 50% by 2050
Malmö, Sweden	Reduce 25% by 2012 (base 1990)
Melbourne, Australia	Reduce 30% by 2010 and zero net emissions by 2020; reduce street lighting 50% by 2010 (base 1996)
Montreal QC, Canada	Reduce 20% by 2012
Moreland, Australia	Zero net emissions by 2030; zero net emissions by government own-use by 2020
Münster, Germany	Reduce 40% by 2020 (base 1990)
Nelson, New Zealand	Reduce 40% by 2020 (base 2001)
New Castle, Australia	Reduce 25% below 2008 BAU scenario; 30% for government own-use emissions (base 1995)
New York City, USA	Reduce 7% by 2012 (base 1990)
Oakville ON, Canada	Reduce 6% by 2014; 20% for businesses (base 2004)
Oslo, Norway	Reduce 50% by 2030 (base 1991)
Ottawa ON, Canada	Reduce 20% by 2012 (base 1990)
Philadelphia PA, USA	Reduce 10% by 2010 (base 1990)

Portland OR, USA	Reduce 10% by 2010 (base 1990)
Rhône-Alpes, France	Reduce 20% by 2020
Saitama, Japan	Reduce 6% per-capita by 2010 (base 1990)
Salt Lake City UT, USA	Reduce 3% annually for 10 years, with a long-term goal of reducing emissions 70% from present levels by 2040
San Francisco CA, USA	Reduce 20% by 2012 (base 1990)
Sapporo, Japan	Reduce 6% per-capita by 2010 (base 1990); reduce 10% total by 2017 (base 1990)
Seattle WA, USA	Reduce 7% by 2012 (base 1990)
Sendai, Japan	Reduce 7% per-capita by 2010 (base 1990)
Seoul, Korea	Reduce 25% by 2020 (base 1990)
Stockholm, Sweden	Reduce per-capita CO2 to 3.0 tonnes/person by 2015 (base 5.5 tonnes/person in 1990)
Sydney, Australia	Reduce 70% by 2030 (base 2006); reduce 70% by 2050 (base 1990); reduce 20% by 2012 for government own-use (base 2006)
Tokyo, Japan	Reduce 25% by 2020 (base 2000)
Toronto ON, Canada	Reduce 6% by 2012; 30% by 2020; 80% by 2050
Waitakere, New Zealand	Reduce 40% per-capita by 2021, 80% per-capita by 2051 (base 1990) for community; reduce 50% by 2021 for corporate emissions
Wellington, New Zealand	Reduce 30% by 2020 and 80% by 2050 (base 2001) for community; reduce 40% by 2020 and 80% by 2050 for corporate emissions
Winnipeg MB, Canada	Reduce 20% by 2018 (base 1998)
Whitehorse YT, Canada	Reduce 6% by 2013 (base 2001); 20% for municipal own-use (base 1990)
Vancouver BC, Canada	Reduce 6% by 2012 (base 2007); 33% by 2020; 80% by 2050; and all new buildings should be carbon-neutral by 2030
Växjö, Sweden	Reduce 50% per-capita by 2010 and 70% by 2025
Yokohama, Japan	Reduce 30% per-capita by 2025; 60% per-capita by 2050

Table P2: Targets for Share of Renewable Electricity	
Austin TX, USA	30% by 2020
Adelaide, Australia	15% by 2014
Ann Arbor MI, US	20% by 2015
Cape Town, S. Africa	10% by 2020
Freiburg i. BR, Germany	10% by 2010
Taipei City, Taiwan	12% by 2020
Sydney, Australia	25% by 2020

Table P3: Targets for Share or Amount of Renewable Energy	
Ballarat, Australia	10% of total energy by 2016
Beijing, China	4% of electric power capacity by 2010 and 6% of heating capacity
Bhubaneswar, India	2% reduction in conventional energy consumption by 2012 (compared to 2005)
Bristol, UK	20% of energy used by new buildings
Calgary AB, Canada	30% of total energy by 2036
Cape Town, South Africa	10% of total energy by 2020
Daegu, Korea	5% of total energy by 2012; 15% reduction in (total/conventional) energy consumption by 2030

