Sustainable Urban Energy and Emissions Planning Guidebook

A GUIDE FOR CITIES IN EAST ASIA AND PACIFIC
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Preface

This Guidebook builds on the World Bank’s report “Energizing Green Cities in Southeast Asia: 3 City Synthesis Report,” which is a product of the AusAID-supported Sustainable Urban Energy and Emissions Planning (SUEEP) program in the East Asia and Pacific (EAP) region. The SUEEP program seeks to help EAP city governments to formulate long-term sustainable urban energy and low-carbon development strategies that can be integrated into existing development plans. The Guidebook aims to help cities to establish and implement a road map for achieving a sustainable energy future. Its comprehensive framework and indicative step-by-step guide are intended to support cities’ efforts to develop their unique energy and emissions plans.

The World Bank will be using this Guidebook as a tool to support cities in sustainable urban energy and emissions planning. The Guidebook will be revised after subsequent phases of the SUEEP process are implemented and the lessons learned are reviewed. We look forward to providing support to EAP cities that are keen to embark on the journey toward sustainable development for the benefit of future generations.
Acknowledgments

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### Abbreviations and Acronyms

<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Full Form</th>
<th>Description</th>
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<tbody>
<tr>
<td>AusAID</td>
<td>Australian Agency for International Development</td>
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<tr>
<td>BRT</td>
<td>bus rapid transit</td>
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<tr>
<td>BTU</td>
<td>British thermal unit</td>
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<tr>
<td>CDM</td>
<td>Clean Development Mechanism</td>
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<tr>
<td>CER</td>
<td>Certified Emission Reduction</td>
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<tr>
<td>CFL</td>
<td>compact fluorescent lamp</td>
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<tr>
<td>CNG</td>
<td>compressed natural gas</td>
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<tr>
<td>CO₂</td>
<td>carbon dioxide</td>
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</tr>
<tr>
<td>DOE</td>
<td>Designated Operational Entity</td>
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<tr>
<td>EAP</td>
<td>East Asia and Pacific</td>
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<tr>
<td>EB</td>
<td>Executive Board</td>
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<tr>
<td>ESCO</td>
<td>Energy services company</td>
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<tr>
<td>ESMAP</td>
<td>Energy Sector Management Assistance Program</td>
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<tr>
<td>GDP</td>
<td>gross domestic product</td>
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<tr>
<td>GHG</td>
<td>greenhouse gas</td>
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<tr>
<td>GTZ</td>
<td>German Technical Cooperation</td>
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<tr>
<td>HFC</td>
<td>hydrofluorocarbons</td>
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</tr>
<tr>
<td>ICLEI</td>
<td>Local Governments for Sustainability</td>
<td></td>
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<tr>
<td>IMCCC</td>
<td>Inter-Ministerial Committee on Climate Change</td>
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<td>IPCC</td>
<td>Intergovernmental Panel on Climate Change</td>
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<tr>
<td>KPI</td>
<td>Key Performance Indicator</td>
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<tr>
<td>kW</td>
<td>kilowatt</td>
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<tr>
<td>kWh</td>
<td>kilowatt-hour</td>
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<tr>
<td>LED</td>
<td>light-emitting diode</td>
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<tr>
<td>LEED</td>
<td>Leadership in Energy and Environmental Design</td>
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<tr>
<td>LPG</td>
<td>liquefied petroleum gas</td>
<td></td>
</tr>
<tr>
<td>MMBTU</td>
<td>million BTU</td>
<td></td>
</tr>
<tr>
<td>MW</td>
<td>megawatt</td>
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<tr>
<td>NCCS</td>
<td>National Climate Change Secretariat</td>
<td></td>
</tr>
<tr>
<td>NGO</td>
<td>nongovernmental organization</td>
<td></td>
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<tr>
<td>OECD</td>
<td>Organisation for Economic Co-operation and Development</td>
<td></td>
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<tr>
<td>PFC</td>
<td>perfluorocarbons</td>
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<tr>
<td>PMEB</td>
<td>Barcelona Energy Improvement Plan</td>
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| PLN          | Perusahaan Listrik Negara  
  (state-owned electricity company) |
| PoA          | programs of activity |
| PPP          | public-private partnership |
| ROI          | return on investment |
| SEAP         | Sustainable Energy Action Plan |
| SED          | Sustainable Energy Development |
| SET          | Sustainable Energy for Tshwane |
| SUEEP        | Sustainable Urban Energy and Emissions Planning |
| toe          | ton of oil equivalent |
| TRACE        | Tool for Rapid Assessment of City Energy |
Cities currently account for about two-thirds of the world’s annual energy consumption and about 70 percent of the world’s greenhouse gas (GHG) emissions. In the coming decades, urbanization and income growth in developing countries are expected to push cities’ shares even higher. Urban growth will be particularly notable in Asia, where the urban population is expected to increase by 50 percent between 2000 and 2030, and the urban share of East Asia’s total population is expected to rise from 46 percent in 2011 to 60 percent by 2030.

To this end, the AusAID-supported Sustainable Urban Energy and Emissions Planning (SUEEP) program in the East Asia and Pacific region (EAP) seeks to help city governments in the EAP region to formulate long-term sustainable urban energy and low-carbon development strategies that can be integrated into existing development plans.

**Why Engage in the SUEEP Process?**

Today’s rapid population growth coupled with the increase in per capita energy consumption and urbanization taking place in the EAP region mean that now is the time for government leaders to take action and “future proof” their cities against an unsustainable energy future. Current baseline projections for the region show a startling spike in energy demand on the horizon. However, the EAP region’s rapid pace of construction, quickly shifting transportation sector, and growing industries give cities the unique opportunity to rein in energy-intensive development and nurture progressive energy and emissions policies that can help prevent the overly energy-dependent development suffered by many cities around the world.

**Overarching City Aspirations**

Energy use and GHG emissions are inextricably linked with how well a city works overall. The SUEEP process is designed so that energy and emissions planning are aligned with overarching city goals, including

- improved quality of life,
- economic growth, and
- environmental protection.

A strong SUEEP process links these aspirations with actionable initiatives to improve energy and emissions performance. It also enables benefits such as local air quality improvements, financial savings, new jobs, local economic development, and new partnerships across city agencies and the private sector.

**Green Growth**

Similarly, the SUEEP process is closely related to the fundamentals of “green growth,” that is, economic growth centered on sustainable use of natural resources. Green growth is about making growth processes resource-efficient, cleaner, and more resilient without necessarily slowing them.

Many cities around the world are now referencing the green growth model as they develop their economic plans. Fully addressing green growth strategies is beyond the scope of this Guidebook, but many green growth principles are demonstrated in the SUEEP process and can be considered comprehensively by city authorities.
About This Guidebook

What Is the SUEEP Process?
The purpose of the SUEEP process is to provide a comprehensive approach to planning to maximize energy efficiency across city sectors. The intent is to help cities to develop their own initiatives using different mechanisms and to help them to define a governance system for implementation, monitoring, and reporting. These are important outcomes because they improve energy governance in the city and create a common platform for collaboration between the city and donors, civil society, and the private sector. The SUEEP process also provides a framework that helps city governments prepare a series of investments in energy efficient infrastructure as well as mobilize “green financing” support. The strategic framework for sustainable urban energy development and the pipeline of bankable projects are to be identified in the city’s energy and emissions plan.

Core components of an SUEEP process include the compilation of data on the city’s energy and emissions baseline, involvement of stakeholders throughout the process, implementation of prioritized projects, and monitoring and reporting of outcomes. The data are used to set energy and emissions targets in line with the city’s overall vision and goals.

What Is the Purpose of This Document?
This document is meant to provide a broad framework and an indicative step-by-step guide to help a city to develop its own energy and emissions plan. These guidelines are based on experiences in three pilot cities (Da Nang, Vietnam; Surabaya, Indonesia; and Cebu City, Philippines) combined with best practices in sustainability planning in other cities. This document will undoubtedly be revised in the future after subsequent phases of the SUEEP process are implemented and the lessons learned are reviewed.

It is unlikely that a city will be able to use just these guidelines to undertake the complex, long-term process of energy planning. Many references are provided and components of the process that may require special support from local or international organizations are identified.

Why Is This Document Focused on the EAP Region?
Growing energy demand in EAP is expected to double the region’s total carbon dioxide emissions by 2030. EAP is also home to the world’s most rapidly expanding urban population. The region’s growing middle class is accelerating the pace of construction and urban expansion. Energy use efficiency is influenced directly and permanently by urban form and density and by investment choices made today about urban infrastructure (transportation, water, energy) and capital, all of which will have a major impact on both energy demand and associated GHG emissions. For example, the recent explosive growth in personal motor vehicles and low-density housing, if untempered, foreshadows future development of high-energy-intensity urban scenarios as the energy demands of the middle- and upper-income residents increasingly mimic those of their counterparts in the developed world.

This Guidebook recognizes the unique conditions of EAP cities and provides information tailored to the region to enable cities to establish the programs and policies that can secure their energy and emissions futures. This document covers the entire planning process, starting with detailed guidance on articulating a vision, establishing energy governance, and engaging stakeholders—three components of sustainable urban energy typically not firmly established in EAP cities. In addition, special emphasis is given to the Clean Development Mechanism and alternative financing methodologies relevant to Asia because these incentives for green growth are strong opportunities for the region. Reference guides from Europe and the United States also provide technical guidance for specific challenges of the SUEEP process, and case studies from the EAP region and from around the world provide examples of how other cities have tackled the challenges of sustainable urban energy planning.
The city’s role as regulator gives it the most clout to manage energy and GHG on a citywide basis, but all four of the city’s roles are important in the SUEEP process. For example, the city as energy consumer leads to an approach focused on internal operations, and may include measures such as establishing an energy and GHG “champion,” devising a sustainable procurement policy, retrofitting buildings with energy-saving equipment, and educating employees about energy-saving practices. But for the city’s role as energy producer and supplier, SUEEP activities might focus on developing efficient generation and distribution technologies, rolling out progressive tariff structures, and establishing effective city utility governance structures for energy efficiency and GHG management.

In addition to the city government’s multiple internal roles, city leaders also need to work closely with the national government—many energy policies, plans, and programs implemented at the national level could affect local policies and investments.