Guelph ON, Canada	25% of total energy by 2023
Grenoble, France	21% of total energy (currently 8%)
Gwangju, Korea	2% of total energy by 2020
Halifax NS, Canada	30% of energy for commercial buildings
Kawasaki, Japan	8 PJ by 2010
Kobe, Japan	3-4% of energy by 2010
Leicester, UK	10% of total energy by 2010 and 20% by 2020
London, UK	665 GWh of electricity and 280 GWh of heat by 2010
Lübow-Krassow district, Germany	100% of total energy by 2030
Lüchow-Dannenberg district, Germany	100% of total energy by 2010-2015
Madrid, Spain	20% reduction in fossil-fuel use by 2020
Münster, Germany	20% of total energy by 2020
Melbourne, Australia	25% of electricity for residential buildings and 50% of public lighting by 2010
Nagpur, India	3% reduction in conventional energy consumption by 2012 (compared to 2005)
Niigata, Japan	3 PJ by 2012
Rajkot, India	10% reduction in conventional energy consumption by 2013
Rhône-Alpes, France	23% of total energy by 2020
Saitama, Japan	6.7% of total energy by 2012
Salt Lake City, USA	10% of energy used for new buildings
Shanghai, China	5% of energy (capacity) by 2010
Stockholm, Sweden	80% of district heating from renewable sources
Subury ON, Canada	50% of energy from “local sources”
Taipei City, Taiwan	12% of total power generating capacity by 2020
Tokyo, Japan	20% of total energy by 2020
Växjö, Sweden	100% of total energy (fossil-fuel free)
Yokohama, Japan	10-fold expansion of renewable energy by 2025

Table P4: Targets for Installed Capacity of Renewable Energy	
Adelaide, Australia	2 MW of solar PV on residential and commercial buildings
Barcelona, Spain	100,000 m2 of solar hot water by 2010
Boston MA, USA	25 MW of solar PV by 2015
Kunming, China	6 million m2 surface area covered by of solar PV and solar hot water, with at least 100 MW solar PV
Leister, UK	1000 buildings with solar hot water by 2010
Los Angeles, USA	1.3 GW of solar PV by 2020, though a combination of residential and commercial programs and city-owned facilities
Nagoya, Japan	solar PV for 23,000 households and 13,000 businesses
Philadelphia, USA	58 MW of solar PV by 2021
Rovigo prov., Italy	13,000 m2 of solar hot water and 1.3 MW of solar PV by 2010
Sakai, Japan	solar PV for 10,000 households by 2013 and 100,000 by 2030
San Francisco CA, USA	50 MW of renewables by 2012, including 31 MW of solar PV
Shanghai, China	200-300 MW of wind and 10 MW of solar PV by 2010
Sudbury ON, Canada	150 MW of wind and 10 MW small-hydro
Tokyo, Japan	1 GW of added solar PV by 2010
alloon region, Belgium	200,000 m2 of solar hot water/heating collectors by 2010

Table P5: Targets for Local Government Own-Use Purchases of Renewable Energy	
Austin TX, USA	100% of own-use electricity by 2012
Boston, USA	11% of own-use electricity (currently), 15% by 2012
Bhubaneswar, India	reduce by 15% own-use conventional energy by 2012
Bristol, UK	15% of own-use electricity (14% currently)
Calgary AB, Canada	100% of own-use electricity by 2012
Chicago, USA	20% of own-use electricity by 2006
Christchurch, New Zealand	100% of own-use electricity from carbon-neutral supplier (currently)
Hepburn Shire, Australia	100% for own-use in buildings, 8% for public lighting
Houston TX, USA	50% of own-use electricity (currently)
Kawasaki, Japan	5% of own-use electricity (currently)
Madison WI, USA	20% of own-use electricity by 2010
Mississauga ON, Canada	100% of own-use electricity for city center (currently)
Nagpur, India	reduce by 20% own-use conventional energy by 2012
New York City, USA	20 MW of wind power for own-use by 2008
Okotoks AB, Canada	80% of own-use electricity (currently)
Philadelphia PA, USA	15% of electricity for city buildings by 2015
Portland OR USA	100% of own-use electricity by 2010
Santa Monica CA, USA	100% of own-use electricity (currently)
Sydney, Australia	100% of own-use energy
Woking Borough, UK	20% of own-use electricity by 2011
Tokyo, Japan	5% of electricity by 2020 for public facilities
Toronto ON, Canada	25% of own-use electricity by 2012
Sydney, Australia	100% of own-use electricity for buildings; 20% for street lighting
Waitakere, New Zealand	15% of own-use energy by 2015 and 20% by 2020

Table P6: Targets for Share of Buildings with Renewable Energy	
Cape Town, S. Africa	10% of homes with solar hot water by 2010
Dezhou, China	50% of buildings with solar hot water by 2010
Iida City, Japan	30% of homes with solar PV by 2010
Kunming, China	50% of buildings with solar hot water and/or solar PV by 2010; 90% of new construction
Oxford, UK	10% of homes with solar hot water and/or solar PV by 2010

Table P7: Urban Planning	
Adelaide, Australia	“Adelaide City Development Plan” calls for green buildings and renewable energy technologies
Barcelona, Spain	“Plan for Energy Improvement in Barcelona (2002-2010)” includes increasing the share of renewable energy used
Berlin, Germany	“Berlin Energy Action Plan”
Chicago IL, USA	“Chicago Climate Action Plan”
Dubai, UAE	Sustainable Development Policy
Guelph ON, Canada	“Community Energy Plan”
Göteborg, Sweden	“Göteborg 2050” envisions being fossil-fuel-free by 2050
Halifax NS, Canada	“Community Energy Plan”
Hamburg, Germany	Developing Wilhelmsburg model urban district supplied entirely from renewables
Hokuto, Japan	“Hokuto New Energy Vision”
Kawasaki, Japan	“Kawasaki City New Energy Vision”
Kobe, Japan	“Kobe City New Energy Vision”
London, UK	“London Energy Strategy” calls for “sustainable energy system” by 2050
Melbourne, Australia	“Zero Net Emissions by 2020” calls for green building design, energy efficiency, renewable energy, and tree planting.
Mexico City, Mexico	“Proaire 2002-2010” targets reduced reduced air pollution and greenhouse gas emissions. Projects include energy efficiency and solar hot water in the residential sector.
New York City, USA	“PlaNYC 2030” encourages solar and distributed generation, pilot projects
Ottawa ON, Canada	“Ottawa 2020” and “Air Quality and Climate Change Management Plan”
Porto Alegre, Brazil	“Program to Encourage the Use of Solar Energy in Buildings”
Saitama, Japan	“Saitama City New Energy Vision”
Salt Lake City, USA	"Salt Lake City Green" environmental plan includes wind power purchases
Shanghai, China	“Regulations of Renewable Energy Development in Shanghai”
Taipei City, Taiwan	“Renewable Energy Promotion Plan”
Tokyo, Japan	“Tokyo Renewable Energy Strategy” (2006); “Tokyo Environment Master Plan” (2008); “Tokyo Climate Change Action Plan” (2007)
Toronto ON, Canada	“Sustainable Energy Action Plan”
Tsuru, Japan	“Tsuru Regional New Energy Vision”
Växjö, Sweden	“Fossil Fuel Free Växjö” to reduce per-capita CO2 emissions
Wellington, New Zealand	District planning encourages renewable energy, particularly wind power
Yokohama, Japan	"Yokohama Energy Vision" targets commercial and public buildings, electric vehicles, solar PV subsidies, green power certificates, and solar hot water mandates

Table P8: Building Codes and Mandates	
Barcelona, Spain	Mandates 60% of hot water heating energy from solar in all new buildings and major renovations; was subsequently copied by 70 other municipalities throughout Spain
Berkeley CA, USA	Mandated design review for solar PV installations in industrial, commercial, and some residential buildings
Berlin, Germany	Mandates for solar hot water on some new buildings
Boulder CO, USA	No-shade building ordinance entitles all structures to sunshine
Cape Town, South Africa	Requires solar hot water in new houses for middle- and high-income groups
Delhi, India	Requires solar water heaters in all government hospitals, hotels and jails and also in all residential buildings built on an area of 500 m2 or more
Lianyangang, China	Requires solar hot water in all new residential buildings up to 12 stories, and in new construction and renovation of hotels and commercial buildings
Mexico City, Mexico	Mandates solar hot water for new commercial buildings
Nagpur, India	Requires new residential buildings larger than 1500 m2 to install solar hot water
San Francisco	Requires all new buildings over 100,000 ft2 to supply 5% of building energy use from on-site solar
Tuscon AZ, USA	New single-family homes must include solar hot water or stub-out for later installation
Tokyo, Japan	Requires property developers to assess and consider possibilities for solar hot water and other renewables and report assessments to owners; establishes tradable green-heat certificates based on solar hot water
Rajkot, India	Requires new residential buildings larger than 150 m2 and hospitals and other public buildings to install solar hot water
Rio de Janeiro	Requires all public buildings to use solar hot water for 40% of heating energy (State Law 5.184, 2008)
Rizhao, China	Requires solar hot water in selected types of new buildings
San Francisco CA, USA	Requires new buildings over 100,000 ft2 (9,300 m2) to obtain 5% of energy from onsite solar
São Paulo, Brazil	Mandates solar hot water in residences with four or more bathrooms (larger than 800 m2), and requires new construction to provide the possibility for using solar
Shenzhen, China	Requires solar hot water in new buildings less than 12 stories in height
Vancouver, BC	Requires buildings to allow for future roof-mounted solar
Woking Borough, UK	Requires 10% of energy from on-site renewables in commercial and residential buildings, and CHP in larger developments
Wuhan, China	Requires solar hot water in all residential buildings, hospitals, schools, hotels, recreation facilities, and public buildings less than 12 stories in height. Same requirement for commercial buildings if constructed using government investment.