**SUEEP Process Overview**

The SUEEP process is divided into six main stages (see figure 1.1):

- **Commitment**
- **Urban Energy and Emissions Diagnostics**
- **Goal Setting**
- **Planning**
- **Implementation**
- **Monitoring and Reporting**

The steps within each stage, and the stages themselves, overlap on occasion—planning is not a neatly linear process. The SUEEP process is meant to give cities a framework for their energy- and emissions-planning activities, and is not designed to be overly rigid or formulaic. A city should work through the process in any way that suits its unique conditions.

The process begins with Commitment, the first stage in securing political and stakeholder support for the energy and emissions plan. A strong commitment from local leaders is essential to the plan’s long-term success and lays the groundwork for future action.
During the second stage, Urban Energy and Emissions Diagnostics, a city collects the basic data needed to understand its energy and emissions baseline and identify areas of activity that are important and have the potential for improvement.

The third stage, Goal Setting, involves combining the city’s overarching political priorities with the findings of the second stage to develop energy and emissions goals relevant to the city. Establishing a convincing story about the importance of energy and emissions planning and how the city will benefit are crucial to the success of the process.

The fourth stage, Planning, brings together all the knowledge and thinking developed thus far into a documented plan that clearly expresses the city’s strategic focus on energy, the initiatives that will help the city achieve its goals, and how progress will be monitored.

Implementation is the longest-running stage of the process, and will overlap with future iterations because some initiatives from this stage will span lengthy periods. The success of this stage directly depends on robust planning in the previous stage so that inadequate governance structures, a lack of financing, or a hostile policy environment do not derail implementation.

The Monitoring and Reporting stage takes stock of SUEEP progress and identifies components of the plan that need readjusting. This stage is crucial for establishing accountability and for refining the plan to continually improve its approach to energy efficiency and emissions reduction.

The Monitoring and Reporting stage provides crucial inputs into each successive SUEEP process—which ideally would occur every two to three years. After the first iteration of the process, the city will be able to reaffirm or revise its commitment, recast its vision and goals, if necessary, and begin the diagnostics to lay the foundation for its next energy and emissions plan.

**Multiple Levels of Engagement**

The SUEEP process provides a comprehensive approach to integrating energy efficiency measures into a city’s character, but cities have different capacities, resources, and priorities. To accommodate the individuality of cities, three levels of engagement are possible:
A high-level and quick assessment of a city’s energy efficiency measures. The Tool for Rapid Assessment of City Energy (TRACE), developed by the World Bank’s Energy Sector Management Assistance Program, offers city governments quick diagnoses of energy efficiency performance across their systems and sectors. TRACE prioritizes sectors and presents a range of potential solutions. The tool includes embedded implementation guidance and illustrative case studies (for more details on TRACE, see technical assistance opportunities 3.2 and 4.2).

- Deeper sectoral engagement in selected areas to help finance energy projects and to bring technical expertise to projects (for example, public-private partnerships).
- Implementation of all stages of the SUEEP process, the success of which will depend on a city government’s interest, commitment, and ownership.

**ICONS USED IN THIS GUIDEBOOK**

- **CASE STUDY:** The case studies presented throughout this document illustrate how cities and organizations around the world have implemented either part or all of the SUEEP process.
- **EXAMPLE:** Illustrative examples of key concepts or activities are provided throughout the Guidebook. Examples cover a wide range of information, but generally include information from cities that have already begun developing a component of an energy and emissions plan.
- **RESOURCES:** The Guidebook recognizes that some aspects of planning require more detailed implementation guidance. Resources point to various books, articles, references, and websites that provide further detail on a specific aspect of the SUEEP process.
- **TECHNICAL ASSISTANCE OPPORTUNITY:** If technical assistance is available for complicated or specialized aspects of the SUEEP process, the Guidebook points the reader to resources for engaging assistance from external organizations.
- **TIP:** The tips are short suggestions to help cities successfully implement the SUEEP process. Tips include lists of considerations, common pitfalls, key success factors, and the like.
- **TOOLKIT REFERENCE:** An Excel-based toolkit supplements Chapter 3: Urban Energy and Emissions Diagnostics and Chapter 5: Planning. The reader will be pointed to the specific tool referenced in the Guidebook. The applicable spreadsheets and templates are contained in the CD-ROM SUEEP Toolkit.
References

This Guidebook is built on the following documents:

**Sustainable Urban Energy Planning: A Handbook for Cities and Towns in Developing Countries, 2009**
Developed by ICLEI (Local Governments for Sustainability), UN-Habitat, and UNEP (United Nations Environment Programme). Full document and further information available at www.iclei.org.

**How to Develop a Sustainable Energy Action Plan (SEAP), 2010**
Developed by The Covenant of Mayors, European Union. Full document and further information available at www.eumayors.eu.

Developed by EnEffect, the Bulgarian Centre for Energy Efficiency, in the framework of the MODEL Project, financed by the European Commission under the Intelligent Energy - Europe Programme. Full document and further information available at www.energy-cities.eu.

**Energy Planning Guidance: An Introduction, 2009**

**BELIEF: Involve Stakeholders and Citizens in Your Local Energy Policy, 2008**
Developed by Energie-Cities, with the support of Intelligent Energy Europe, Sustainable Energy Europe.

**The Climate Compass Compendium of Measures for Local Climate Change Policy**
Developed by Climate Alliance (the European City Network). Full document and further information available at www.climate-compass.net.

Developed by ENOVA / 3-NITY. Full document and further information available at www.managenergy.net.


**European Energy Award, 2011**
Developed by European Energy Award. Further information available at www.european-energy-award.org.

**Climate Protection Manual for Cities, 2007**

**Eco2 Cities Guide. Ecological Cities as Economic Cities, 2012**

**Green Infrastructure Finance: Framework Report, 2012**
Commitment

Commitment sets the stage for successful energy and emissions management by establishing high-level political buy-in to propel the rest of the process. Establishing political and stakeholder commitment to SUEEP by developing the city’s vision for energy and emissions is important, as is setting up governance structures for development and implementation of the plan. The key to success during the Commitment stage is communication.

STEP 1
Create a Vision Statement

Articulating a clear and convincing vision statement for sustainable energy and emissions planning sets the political stage for securing buy-in from the wide array of stakeholders who play a part in the success of the SUEEP process.

Developing Your Vision

What Is a Vision Statement?
A vision is a concise statement that provides a picture of an ideal future condition the city may one day realize. A city’s vision will generally include a vision statement (see example 2.1) and a longer, more detailed explanation of why the vision is important and how it relates to the city. New York’s PlaNYC contains a good example of an SUEEP vision statement in its introduction (http://www.nyc.gov/html/planyc2030/html/home/home.shtml).

Developing a vision is a political process and should therefore link energy and emissions goals to the city’s overall political priorities.

Why Is an Energy and Emissions Vision Important?
The vision provides the principles underpinning development of the energy and emissions plan. An inspiring vision statement has the power to engage stakeholders by clearly communicating the purpose of the SUEEP process. A vision statement also provides a clear, ultimate goal that aligns the people, departments, organizations, academic institutions, and utilities that are contributing to a city’s energy and emissions plan. See case studies 2.1 and 2.2. Sustainable energy and emissions programs yield benefits beyond energy management and emissions mitigation, and these ancillary benefits can enhance the SUEEP vision. Espousing these benefits will help to gain stakeholder support for the program.

Economic Development
A stable and reliable energy supply is essential for attracting businesses and growing city economies. Energy and emissions initiatives have the potential to create new, green jobs and to promote the development of new businesses such as energy services companies.

Environmental Protection
Improved energy and emissions management encourages the use of more efficient technologies and best practices that will strengthen environmental protection and contribute to the improvement of citizens’ health.
As part of its recent development efforts, the city of Da Nang established a vision for future development that focuses on remediating and celebrating the natural environment. The plan sets forth specific goals that link to the global sustainability agenda and the city’s economic, social, and environmental aspirations.

The three overarching goals leading the plan include:

- establishing Da Nang as an environmental city, emphasizing land, water, and air quality while providing a safe and healthy environment for people, investors, and domestic and foreign tourists;
- preventing environmental pollution and degradation while encouraging environmental rehabilitation; and
- facilitating awareness of environmental issues among Da Nang’s residents, international and local organizations, and individuals working in Da Nang.

The city developed its vision by collaborating with the German Organization for Technical Cooperation (GTZ) as part of a €1.5 million project implemented between mid-2010 and the end of 2012.

For more information on the city and administration of Da Nang, see www.danang.gov.vn. The environmental planning document is not available online, but is published in hard copy by the Da Nang Office of Natural Resources and Environment.

Social Equity
Energy and emissions programs improve city energy operations and infrastructure, which are often linked to accessibility and reliability of supply for citizens.

City Branding
Energy and emissions programs can be used to attract investments through positive city branding.

Improving Risk Management
The data collection exercise required to develop the energy and emissions plan enables the city to better understand its current and projected energy use and take action to mitigate specific risks.

Demonstrating Value to Society
Energy and emissions programs enable cities to communicate to citizens the added value of energy-related government activities and clarify the rationale behind energy governance and rulemaking.

Creating an Inspiring Vision
The SUEEP vision should relate to the city’s character as well as its wider environmental, economic, social, and energy goals. The vision is critical to garnering support and maintaining stakeholder motivation to follow through with the energy and emissions plan in the long term. The elements of an inspiring vision are unique to each city and no prescriptive process can be used. See resources 2.1 for guidance.

RESOURCES 2.1
CREATING A VISION
A number of useful resources illustrate the process of developing a vision:

- BELIEF is a European project cofinanced by the European Commission under the Intelligent Energy–Europe program. BELIEF has published a document that gives cities guidance on establishing and running an Energy Forum. For further information, see http://www.managenergy.net/resources/916.
CASE STUDY 2.2: NORTH VANCOUVER, CANADA
100 YEAR SUSTAINABILITY VISION

The City of North Vancouver and the University of British Columbia Design Centre for Sustainability worked together to prepare the city’s 100 Year Sustainability Vision:

“To be a vibrant, diverse, and highly livable community that provides for the social and economic needs of our community within a carbon neutral environment by the City’s 200th birthday in 2107.”

Operating under the themes of livability, sustainability, and resilience, this 100-year plan looks at likely scenarios, challenges, and opportunities in the coming decades, allowing the city to develop more forward-thinking policy planning and to be a better, stronger advocate for regional, provincial, and federal sustainability legislation. This long-range vision aims to guide the city toward carbon-neutral status by 2107, the city’s 200th anniversary.


Engaging Stakeholders to Create a Vision

When developing the vision, a city should identify the energy and emissions plan’s potential stakeholders and engage them early on to create buy-in for the ideas and support for the implementation of sustainable policies. The city’s energy vision can be developed with stakeholders in a number of ways:

- consultations and meetings;
- requests for feedback through traditional media, for example, newspapers;
- town hall meetings;
- energy forums; and
- Internet, mobile-based platforms, and texting.

STEP 2
Establish Leadership and Organization

A city government’s ability to formulate and implement sustainable energy policies will depend on its institutional structure, governance, and oversight function. Influence on stakeholders and specific sectors (for example, waste) provides cities with the capacity to implement climate change policies and action plans that can reduce energy use and GHG emissions. With strong leadership and good governance, city governments can encourage an inclusive approach in the SUEEP process and garner wide support for its policies to tackle climate change.

Mapping Institutional Structures

Establishing good energy governance requires first understanding how energy issues are dealt with internally and which lines of communication are most important. This understanding can be achieved through an institutional map that highlights agencies and individuals integral to the energy planning process.

The City Government’s Roles and Responsibilities

Energy efficiency cuts across sectors and extends through most areas of public service provision and private enterprise. Cities often have the most direct line of public communication to residents, businesses, and industries, which means that education and incentives are most efficiently delivered through city governments. These factors, combined with the city government’s overall picture of city development and its possession of the tools to influence or regulate sectors, means that it should be responsible for developing a comprehensive, sustainable plan for the city. The city government should take the lead in energy and emissions planning and in advocating for and implementing changes that advance the city’s goals. One of its
responsibilities would thus be to set up an organizational structure for energy planning that includes national, regional, and sublocal governments as well as the key stakeholders in the SUEEP process.

In development planning, the government must recognize the influence it has in implementing policies at the city level. The city government has to be fully responsible for sectors it has significant influence over (for example, street lighting, water supply, and wastewater treatment). For sectors in which national policies affect the city, the city government should work closely with the national government to seek support or financing for measures that are aligned with national goals or to ensure that city policies are not negatively affected by national ones.

**The National Government’s Roles and Responsibilities**

Many aspects of energy consumption, such as power sources, gasoline subsidies, household appliance energy efficiency standards, and vehicle fuel efficiency standards, are influenced by national energy policies. The expected increase in energy consumption caused by rapid urbanization in the EAP region means that national governments will have to take the lead in implementing policies (through regulations or incentives) to promote the efficient use of energy. However, the efforts of city governments will be essential to achieving national policy goals and targets, so national governments should work closely with city governments. For example, the Ministry of Energy, Ministry of Transportation, and Ministry of Environment should be included in city-level SUEEP discussions.

The national government should provide clear guidance to cities about the direction it will take with regard to sustainable development to allow cities to plan and, where possible, cooperate in spheres in which national and city goals are aligned. In these areas, policies implemented by the city and national governments can serve to reinforce each other, making efforts to develop the city sustainable and more effective.

**Establishing Energy Governance**

**Adapting City Structures**

Establishing city structures that support energy governance helps cities manage their energy planning process and increases the likelihood of a successful outcome. See case study 2.3. Good energy governance includes

- an energy and emissions champion;
- formal city groups dedicated to the SUEEP process, for example, a steering committee and working groups;
- a communications strategy to inform government employees of the SUEEP process; and
- training opportunities with links to local educational institutions where required.

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**CASE STUDY 2.3: BARCELONA, SPAIN**

**THE BARCELONA LOCAL ENERGY AGENCY**

The Barcelona Local Energy Agency came into being on May 14, 2002, in response to the European Union’s *Green Paper* and *White Paper on Energy*. These documents recognized the role of local authorities in energy administration and the positive value of exchanging experiences.

The agency comprises city agencies involved in energy and environmental management, along with local educational institutions. The Barcelona Local Energy Agency aims to promote Barcelona as an exemplar city with respect to energy and environmental protection.

The Energy Agency is the focal point of Barcelona’s Energy Improvement Plan, which sets forth a series of ambitious targets for energy management in the city.

For further information, see www.barcelonaenergia.cat.
City departments such as planning, land use planning, and transportation planning will want to integrate energy and emissions planning into their functions—after all, they will be affected by it.

**Energy and Emissions Champion**

The energy and emissions champion will be responsible for overseeing the SUEEP process and making the high-level decisions associated with it. This person should be assigned a team of direct reports or be given the authority to coordinate various groups undertaking the SUEEP work.

The energy and emissions champion must advocate for the benefits of the SUEEP process and understand the various roles that stakeholders can play in providing inputs to the planning process.

**Steering Committee and Working Groups**

The steering committee is made up of city administrators and stakeholders. These people provide strategic direction and technical support to the SUEEP process. See case studies 2.4 and 2.5. Other stakeholders (for example, nongovernmental organizations and representatives of the private sector) should also be given the opportunity to be part of the steering committee because this will enable them to buy into and take ownership of the recommendations put forward by these committees.

Working groups are made up of skilled people from the various city departments, public agencies, and potentially, utilities. Other stakeholders can be included, especially those who would be

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**CASE STUDY 2.4: SINGAPORE**

**INTER-MINISTERIAL COMMITTEE ON CLIMATE CHANGE**

Singapore’s Inter-Ministerial Committee on Climate Change (IMCCC) was established in 2007 to oversee interagency coordination on climate change. As of January 2012, the IMCCC was chaired by Mr. Teo Chee Hean, Deputy Prime Minister, Coordinating Minister for National Security and Minister for Home Affairs. The other members of the IMCCC are ministers from the Finance, Trade and Industry, National Development, Environment and Water Resources, Foreign Affairs, and Transport ministries. The IMCCC is supported by an Executive Committee (Exco) comprising the Permanent Secretaries of these ministries. The secretariat is from the National Climate Change Secretariat (NCCS), which was set up as a dedicated agency under the Prime Minister’s Office in July 2010 to coordinate Singapore’s domestic and international policies, plans, and actions on climate change.

The Exco oversees the work of three working groups:

- The International Negotiations Working Group defines Singapore’s strategy in the international climate change negotiations under the UN Framework Convention on Climate Change.
- The Mitigation Working Group establishes the suite of domestic measures to mitigate carbon emissions. Members include the permanent secretaries of ministries such as Trade and Industry, Transport, National Development, Environment and Water Resources, as well as management from statutory boards such as the Energy Market Authority, the National Environment Agency, and the Economic Development Board.
- The Resilience Working Group studies Singapore’s vulnerability to the adverse effects of climate change and develops long-term plans to ensure that Singapore is able to cope with climate change. Members include the deputy secretaries of ministries such as National Development, Environment and Water Resources, Finance, and Health as well as management from the Building and Construction Authority, Maritime and Port Authority of Singapore, Energy Market Authority, and the Public Utilities Board, among others.

In addition, NCCS uses two platforms, the Climate Change Network and the Climate Change Forum, to nurture dialogue on climate change–related issues. The Climate Change Network, which comprises distinguished members from the media, business, and academic communities, serves as a platform for representatives from the public and private sectors to meet, network, and exchange information on climate change issues. The Climate Change Forum allows government agencies to exchange information, share best practices, and update each other regularly on climate change–related events or forums they host or participate in.

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CASE STUDY 2.5: BANGKOK, THAILAND
BANGKOK’S STEERING COMMITTEE FOR GLOBAL WARMING

Bangkok’s Steering Committee for Global Warming and its five working groups have been leading the way to developing a sustainable approach to emissions planning for the city.

As part of the city’s commitment to improved mitigation of climate change, Bangkok established a global warming steering committee supported by five working groups (WGs): the WG for Improvement of Transportation System, the WG for Promotion of Renewable Energy, the WG for Energy Conservation and Building Retrofit, the WG for Solid Waste and Wastewater Management, and the WG for Expansion of Green Areas. These five groups provide the steering committee with technical and policy advice to support its decisions about sustainability in the city.

Part of the steering committee’s core responsibility is the city’s 5-Year Action Plan for Global Warming Alleviation. The plan includes concrete goals and actions to ensure the goals are met.

For more information, see http://lcc.ait.asia/upload/activities/BMA_20May2011.pdf.

most affected by policies arising from the SUEEP process, as well as those whose support would be required in implementing policies. Working groups are responsible for the technical and production work required for the SUEEP process.

Internal Communication

Energy and emissions planning is a multidisciplinary exercise and requires coordination and communication among numerous internal government agencies so that

- politicians and administrators who are not directly part of the SUEEP process can be educated about what it involves so they have the opportunity to point out synergies or conflicts that may arise within their areas of work, and
- politicians and administrators who are directly part of the SUEEP process have a broad awareness of the issues involved in energy planning and understand their colleagues’ roles, including points of contact if questions or issues arise.

Internal communication can be difficult in large organizations such as governments—one of the energy champion’s most important responsibilities is to take a strategic approach by establishing a communications plan early on. There is no specific formula for a communications plan, but it can include actions such as periodic team meetings, information sharing, using email lists, and so on.

Training

A common challenge in the energy and emissions planning process is that skilled personnel and other resources are not available within the city government. A city can find creative ways to augment its capacity, such as internal resourcing adjustments, training programs, reaching out to other cities, partnering with academic institutions, or forming internal groups for workshop activities.

Energy and Emissions Task Force

An energy and emissions task force is a small team of dedicated city government staff whose predominant job is to develop the energy and emissions plan and manage its implementation. (See figure 2.1 for a possible organizational structure for such a task force.) Whether the task force leads the SUEEP process depends on the city’s organizational structure and specific requirements. The task force’s scope of responsibility can be determined based on the city’s needs, but generally will include overseeing and executing data collection and analysis, ensuring the appropriate stakeholders are brought into the SUEEP process, taking on city-led project development and project implementation, and monitoring and reporting. This list of responsibilities is not exhaustive and will be determined based on the needs of the city.
STEP 3
Identify Stakeholders and Links

Engagement of stakeholders underpins the long-term success of the SUEEP process in several ways. First, it improves the quality, effectiveness, and legitimacy of the plan by allowing a broad consensus to be reached. Second, it encourages transparency and innovation by incorporating inputs from stakeholders with different perspectives. Finally, it ensures the long-term acceptance, viability, and support of strategies and measures recommended. See tip 2.1.