Table P9: Tax Credits and Exemptions	
Anne Arundel County MD, USA	Property tax credit (50% of installation costs net of state and federal grants and credits, maximum $2500)
Belo Horizonte, Brazil	Tax credits for residential solar
Boulder CO, USA	Rebate of sales and use taxes for solar (15% of tax)
Caledon ON, Canada	Property development fee discount of 5% if projects include some form of on-site renewable energy
Howard County MD, USA	Property tax credit for solar and geothermal (50% of eligible costs, maximum $5000 for solar PV or geothermal heating system, $1500 for solar hot water)
Nagpur, India	Property tax credit of 10% for solar hot water in new residential buildings
New York, USA	Property tax abatement for solar PV. Allows building owners to deduct from property taxes a portion of the expenditures associated with installing a PV system, 8.75% of system expenditures per year for 4 years (total of 35%), with a maximum incentive of $62,500 annually

Table P10: Transport Infrastructure and Fuels Mandates, Operation, Investment, and Subsidies	
Adelaide, Australia	Operate solar-electric public buses and charge using 100% solar electricity
Ann Arbor MI, USA	Subsidies for public-access biofuels stations
Ballarat, Australia	Plan to use biodiesel in municipal fleet vehicles
Betim, Brazil	Mandates for biofuels in public transport and taxis (plan through 2017); also preference to flex-fuel vehicles for municipal vehicle fleet purchases.
Boston MA, USA	Mandate that all new municipal fleet vehicles be alternative fueled
Calgary AB, Canada	B5 and B20 used in municipal fleet vehicles
Curitiba, Brazil	Plan to use biofuels in all municipal buses
Halifax NS, Canada	B5 used in municipal fleet vehicles and public transit; target of 15% biofuels in fleet
Markam ON, Canada	Biofuels used in municipal fleet vehicles
Mississauga ON, Canada	B5 used in municipal fleet vehicles and public transit
New Castle, Australia	B20 used in public vehicles
Ottawa ON, Canada	B5 and E10 fuels used in municipal fleet vehicles
Portland OR, USA	Mandate for biofuels blending B5 and E10 for all diesel and gasoline sold within city limits; biofuels investment fund to enhance production, storage, distribution; biofuels infrastructure grants for conversion of fueling stations; use of biofuels in municipal fleet vehicles
Stockholm, Sweden	Plan to have 50% of all public transit buses run on biogas or ethanol by 2011, and 100% of buses by 2025. Metro and commuter trains run on green electricity. Investments in additional biofuels filling stations.

Table P11: Carbon Cap-and-Trade Schemes	
Tokyo, Japan	Carbon cap-and-trade system imposed on large businesses starting in 2010. Obligated businesses will trade green-electricity certificates and green-heat certificates derived from solar hot water.

Table P12: Promotion and Market-Facilitation Agencies and Departments	
Barcelona, Spain	Energy Agency of Barcelona
Betim, Brazil	Renewable Energy Reference Center
Christchurch, New Zealand	Target Sustainability
Dubai, UAE	Renewable Energy Division
Gelsenkirchen, Germany	Solar City Gelsenkirchen
Münster, Germany	Department of Green Spaces and Environmental Protection
Nagpur, India	Renewable Energy and Energy Efficiency Resource Center
Portland OR, USA	Bureau of Planning and Sustainability
Tokyo, Japan	Division of Global Urban Environment

Table P13: Electric Utility Policies	
Austin TX, USA	Renewable portfolio standard 30% by 2020
Boulder CO, USA	Carbon tax on fossil-fuel electricity purchases
Gainesville FL, USA	Feed-in tariff for solar PV (32 cents/kWh for 20 years)
Mexico City, Mexico	Net metering for solar PV
Minneapolis MN, USA	Renewable portfolio standard 30% by 2020 (for Xcel Energy)
New York City, USA	Net metering up to 2 MW capacity
Oakville ON, Canada	Local utility voluntary green power sales
Sacramento CA, USA	Feed-in tariff for eligible generation starting January 2010 (by SMUD)