Given the importance of stakeholder engagement to the SUEEP process, a city will find it essential to create a methodical and comprehensive strategy to engage stakeholders and provide sufficient budgets to carry out that strategy. Stakeholders should be brought on board early in the SUEEP process because gaining understanding and buy-in up front will help to break down the barriers that can lead to failed projects.

Mapping Stakeholders

During Step 1, the city identified and made a list of appropriate stakeholders to provide inputs to the city’s vision. In Step 2, the city considered which stakeholders (both government and external) should be part of the steering committees, working groups, and the energy and emissions task force. This mapping of stakeholders will continue throughout the development of the energy and emissions plan as city governments identify parties who could provide the necessary data and information.

Stakeholders can be involved in the SUEEP process to varying degrees (see tip 2.2). When developing an energy and emissions plan, an engagement strategy should be devised that determines the level of input needed from each stakeholder. This strategy should identify the key audience, specify the message to be transmitted and the desired
outcome, and establish a set of indicators to evaluate the impact of the communication (headcount, surveys, website hits, feedback, and the like). In addition, the city’s unique circumstances will have to be considered and the strategy tailored to meet the needs and desires of the audience. Details on key elements of a communication strategy, including everything from background notes to case studies, can be found at The Covenant of Mayors website (www.eumayors.eu).

Engaging Internal Support

Building strong internal political support for the SUEEP process is just as important as establishing external support. See case study 2.6. The mayor and SUEEP team must drive the SUEEP process and develop an environment that enables city government agencies to understand their roles in attaining the city’s goals and vision.

**Tip 2.2**

**UNDERSTANDING STAKEHOLDERS**

Understanding your stakeholders will allow you to develop the best consultation strategy for their varying degrees of influence and interest. A stakeholder map is a useful way to define your city’s different types of stakeholder as the basis for your consultation strategy. Stakeholders with low levels of influence and low interest should be kept informed of the SUEEP process but do not need to be involved further. However, stakeholders with high levels of influence and strong interest are key players and need to be persistently and actively engaged. Stakeholders that fall in between can be engaged with varying levels of participation.

**Case Study 2.6:**

**Tshwane, South Africa**

**Joint Stakeholders Partnership**

Since August 2003, Tshwane has participated in the Sustainable Energy for Environment and Development program, an initiative that focuses on building capacity in cities to address energy issues. This program aims to promote the integration of sustainable energy and environmental approaches and practices into all operations of the city.

As part of the program, Tshwane established an interdepartmental steering committee to run activities of the Sustainable Energy for Tshwane (SET) program. SET received political support from high-level officials and technical assistance from Sustainable Energy Africa. In addition, the city brought in a political champion, a lead city government agency, the SET committee, and a Non-Conventional Energy Forum to help create awareness of energy approaches and practices in city operations.

The SET program initially faced challenges from a lack of commitment by some departments that did not have decision-making powers to advance the agenda. These challenges were overcome through interdepartmental communication, and the steering committee’s success has been maintained through ongoing strategic workshops.

For more information, see the SET website: http://www.tshwane.gov.za/Services/EnvironmentalManagement/Pages/default.aspx.
Engaging internal support involves establishing a suitable institutional structure and building internal knowledge through communication and personal relationships.

Strategies to attain support for the energy and emissions plan include the use of informational presentations, email, postings, and gatherings; establishing an internal forum or task team; and getting government funding for training activities associated with the energy and emissions plan.

See example 2.2 for potential internal and external stakeholders.

**EXAMPLE 2.2**

**POTENTIAL STAKEHOLDERS**

**Internal**
- City mayor
- City-controlled utilities
- City planners and zoning committee
- Department of transportation
- City procurement office
- Department of construction
- Chamber of Commerce
- City budget office
- Department of economic development
- Civil servants from relevant city administrations
- Representatives from city neighborhoods or divisions

**External**

**Government institutions**
- National and regional politicians
- Planning managers
- Energy utilities in the city
- Regional and local energy agencies

**Industry**
- Industrial energy experts
- Consultants
- Business community
- Trade unions
- Developers

**External organizations**
- Representatives from cooperatives and foundations
- Representatives from relevant interest organizations
- Academic institutions
- Schools
- Nongovernmental organizations

**The Public**
- Citizens

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**Engaging External Support**

Establishing external support for the SUEEP process needs to be undertaken on a larger scale, given the wide spectrum of stakeholders that the city government will have to engage. Significant time and resources will need to be allocated to gaining external support.

Stakeholders have different aspirations, expectations, and needs, so a considered approach needs to be taken on the strategies to be used in engaging them. The strategy will ultimately depend on the city’s context, but some of the most commonly used strategies include

- task and partnership teams,
- meetings with key leaders,
- focus group workshops and public meetings,
- energy forums, and
- media.

**Partnerships**

Bringing in the right external partners helps fill gaps in city capacity and adds valuable knowledge and experience to the SUEEP process. See case studies 2.7 and 2.8.

The right partnerships can be established if you carefully consider which external parties can be most helpful and make sure there is no conflict of interest (for example, a supplier or manufacturer of energy efficiency equipment could influence the

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**CASE STUDY 2.7: LONDON, UNITED KINGDOM**

**LONDON ENERGY PARTNERSHIP**

The London Energy Partnership is a crucial element in London’s response to the challenges of climate change, reliability of energy supply, and fuel poverty. It aims to transform London into a world-class city for sustainable energy by bringing together a range of sectors and organizations to deliver energy more effectively. The partnership is made up of a consortium of businesses, government, and public bodies. Acting as an independent organization, it uses the power of partnership to promote sustainable energy solutions in London.

For example, the London Energy Partnership worked with the London Borough of Dagenham to develop ”A Guide to the Barking Town Centre Energy Action Area,” an implementation plan that sets out a strategy for reducing carbon emissions from new developments. This is one of many partnerships that the London Energy Partnership has engaged in. For more information, see their website: www.lep.org.uk.
The SUEEP process toward their specific product or service. A city needs to consider partnerships with people and organizations that may lie outside its usual set of contacts.

Technical assistance through nongovernmental organizations or development aid projects, capacity building in conjunction with other cities that have already undertaken the energy planning process, and participation in national and international energy and climate change programs are useful strategies. In addition to partnering with official organizations, public-private partnerships have been gaining popularity and innovative financing mechanisms are available to harness their potential.

CASE STUDY 2.8: SURABAYA, INDONESIA

Bappeko is the long-term planning agency for the city government of Surabaya. The head of the agency reports directly to the mayor, and the purpose of the agency is to create long-term plans with the participation of multiple city agencies through wide stakeholder engagement. This agency creates the integrated land use plan, which requires input from the Department of Transportation (traffic, public transportation), the City Water Company, Cleansing and Park Department (street lighting, waste, wastewater), and a number of other city agencies. Bappeko also works externally with local universities, neighborhood leaders, and private sector businesses and developers.

Source: bappeko.surabaya.go.id.

RESOURCES

STAKEHOLDER ENGAGEMENT


Source: Covenant of Mayors (www.eumayors.eu).

RESOURCES

EXTERNAL RESOURCES FOR ASSISTANCE

- World Bank Group
- Asian Development Bank
- UN Habitat—Sustainable Urban Development Network
- ICLEI—Local Governments for Sustainability
- United States Energy Association Energy Partnership Program
- South Asia Regional Initiative for Energy
- Private energy services companies

RESOURCES

EXTERNAL RESOURCES FOR ASSISTANCE

- World Bank Group
- Asian Development Bank
- UN Habitat—Sustainable Urban Development Network
- ICLEI—Local Governments for Sustainability
- United States Energy Association Energy Partnership Program
- South Asia Regional Initiative for Energy
- Private energy services companies
Urban Energy and Emissions Diagnostics

This chapter summarizes the creation of baseline diagnostics that provide the foundation for deciding which projects to implement. Creating the energy balance and GHG emissions inventory, as well as cataloging past and ongoing energy efficiency and energy planning initiatives, helps a city to identify major trends and opportunities. This information allows a city to assess the potential for energy and emissions reduction projects so its sustainability goals can be achieved. This chapter also refers to the CD-ROM SUEEP Toolkit spreadsheets and templates that explain how to assess the potential of projects to reduce energy and emissions. Suggestions on how to collect the data, do the calculations, and bring the data together as a whole—as well as common pitfalls—are also discussed in this chapter.

STEP 4
Inventory Energy and Emissions

The energy and emissions baseline inventory provides the foundation of data on which the energy and emissions plan is based. Major trends and opportunities are quantified during the baseline inventory and subsequent monitoring inventories.

The energy and emissions inventory gathers the technical information and data needed to develop two key components of the energy planning process: the Energy Balance and the Greenhouse Gas (GHG) Inventory.

Methodology for the Baseline Inventory

The methodology used in this Guidebook is based on the ICLEI “International Local Government Greenhouse Gas Emissions Analysis Protocol,” which follows principles of the Intergovernmental Panel on Climate Change’s (IPCC’s) “2006 Guidelines for Greenhouse Gas Inventories” and has been revised by the authors for application by cities. Further elaboration on the methodology can be found in the Covenant of Mayors “How to Develop a Sustainable Energy Action Plan (SEAP) – Guidebook” (http://www.eumayors.eu/IMG/pdf/seap_guidelines_en.pdf). The World Resources Institute and the World Business Council for Sustainable Development are also working with the C40 Cities Climate Leadership Group (C40; a network of 40 of the world’s large cities, plus affiliate cities, committed to implementing meaningful and sustainable local climate-related actions that will help address climate change globally) to develop a consistent protocol for determining the urban GHG inventory and energy balance.

Typical categories for the inventories are outlined in example 3.1, though some cities may consume other types of fuel in addition to those in the example.
The broad methods for calculating the energy balance and GHG inventory follow:

For the energy balance
- Define the city and data boundary
- Define the baseline year
- Define the sectors of study
- Define fuels for each sector
- Collect fuel sales and consumption data

For the GHG inventory
- Gather the information from the energy balance
- Define emissions factors for each fuel
- Define sectors whose emissions are not related to the use of fuel
- Define emissions factors for nonfuel sectors
- Collect data as defined above for nonfuel sectors

The inventory should be as complete and accurate an assessment of the city’s energy and emissions as possible so that short-term and long-term energy policies can be developed to support the city’s economic development and enhance the quality of life of its citizens. Because the focus of this Guidebook is on supporting cities that have not begun the inventory process, more detailed and complex aspects of GHG inventory methods (such as life-cycle assessments and embodied energy of materials) are not included.

**Data Collection**

Data collection is an iterative process requiring multiple requests, clarifications, and approvals before an energy and emissions inventory is completed. This section provides direction on what information to request and where data can usually be found. Further details on calculation methods, specific data elements, and conversions can be found in the “Energy Balance and GHG Inventory Spreadsheet” in the CD-ROM SUEEP Toolkit.

The most common source of base energy data is information for electricity, gas, and fuel sales by utilities and national fuel companies. A national regulatory body that oversees multiple private energy providers can also be a good source of consumption data. Beyond fundamental energy and fuel consumption data, a variety of contextual data, such as power plant fuels and regional electrical grid distribution, is required to provide accurate emissions factors.

Step 6, during which energy and emissions reduction projects are assessed, requires a much broader mix of data, such as power plant combustion technology, motor vehicle fleet data, street lighting lamp type inventory, and many other behavioral and technological data. So collecting these types of data while you are collecting the base energy and fuel sales data can save you some time.

**Data Reliability**

Data collected for all sectors should use the same physical boundaries, calendar year, and collection methodology to provide the level of accuracy and reliability required to meet global standards for energy planning and GHG inventories. This allows comparability between cities and better sharing of data and projects, in addition to consistency between your own inventory years.

**Data Collection Process**

To collect energy data, you will need diligence and perseverance because there are multiple sources of data and they are often not in the format, units, year, or boundary definition needed for an inventory. You can ease the data collection process by developing relationships with key individuals in

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<table>
<thead>
<tr>
<th>EXAMPLE 3.2</th>
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</thead>
<tbody>
<tr>
<td><strong>TYPICAL SOURCES FOR DATA</strong></td>
</tr>
<tr>
<td>Transportation: National petroleum company&lt;br&gt;Department of Transportation</td>
</tr>
<tr>
<td>Industrial: Electrical utility, industrial customers&lt;br&gt;Natural gas utility, industrial customers&lt;br&gt;National petroleum company</td>
</tr>
<tr>
<td>Commercial: Electrical utility, commercial customers&lt;br&gt;Natural gas utility, commercial customers (Natural gas, LPG, liquified natural gas [LNG])</td>
</tr>
<tr>
<td>Residential: Electrical utility, residential customers&lt;br&gt;Natural gas utility, residential customers (Natural gas, LPG, LNG)</td>
</tr>
<tr>
<td>City: Electrical utility, city as customer&lt;br&gt;Natural gas utility, city as customer (Natural gas, LPG, LNG)</td>
</tr>
</tbody>
</table>
each organization (see example 3.2 on typical organizations) to minimize the number of contacts (or even narrow it down to a single point of contact within each organization) required to collect the variety of information needed. Organizations often ask for an initial meeting at which you will make the data request before they will begin to collate the base consumption and sales data and the contextual data. A follow-up meeting is often necessary to confirm the context, boundary, detail, and subtleties of the data provided. It is important that you pin down any areas of uncertainty, for example, physical boundaries, calendar year, and collection methodology, to make sure that the data are reliable. A letter from the mayor’s office is often helpful for explaining the purpose of the data requests and to reassure the data provider that the information will be kept confidential and will not be used for any purpose other than for energy planning and policies.

**Boundary Issues**
Clear and consistent boundary definitions for the collected data will provide more accurate consumption and emissions totals. Cities often choose the mayoral geopolitical jurisdiction as the boundary for the energy and emissions plan. However, boundaries should be extended given that local governments are responsible for policies of subnational regions that influence the flow of energy and materials and because a city’s energy consumption is affected by national and regional decisions and policies. Although this approach is preferred, collecting data on cross-boundary flows of vehicles, fuels, and energy can be difficult for cities because vehicle fuel purchases occur both inside and outside city boundaries. It is recommended that each city that embarks upon a GHG inventory process identify the most reliable data source for each cause of cross-boundary emissions and use these sources consistently for every GHG inventory update.

**Stakeholder Engagement**
Most data come from stakeholders outside the city government’s authority, such as the electrical utility and the natural gas utility. Bringing these stakeholders into a technical working group or even the energy task force to gain their buy-in and understanding of the context of the data requests can be helpful. (See technical assistance opportunity 3.1.) Representatives from these organizations are often more aware of how to gain approvals from within the organization and know the right people to approach to collect and summarize the requested data. On top of this, utilities and departments who provide energy and emissions data may also be the entities that will eventually roll out energy projects. In light of these factors, engaging stakeholders is critical.

**The Energy Balance**
The energy balance illustrates the flow of energy into and out of a city. It is presented in a constant unit, typically joules (megajoules, MJ; gigajoules, GJ; terajoules, TJ; or petajoules, PJ), even though the data are generally collected in the same units in which the energy is sold (kilowatt-hours [kWh] of electricity, liters of gasoline, cubic meters of liquefied petroleum gas [LPG], and so on). So you will need to convert energy sales data into a consistent unit of energy to be able to compare the scale of energy provided by each fuel type.

An energy balance shows energy by primary fuel, purchased energy, and useful energy, as well as wasted energy from conversion processes, and is often summarized in a Sankey diagram as shown for Surabaya, Indonesia, in figure 3.1.

The energy balance helps to identify the largest energy users, which will help in the goal setting and the prioritization of projects in Step 9. The energy balance also shows the primary fuel types and will inform the GHG inventory calculations.

**Calculating the Energy Balance**
The energy balance calculation is summarized below. This process requires familiarity with technical energy unit conversions and an understanding of site energy versus source energy (see tip 3.1).
1. Determine all significant fuel types for each end-use sector (example 3.1).
2. Collect fuel sales data for each fuel type for each end use (example 3.1).
3. Convert fuel sales data into a common energy unit (MJ, TJ) (see tip 3.2).
4. Calculate total site energy consumption by fuel type.
5. Calculate (or estimate) primary source energy fuel consumption for electricity consumption (see tip 3.1).
6. Calculate total primary fuel type energy consumption.

This process is elaborated in the “Energy Balance and GHG Inventory Spreadsheet” in the CD-ROM SUEEP Toolkit. See toolkit reference 3.1.

See case study 3.1 for one city’s experience determining its energy balance.

A Sankey diagram illustrates a city’s energy balance and gives a snapshot of the largest energy consumers and the city’s primary fuels. The diagram reads from left to right, with the width of each bar showing the amount of energy for that end use or fuel type. Energy coming into the city or into power plants as primary source energy is shown on the left and is typically categorized by fuel type. The bars flow to the right and show how fuel is used. For example, some natural gas flows directly to industrial customers for useful heating energy, but some natural gas flows and merges into the primary input energy for electrical power generation, along with coal and oil.

Energy conversion in the thermodynamic cycle of electrical power generation, resulting in the loss of 60–70 percent of the energy value of primary fuel, is also illustrated on the top left of the diagram.
The GHG Inventory
A GHG inventory is a snapshot of all of the GHGs emitted by a city in a year. It includes emissions from fossil fuel combustion in electrical power plants, cars, and trucks as well as other emitted GHGs such as methane and hydrofluorocarbons.

The governing equation for calculating a GHG inventory is below. Each relevant activity is calculated separately.

\[
\text{Activity Data} \times \text{Emissions Factor} = \text{Emissions}
\]

\[
\text{Activity Data} = \text{fuel or material consumption.}
\]

For example,

- Electricity consumption in kWh, or
- Coal consumption in tons (t).

\[\text{Emissions Factor} = \text{Factor based on the carbon content of the fuel or material.}\]

For example,

- Carbon content of electricity in kgCO₂/kWh, or
- Carbon content of coal in kgCO₂/ton coal.

**CASE STUDY 3.1: SURABAYA, INDONESIA**

**SURABAYA ENERGY BALANCE 2010**

The city of Surabaya developed an energy balance and GHG inventory in 2010 with the support of the World Bank under the first phase of the SUEEP process. Bappeko, an agency that develops long-term plans for the city, was appointed to be the lead agency. A local external consultant was hired to support the data collection across city agencies and utilities.

These agencies contributed data to the Surabaya energy balance and GHG inventory:

- Surabaya Department of Transportation
- PERTAMINA—state oil company
- DKP—Cleansing and Park Department
- PLN—state electricity utility
- Department of Finance
- PDAM—regional drinking water utility
- PGN—state-owned natural gas company

In addition to input from the city agencies, the Japan International Cooperation Agency performed a transportation study in 2009.

Figure 3.1 summarizes Surabaya’s energy balance. It shows that electricity is generated mainly from oil and coal, as well as a small amount of natural gas. It also shows that the predominant transportation fuels are gasoline and diesel.

Activities include the combustion of fossil fuels, emission of methane from solid waste landfills or the sanitary wastewater treatment processes, emission of hydrofluorocarbons from industrial activities, and others. Emissions factors can be found in the UN Framework Convention on Climate Change or the IPCC 2006 Protocol for GHG Inventory. If sufficient data are available, the actual emissions factor for the mix of electricity generation for a city can be calculated. The Energy Balance and GHG Inventory Spreadsheet in the CD-ROM SUEEP Toolkit provides a framework for the required data inputs. See toolkit reference 3.2.

An important aspect of the GHG inventory is identifying Scope 1, Scope 2, and Scope 3 emissions, which are outlined below:

**Scope 1.** GHG emissions that occur within the physical boundary established for the inventory.

**Scope 2.** Indirect emissions that occur outside the city boundary as a result of activities that occur within the city, limited to electricity consumption, district steam, and district cooling.

**Scope 3.** Other indirect emissions and embodied emissions that occur outside the city boundary as a result of activities conducted by the city, TOOlKIt REFerEnCE 3.2

**ENERGY BALANCE AND GHG INVENTORY CALCULATOR**

The GHG inventory calculator provides a step-by-step process for determining the city’s annual carbon emissions following ICLEI’s industry standards for an urban GHG inventory. This method relies on the data gathering and calculations in the energy balance calculator, so these two operations must be done consecutively. The output from this spreadsheet provides the city’s total CO₂ equivalent emissions by end use and by fuel type.

**TIP 3.3 CO₂ EQUIVALENT**

Another commonly overlooked technical aspect of a GHG inventory is the common unit of “CO₂ equivalent.” Many gases can cause a heat-trapping phenomenon similar to that caused by CO₂, but they have varying degrees of what is called “global warming potential” (GWP). CO₂ is the most common GHG, so all other GHGs are converted to the common unit of CO₂ equivalent.