Table P14: Subsidies, Grants, and Loans	
Adelaide, Australia	Subsidy for solar PV, A$1000/watt for systems > 1kW
Alice Springs, Australia	Subsidies for solar hot water (35%)
Aspen CO, USA	Subsidies for solar PV ($1500 for systems > 2kW)
Austin TX, USA	Subsidies for solar PV and solar hot water in homes and businesses, and low-interest loans for solar PV
Beijing, China	Subsidies for ground-source heat pumps (50 RMB/m2) and water-source heat pumps (35 RMB/m2)
Berkeley CA, USA	Loans to households for solar PV, repaid through property tax bills (up to $37,500 per installation)
Berlin, Germany	Subsidies for solar PV (40%) and solar hot water (30%) on apartment buildings
Boulder CO, USA	Small loan program ($3000-5000 loans)
Christchurch, New Zealand	Lower permit costs for solar hot water
Delhi, India	Subsidies to non-commercial institutions for solar hot water on buildings of system size 100–6000 liters hot water per day (6,000–60,000 rupees/system)
Dunedin, New Zealand	Waives consent fee for residential solar hot water installations
Kanagawa, Japan	Loans to households for solar PV, solar hot water, and wind

Kawasaki, Japan	Subsidies for solar PV for households (JPY 70,000/kW up to 3.5 kW)
Kyoto, Japan	Subsidies for solar PV for households (JPY 50,000/kW up to 4 kW)
Honolulu HI, USA	Solar Roofs Loan Program provides 7-year low-interest loans (0-2%) and installation in partnership with local electric utility, for low-income residents
Marin County CA, USA	Subsidies for solar ($500 for solar PV, $300 for solar hot water)
Matsuyama, Japan	12.5% of solar PV cost for systems less than 10 kW; JPY 1 million for systems larger than 10 kW
Maui County HI, USA	Subsidy for solar PV ($1000)
Montgomery County MD, USA	Electricity price rebate for clean energy ($0.005/kWh)
Ototoks AB, Canada	Revolving fund provides finance for solar
Orange County FL, USA	Subsidy for solar hot water ($200)
Orlando FL, USA	Subsidy for solar PV in commercial buildings
Palm Desert CA, USA	Loans repaid through property tax assessments ($5000 minimum)
Porto Alegre, Brazil	Grants for installation of solar hot water in buildings (fixed grant per installation)
Rome, Italy	Subsidies for solar hot water (up to 30%) and solar PV (up to 60%)
Sapporo, Japan	Subsidies for solar PV for households (10%)
San Francisco CA, USA	Subsidies for solar PV ($2000-4000 for households, $7000 for low-income households, $1500/kW for businesses and non-profit entities up to $10,000)
Sonoma County CA, USA	Loans repaid through property tax assessments ($2500 minimum)
Southampton NY, USA	Subsidies for solar PV ($2500)
Taipei City, Taiwan	Subsidies for solar hot water
Tianjin, China	Subsidies, discounted loans, and tax rebates
Tokyo, Japan	Subsidies for solar PV in 2009 and 2010 (JPY 100,000/kW) and solar hot water (up to JPY 33,000/m2 based on type)
Toronto ON, Canada	Sustainable energy fund provides low interest loans for renewables
Waitakere, New Zealand	Waives up to $500 of consent fee for residential solar hot water
Yokohama, Japan	Subsidies for solar PV (JPY 65,000/kW, up to 4 kW)

Table P15: Government Funds and Investments	
Beijing, China	13 billion RMB ($2 billion) investment fund to achieve 4% energy target
Edinburgh, UK	Climate Change Fund totaling £18.8 million
Johnstown PA, USA	Community Fund for the Alleghenies provides loans and grants
Kunming, China	Fund for solar PV industry development and solar PV projects
Montreal QC, Canada	CAD$24 million energy fund over 6 years
San Francisco, USA	Solar Energy Bond issue of $100 million
Toronto, Canada	CAD$20 million Green Energy Fund to support renewable energy investments

Table P16: Support for Private and Community Initiative	
Christchurch, New Zealand	Working with private solar hot water companies to reduce purchase costs
Moreland, Australia	Established Moreland Energy Foundation to support private and community initiative; also Solar Bulk-Buying Forum
Milagro, Spain	Citizen-owned 10-MW solar PV power plant, contributing 60% of Navarra's electricity supply (750 citizen-owners)
Iida City, Japan	Community-directed investment fund for solar PV of $2 million equivalent
Samsø, Denmark	Citizen-owned wind turbines that provide 100% of community's power needs
Tokyo, Japan	Facilitates "Green Energy Purchasing Forum" for trading of green-electricity and green-heat certificates