The GHG inventory should include measurement for the following gases according to the UN Framework Convention on Climate Change:

<table>
<thead>
<tr>
<th>GHG</th>
<th>Formula</th>
<th>GWP</th>
</tr>
</thead>
<tbody>
<tr>
<td>Carbon dioxide</td>
<td>CO₂</td>
<td>1</td>
</tr>
<tr>
<td>Methane</td>
<td>CH₄</td>
<td>25</td>
</tr>
<tr>
<td>Nitrous oxide</td>
<td>N₂O</td>
<td>298</td>
</tr>
<tr>
<td>Sulphur hexafluoride</td>
<td>SF₆</td>
<td>22,800</td>
</tr>
<tr>
<td>Hydrofluorocarbons (HFCs)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>HFC-23</td>
<td>CHF₃</td>
<td>14,800</td>
</tr>
<tr>
<td>HFC-32</td>
<td>CH₂F₂</td>
<td>675</td>
</tr>
<tr>
<td>Perfluorocarbons (PFCs)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Perfluoromethane</td>
<td>CF₄</td>
<td>7,390</td>
</tr>
<tr>
<td>Perfluoroethane</td>
<td>CF₃</td>
<td>12,200</td>
</tr>
<tr>
<td>Perfluoropropane</td>
<td>CF₂</td>
<td>8,830</td>
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<td>Perfluorobutane</td>
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<td>8,860</td>
</tr>
<tr>
<td>Perfluorocyclobutane</td>
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</tr>
<tr>
<td>Perfluoropentane</td>
<td>CF₁₂</td>
<td>13,300</td>
</tr>
<tr>
<td>Perfluorohexane</td>
<td>CF₁₄</td>
<td>9,300</td>
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</tbody>
</table>

cASe STUDY 3.2: SEOUL, REPUBLIC OF KOREA

**GHG INVENTORY 2008**

In 2008, Seoul undertook a citywide GHG inventory exercise for “planning to realize all-around green innovation ranging from building, urban planning and transportation to daily life by 2030 to become a city with world-leading green competitiveness.” The energy and GHG information has been used to develop better building codes and a more energy efficient transportation network, to justify the increase in the share of renewable energy sources, and to streamline the waste collection operations of the city.

including electrical transmission and distribution losses; solid waste disposal; waste incineration; wastewater handling; aviation and marine activities; and embodied emissions in fuels, construction materials, water, imported food, and upstream of power plants (such as emissions from fossil fuel extraction).

Output from a GHG Inventory
The result of a GHG inventory is a city’s total annual GHG emissions in tons of CO₂ equivalent (see tip 3.3 for an explanation of CO₂ equivalent). The inventory results provide a breakdown of the total emissions into end-use sectors, fuel types, and month-by-month or even daily data (example 3.3). See case study 3.2 for how Seoul used the data from its GHG inventory. The actual single data point of emissions in one year does not tell a story or show levels of performance. This datum becomes more relevant and meaningful only if it can be compared with data for previous years.

Benchmarking Results
Comparing energy and emissions results with other cities’ results or global averages can provide significant insights into how a city uses energy and how it stacks up against its peers or against other cities that governments aspire to emulate. Benchmarking can be based on citywide metrics such as tons of CO₂ per capita or tons of CO₂ per unit of GDP to show macro trends and comparisons. A sectoral comparison of energy use and emissions across cities is a useful indicator of the efficiency of a city’s
sectors in energy use and emissions. In Step 16: Collect Information on Projects, results from individual energy and emissions reduction projects can be compared with the results of similar projects in other cities.

**TECHNICAL ASSISTANCE OPPORTUNITY 3.2 TRACE BENCHMARKING TOOL**

The TRACE online web tool developed by the World Bank Energy Sector Management Assistance Program group allows a city to enter its energy consumption data and see how it ranks against a database of more than 64 cities and 28 Key Performance Indicators. This database is based on publicly reported energy consumption figures and GHG inventory data along with background data such as population, GDP, and so forth. A wide variety of cities from around the world are included, which allows comparisons to be made with cities of similar size, region, level of development, and institutions. Information on larger, more developed cities that a city may aspire to emulate is also included in TRACE. Benchmarking provides an important snapshot of sectors that are performing well and of those that have the opportunity to improve and thereby change the course of a city’s energy consumption.


**STEP 5 Catalog Existing Projects and Initiatives**

Once the inventories of energy consumption and GHG emissions are complete, you will want to catalog current and past energy initiatives to learn about the factors that enabled past projects to succeed and the hurdles they faced. This step is an important learning exercise for SUEEP leadership and for the energy task force. They will be able to take actions to build on current and past successes, address roadblocks in future projects, and avoid the mistakes made in the past. But care should be taken not to discount a project because it was not implemented or not successful; circumstances may have changed.

**Survey Stakeholders**

The best way to catalog past energy projects is through face-to-face interviews. The energy task force should interview relevant stakeholder agencies—including those employees who have an interest in energy issues as well as those who have been at the agencies for many years and have built up stores of institutional knowledge about past projects. Interviewing multiple representatives within an agency is useful because departments often work independently and may not be aware of projects undertaken by other departments in the same agency.

**RESOURCES 3.1 ENERGY AND EMISSIONS DIAGNOSTICS**

These resources can be consulted for further information on diagnostics.


Benchmarking can be done against peer cities, or against cities that have been working to reduce carbon emissions for many years or have higher levels of economic development (see technical assistance opportunity 3.2). The guidance in resources 3.1 provides additional detail on energy diagnostics.
Stakeholders should be asked the following questions to get a sense of the context and circumstances they faced when previous projects were implemented. These questions will help you find out the critical success factors or failure points:

a) Which agency led the project?
b) Who were the stakeholders? 
c) Which stakeholders should have been involved but were not?
d) How much time was spent implementing the project?
e) How much money was spent on the project?
f) Was funding sufficient? 
g) What data on the impact of the project were collected? 
h) Did social or cultural norms prevent uptake of the project? If so, what were they? 
i) Which stakeholders benefited the most and who lost out from the project?

In addition to interviews, gather project implementation plans, status reports, and any other project documentation you can find. Collate and organize it so the information will be useful for future projects.

**Extract the Lessons Learned**

After collecting the data and identifying factors that contributed to the success or failure of past projects, the energy task force should summarize its findings and highlight both positive and negative themes. Examples of lessons learned include the benefits of a thorough cost-benefit analysis; the importance of following city procurement guidelines; the delays caused by insufficient staff time allocated to implementing the project; and the disincentives arising from the creation of too much documentation to prove that energy efficiency equipment was actually installed.

**Document in Project Assessment Sheet**

The results of the interviews should be documented in the Project Assessment Sheet (discussed in detail in Step 6, and available in the CD-ROM SUEEP Toolkit), which will contribute to the prioritization and development of all projects in Step 9.

The CD-ROM Project Assessment and Prioritization Toolkit (Tab 3) outlines assessments of 78 typical energy and emissions reduction projects undertaken by cities. These assessments are based on an understanding of urban energy issues common in the EAP region and on experiences with similar projects implemented around the world. If a project that your city has undertaken is not among the 78 projects, it can be assessed and considered for inclusion as part of your energy and emissions plan.

**Local Energy Initiatives**

Virtually all cities have undertaken energy efficiency projects of some sort (for example, street lighting lamp replacement and vehicle emissions standards and testing). To learn the most about these past and current projects, identify individuals linked to every sector that potentially has undertaken energy projects, such as transportation, buildings, industry, and city operations. If your city already has dedicated energy teams or energy efficiency champions in each department, identifying the people who will be able to provide a complete list of projects undertaken by their departments will make the process of collating the information on projects much more efficient.

**National Energy Initiatives**

National initiatives are generally broader and affect cities at various levels. Examples of national initiatives include subsidies on gasoline, diesel, or electricity, and nationally funded energy research projects on renewable energy, transportation, or buildings energy efficiency (see case study 3.3). Although a city may not be able to replicate or directly improve a national program, it may be able to participate in the program, expand implementation in its jurisdiction, or even obtain funding. Thus, city governments need to be aware of national policies on urban energy. City programs can build upon national ones and can even set a higher regulatory standard.

Some countries are taking on carbon emissions reduction targets following the Kyoto Protocol and the outcomes of recent Conference of the Parties summits, such as Durban 2011. Such actions can help support Step 7: Make the Case for SUEEP.
CASE STUDY 3.3: QUEZON CITY, PHILIPPINES

NATIONAL STANDARDS THAT INFLUENCE THE CITY

During a 2009 World Bank mission to test the TRACE audit tool, a GHG inventory and energy initiative stock-taking were performed in Quezon City. A wide variety of energy initiatives developed by numerous stakeholders were discovered during the process:

- A national vehicle emissions standard was imposed by the Department of Transportation.
- A national building code existed and was to become the baseline for a local green building guideline.
- A national refrigerator energy code required energy consumption standards for all imported refrigerators.
- National funding was used for the expansion of a bus rapid transit line through Quezon City.
- A national gasoline subsidy still existed, but was gradually being reduced.
- National goals and funding for street lighting expansion for new and existing streets applied.


Non-Energy Initiatives

Many of the drivers of energy consumption growth may not be directly related to energy, for example, land use planning, transportation planning, and cultural habits and norms. Many projects and policies pursued by cities and countries have significant impacts on the future energy path of a city. It is important for a city to assess its land use planning and transportation policies and the implications of those policies for the use of high-capacity public transportation versus personal cars. Initiatives to increase the safety and comfort of walking and biking should be inventoried. This exercise should be undertaken for all sectors, but the focus should be on the transportation sector because it often has the most energy implications from non-energy-related policies.

STEP 6

Assess Potential Energy and Emissions Projects

This step creates an inventory of the qualities of potential energy projects and ranks the projects based on their relevance to city energy goals and likely performance levels. This is a diagnostic exercise, not a decision step or a prioritization step, which are discussed in Step 9. In this step, projects need to be carefully examined to ensure the assessment is accurate for your city’s energy and emissions plan.

The Purpose of the Assessment

The purpose of the assessment is to help you to start building your list of high-priority projects from a long and varied list of possible projects. The assessment provides the input data required for Step 9: Prioritize and Select Projects. Only after the projects’ characteristics (energy savings potential, implementation cost, level of city control, and so forth) have been determined and goals have been identified in Step 8: Establish Goals, can the projects be prioritized in Step 9. The assessment does not require detailed technical development, budgeting, and research. Each project just needs to be put into general categories.

The projects and assessments provided in this Guidebook are meant to be a starting point, and not a definitive analysis of projects for all cities. Details about each pre-developed project can be changed to suit your city, and the pre-set assessment fields that define project characteristics can be revised to be more specific and relevant for your city’s energy and emissions plan. See toolkit reference 3.3.

Brief descriptions of each assessment category follow. (See example 3.4 and technical assistance opportunity 3.3.) These fields provide criteria to be evaluated according to the goals that will be established in Step 8.
Project Description
Describe the project briefly to give a general understanding of what changes the project will make to reduce or change the path of energy consumption in the city.

Sector
Assign the project to one of the five major sectoral categories. Some projects may seem to fall into more than one category (for example, an industrial truck emissions reduction project). In these cases, it is helpful to choose the sector in which implementation is likely to happen. For industrial truck emissions, the “industry” sector would be used instead of the “transportation” sector because the project would be rolled out by working directly with industrial businesses.

Project Type
Assign the project to one of the four types of project categories. This will give the city a sense of the expertise required to develop the project.

Energy Savings Potential
Estimate the project’s potential annual energy savings by referencing case studies similar to the particular project, or by using a calculation method in which end-use energy consumption (residential lighting energy in the city, for instance) is multiplied by the capture rate of the project (households per year) and efficiency savings per household (30 percent lighting savings). An estimate of potential annual energy savings does not need to be precise. It only needs to show low, medium, or high energy savings. The values in the Project Assessment Sheet are recommended, but can be revised based on local experience or issues local to the city. Choose a time horizon for the savings that includes full implementation (for example, two to five years), but take care to use the same time horizon for the cost of the project. Not all projects will use the same time horizon. Some projects can be completed in one year while others will need 10 years of planning and implementation to achieve their full energy savings potential.

Fuel Type Savings
Identify the type of fuel that is reduced or affected by the project. For electricity savings, mark grid electricity, not the underlying primary fuel for power plants in the region.

GHG Savings Potential
Using emissions factors from the GHG inventory spreadsheet in the CD-ROM SUEEP Toolkit, multiply the energy or fuel savings estimated in the previous categories by the fuel emissions factor. The estimate for this category does not need to be precise because this step is only meant to categorize the savings potential as low, medium, or high so as to rank the potential projects.

Implementation Cost
Mark the cost to implement the project. The estimate should include costs incurred by both the public and private sectors where applicable. An estimate of potential annual costs incurred does not need to be precise. It only needs to show low, medium, or high costs.
**Example 3.4**

**Project Assessment Sheet**

**Project Name:** Street Lighting Audit and Retrofit Project

**Project Description:** Existing public lighting is often highly inefficient, using high energy consumption technologies, and lacking strategic coordination of placement and operation. An audit of the existing stock and an assessment of operations and maintenance will help identify appropriate measures to significantly increase energy efficiency. Interventions that include new technologies and retrofitting will also increase the design life of luminaires, which reduces both the requirements and costs of maintenance. The aim of this recommendation is to enable a comprehensive assessment of the lighting system to identify areas for improvement across the network.

**Sector:**
- Transportation
- Industry
- Commercial
- Residential
- City

**Project Type:**
- Incentive project
- Major project
- Organizational development project
- Policy project

**Energy Savings Potential:**
- High (>10,000,000 MWh/yr)
- Medium (10,000–10,000,000 MWh/yr)
- Low (<10,000 MWh/yr)

**Fuel Type Savings:**
- Grid electricity
- Motor gasoline/diesel
- Natural gas
- LPG

**GHG Savings Potential:**
- High (>10,000 tons/yr)
- Medium (1,000–10,000 tons/yr)
- Low (<1,000 tons/yr)

**Implementation Cost:**
- High (>5,000,000/yr)
- Medium ($100,000–$5,000,000/yr)
- Low (<$100,000/yr)

**Estimated Cost Savings:**
- High (>100,000/yr)
- Medium ($10,000–$100,000/yr)
- Low (<$10,000/yr)

**Recipient of Savings:**
- City government
- City residents
- Energy services company
- Utility or private entity

**Likelihood of Funding:**
- High
- Medium
- Low

**Ease of Implementation:**
- Easy
- Medium
- Hard

**Timing of Project Implementation:**
- <1 year
- 1–10 years
- >10 years

**Level of City Control:**
- High: Budget, regulatory
- Medium: Regional stakeholder
- Low: National stakeholder

**Stakeholders:**
- Cleansing and Park Department
- Department of Transportation
- PLN, National Electricity Company
- Leaders of barangay communities without street lighting
- Mayor’s office

**Potential Funding:**
- Annual budget for Cleansing and Park Department
- Annual budget for Department of Transportation
- Mayor’s office discretionary budget
- Donor funded loan program for energy efficiency
- Clean Development Mechanism

**Previous Attempts at Similar Projects:**
- None
**Estimated Cost Savings**
Based on the energy savings potential, energy saved for that sector should be multiplied by the cost per unit of energy. Keep in mind that the price of electricity for city governments is often lower than commercial rates, and diesel fuel purchased by large industries can sometimes be purchased at bulk rates that are lower than rates at public gas stations.

**Recipient of Savings**
Mark the recipient of savings from the project. This is a critical aspect of energy planning and is often not recognized. Many projects are funded by one source but the benefits accrue to another. This is acceptable as long as all parties acknowledge this situation.

**Likelihood of Funding**
Taking stock of all the previous assessment categories and an initial review of costs, benefits, control, timing, and stakeholders, assess the likelihood of obtaining funding for the project. Step 14 provides an extensive discussion on funding and financing.

**Ease of Implementation**
Based on case studies and direct knowledge of implementing projects within a particular sector or city agency, identify whether the project is likely to be relatively easy or difficult to implement. This evaluation can include a variety of factors such as (a) the requirement for legislation (for example, building codes); (b) the requirement for national government investment (for example, a new bus rapid transit line or power plant); and (c) the city’s ability to fully develop, finance, and implement the project.

**Timing of Project Implementation**
Estimate the length of time required to design, implement, and collect data on the effectiveness of each project. This is not meant to be a specific time schedule, but a way to identify each project as either short or long term. In the prioritization process you will want to have a mix of quick-win and long-term projects.

**Level of City Control**
Identify whether the project lies within the jurisdiction of the city government, or if it will require approvals, financing, or involvement from the private sector, national government, international donor agencies, or other stakeholders over which the mayor has limited direct authority or control.

**Stakeholders**
Identify the project’s major stakeholders. The initial list of stakeholders will consist of departments and organizations; specific stakeholders should be added later.

**Potential Funding**
Identify the potential sources of funding. The initial list could comprise local departments, the national government, or NGOs.

**Previous Attempts at Similar Projects**
Describe any previous energy efficiency projects that the city or electrical utility or national government has studied or implemented that are similar to the project. Note whether the project was successful. If it was not successful, describe the factors that made the project difficult.

See resources 3.1 for additional information.
CHAPTER 4

Goal Setting

Armed with an inventory and an understanding of potential projects, city leaders can establish a direction for the city. Projections of energy use and emissions will need to be made based on the city’s growth and urbanization forecasts, and various energy scenarios should be compared with status quo policies and organization. This will help city leaders make the case for committing time and resources to an energy and emissions program. Clear goals will need to be set that outline energy and carbon emissions savings, along with mechanisms for verifying and reporting success. Once projects are assessed, the next task is to prioritize them for implementation and begin to line up the resources needed to tackle the initiatives that align most closely with the city’s aspirations, targets, and goals.

STEP 7
Make the Case for SUEEP

Once the energy and emissions diagnostic information is complete, the next step in the SUEEP process is to develop the arguments about why an alternative energy pathway is important to the city’s wider vision and goals. This step lays out common arguments that can be adapted to each city’s particular needs.

Areas of Concern in the EAP Region

Carbon dioxide ($CO_2$) levels in our planet’s atmosphere have reached the highest levels in recent history. The burning of fossil fuels such as oil, coal, and natural gas is the main reason behind the increase in $CO_2$. Increases in global temperature associated with these human-caused releases of $CO_2$ and greenhouse gases (GHGs) are now better understood, and the questions that global entities such as the World Bank are asking are no longer “what is causing it,” but “what can we do to curb it.” More evidence of changing climatic conditions, such as increased flooding, drought, and hurricane activity, is visible, further elevating climate change concerns to the top of geopolitical agendas. These factors will affect energy, urban growth, and economic policies given their impact on the growth of GHG emissions.

The rapid urbanization rate in the East Asia and Pacific region (EAP) makes the increase in energy consumption—and corresponding GHG emissions—particularly pressing. In May 2010, the World Bank and AusAID released Winds of Change, East Asia’s Sustainable Energy Future, which outlined issues faced by the EAP region, underscoring the need for energy planning in the region. See resources 4.1.

For the last three decades, the region has experienced the strongest economic growth in the world, with a 10-fold increase in GDP. This growth is expanding urban centers, creating
new growth in suburban areas, and significantly increasing the demand for energy. Although GHG emissions per capita are still low compared with developed countries, the region is expected to catch up, resulting in significant impacts on the local and global environment.

The Winds of Change report sends a clear message that the region has options for mitigating emissions growth without sacrificing economic competitiveness. If this path can be followed, the impact of fast-growing economies and urbanization can be balanced against the increasing need for energy reliability and environmental sustainability.

In the EAP region, long-term energy planning must be integrated with the wider planning processes for the land use, transportation, and buildings sectors. These are the major sources of energy and emissions growth in the region, and cities hold the key for regulating and changing the direction of growth toward a lower carbon pathway.

**Triple Bottom Line Thinking**

Making the case for an energy and emissions plan is not only about justifying reduced energy costs and lower emissions. To capture citizens’ hearts and minds, the SUEEP process will have to establish a connection to the city’s larger plan, tying into its aspirations across a variety of sectors.

This concept is called “triple bottom line thinking.” The idea is to establish ties not only to climate change aspirations (reduced carbon emissions) but also to align the initiatives with other environmental factors, economic development, and healthy social networks (figure 4.1). See case study 4.1. For example, a project established under triple bottom line thinking might include the following components:

**Economic:** Distributed generation techniques reduce energy costs for developers, creating more attractive long-term leases.

**Social:** Reduced numbers of four-wheel vehicles results in cleaner air and reduces asthma cases in children.

**Environmental:** Reduced cooling demand in buildings will reduce water consumption and align with future water-reduction goals.

**Establish Links to Citywide Goals**

Gaining support for the SUEEP process can be accomplished by developing synergies between energy savings and the qualities of a successful city. Find those interconnections, and give voice to the idea that this energy plan is not just about a greener planet, but that it is about the city’s aspirations and its unique qualities. See example 4.1.

These synergies and links can alter the perceived definition of an “energy” project (a project in which the benefits are mainly reduced energy costs) to one that enables the city to attain its vision. These links may be internal to the city, but might also reach beyond its boundaries. Stories about the extent of the project’s reach may be most beneficial politically.

**CASE STUDY 4.1: PHILADELPHIA, PENNSYLVANIA, USA**

**MAYOR NUTTER MAKES THE CASE**

In Mayor Michael Nutter’s January 2008 inaugural address, he pledged to make Philadelphia the number one green city in America. His energy goal was “to reduce Philadelphia’s vulnerability to rising energy prices.” To make good on his pledge, he created the Mayor’s Office of Sustainability.

The Mayor’s Office of Sustainability spent a year researching city sustainability, talking with residents, and drafting Greenworks Philadelphia. The ambitious plan sets 15 sustainability targets in the areas of energy, environment, equity, economy, and engagement to make Philadelphia the greenest city in America by 2015.

Greenworks Philadelphia was released in spring of 2009, and in the first year of implementation the Mayor’s Office of Sustainability and its partners made great strides toward making Philadelphia more sustainable.

Source: www.phila.gov/green/greenworks.
Policies and Aspirations
City agencies have wide-ranging agendas and often inconsistent messages between departments. The creation of an energy and emissions plan can align goals across departments, for example,

Economic: A bus rapid transit (BRT) project needs more momentum and organization than just the Department of Transportation to obtain the required funding, so linking to energy and carbon can provide the support needed for implementation.

Social: The Departments of Parks, Transit, Buildings, and Health all agree that air quality concerns are important. The energy and emissions plan can serve as a bridge between these departments to provide unity and consistency.

Environmental: Poor water quality in visible public places is recognized as a detriment to businesses near the contamination. An energy and emissions plan can be a vehicle for driving wider environmental issues to the top of policy agendas.

Understanding Current Progress
Cities may not realize that existing policies already employ some form of triple bottom line thinking. For example, congestion taxes may have been put in place as a result of scarce public parking, but the taxes, in turn, increase demand for more public transportation, which reduces overall GHG emissions, improves air quality, and reduces congestion on the city’s roads.

Establishing connections to what has already been done will not only help tell the story, but may also reveal data that can be used to assure stakeholders that the projections for various scenarios are accurate. City governments should engage with various department leaders and local organizations to understand the current progress and, where politically appropriate, make the case for the energy and emissions plan by aligning it with successful initiatives and declaring that the plan will create continued synergies with these projects.

The Price of Doing Nothing: Scenario Analysis
Making the case for a sustainable energy future requires an understanding of the issues that will occur in the upcoming years and decades. The costs of the SUEEP process and its organization and implementation may at first appear out of reach; however, the costs of business as usual will likely be much higher. The impact of doing nothing is considerable. The first task in making the case for an SUEEP process is understanding existing practices and what those practices are likely to lead to if maintained. See example 4.2.

EXEMPLARY 4.1
SAMPLE LINKS TO WIDER CITY GOALS
The following are a few examples of connections between energy projects and other city initiatives or aspirations.

1. Bus Rapid Transit (BRT) Boosts Local Businesses
Markets, shops, and restaurants on the new BRT lanes have prospered in cities because bus riders are more likely to patronize shops than are drivers of cars who are unable to find parking spots.

2. Street Lighting Saves Lives
Crime rates have decreased dramatically in areas with new street and site lighting, making energy savings a secondary issue to the increased safety associated with this project.

3. Parking Restriction Cleans up City
New parking projects have allowed for more efficient trash collections, with greater access at lower costs. Besides reduced congestion and lower emissions, the streets have become cleaner and more walkable.
Understanding Existing Policies
Gather information from administrative and sectoral leaders about current policies as they relate to energy and carbon concerns. Has anything changed in recent years?

Forecasting Growth
Gather best estimates of the city’s population growth. What are the demographic expectations for the new population?

Recognizing Supply-Side Practices
Review current supply-side energy approaches. How is the fuel mix likely to change? Will surrounding population growth and changes in city boundaries affect supply distribution in the region?

What influence does the city government have with suppliers of energy and drivers of national and regional energy policies?

Increasing Energy Intensity
Assess the impacts on the city of economic growth and urbanization. Will economic growth comprise more-energy-intensive businesses that replace less-energy-intensive business or industrial sectors? What will the urbanization trends mean for transportation end uses?

Qualities of the City
Determine the social aspects of the city that are attractive and must remain, as well as the aspects that are unattractive or harmful and must be addressed. Will urbanization and increased energy consumption affect the livability of the city if policies and practices are unchanged?

Energy Risks
Document the potential risks facing the city if current practices continue. What are the energy reliability concerns associated with regional growth and urbanization? Will increased carbon emissions diminish the attractiveness of the city to various business entities?

With a grasp of these issues, city governments can tell a “story” about where the city currently stands, the direction of energy use and emissions in the city if current practices remain unchanged, and where it could potentially go if actions were taken to tackle energy use. (See technical assistance opportunity 4.1.) The adverse outcomes that accompany inaction will help to garner support for the SUEEP process.

**EXAMPLE 4.2 WINDS OF CHANGE GHG SCENARIOS**

The study underpinning this Guidebook examined two energy scenarios up to 2030: (1) a reference scenario, which features a continuation of current government policies (REF scenario); and (2) an alternative scenario of sustainable energy development (SED scenario), which aims to put the energy sectors on a sustainable path.

Two separate studies projected the growth of energy demand in the transportation and household sectors. The transportation study examined the potential to reduce transportation fuel consumption through fuel economy standards, public transportation, urban planning, and pricing policies. The household study explored the potential to reduce residential electricity consumption through appliance efficiency. The potential emissions reduction is shown in the figure.

**Emissions Gap between REF and SED is Large, but Can Be Bridged by Energy Conservation and Low-Carbon Technologies, 2009–30 (Gt)**

![Graph showing emissions gap between REF and SED](source: Author's calculations.)

**Source:** Author's calculations.

**Note:** Gt = Gigatons.

**TECHNICAL ASSISTANCE OPPORTUNITY 4.1 ENERGY PLANNER FOR SCENARIO DEVELOPMENT**

Developing models to project energy growth under various development scenarios may not be within the current skill sets and resources available to city administrations. Energy planning consultants from local technical universities or international energy consultants can undertake the technical calculations and work with city leadership to define various development scenarios, including the business as usual base case.
Find Compatible National Energy and Emissions Goals

Most countries in the EAP region have signed and ratified the Kyoto Protocol and adopted climate action plans. Most large-scale utility providers in the region recognize the risks associated with business as usual but do not have a clear understanding of the steps needed to change their trajectory.

Many nonprofit groups and climate change advocates are making the case for region-wide transformative practices and supply-side projects. Politically speaking, establishing connections with these groups can align a city with these causes, giving the entire process momentum and high-level national support.

These ties will also help to create change when implementation funding, resources, or partnerships are needed. A mayor’s sphere of influence extends far beyond the city walls.

STEP 8
Establish Goals

Now that the energy inventory is complete and projections for future growth of energy use have been made, the next step is to create goals. Although the primary objective of the SUEEP process is to improve energy efficiency across sectors, the SUEEP process provides flexibility should a city decide that its goal is to minimize GHG emissions. In such cases, other tools, such as the McKinsey cost curve (see tip 4.1), would need to be used to perform a cost-benefit analysis.

The intent of establishing goals is to articulate targets based on key performance indicators in critical energy use sectors. Achieving the targets will define success. The goals should support the vision statement developed in Step 1, and should use simple overarching statements to frame a desired direction.

Aggressive but Viable

Targets must be based on city-specific empirical data and analysis rather than simply the numbers used by neighboring or peer cities. Based on projections of various scenarios and assessments of either existing or potential projects, a city government would have a range of targets that it could strive to achieve.

The targets should be aggressive but viable and meaningful to stakeholders. See case study 4.2. Although cities are expected to stick to their targets, changes to energy targets and goal statements are acceptable if new data come to light, or if external factors suggest that targets need to change.

TIP 4.1
MCKINSEY GHG ABATEMENT COST CURVE

McKinsey’s global GHG abatement cost curve provides a quantitative basis for discussions about actions that would most effectively deliver emissions reductions, and what they might cost. The cost curve in the figure shows the range of emission reduction actions possible with current technologies or with technologies likely to be available between now and 2030. The height of each bar represents the average cost of avoiding one ton of CO₂ emissions by 2030 through that technology. The width of each bar represents the potential of that technology to reduce GHG emissions in a specific year compared with business as usual.

Note: The curve presents an estimate of the maximum potential of all technical GHG abatement measures below €60 per tCO₂e if each lever was pursued aggressively. It is not a forecast of what role different abatement measures and technologies will play.
Choosing Energy Units
Target statements used for quantifying a city’s energy future can use several different units depending on whether energy costs, energy usage (such as MMBTU or MJ), or carbon emissions are the important factors for the city. Remember that GHGs are emitted from a variety of sources, not just the energy sector (for example, methane from agricultural practices is typically excluded from energy action plans), so noting the extent of the carbon commitment and the emissions sources used in the analysis are important when developing the SUEEP.

Vision Statement Versus Target Statements
The city government should align its energy vision with its larger aspirations. Although the vision statement can be general, target statements should be quantifiable, trackable, and measurable. See examples 4.3 and 4.4.

Interim Targets
Goal statements look toward long-term targets, but short-term and mid-range targets ensure that long-term targets are met. These targets might be linear, that is, if the goal is a 20 percent reduction in 20 years, then 10 percent in 10 years might be appropriate. However, it is more likely that external factors and project momentum will build over time, and a project’s effects may be compounded. The path from current energy use to future projections will probably not be linear, so understanding synergies between projects and the compounding of benefits are necessary for city governments to set realistic interim goals. See case study 4.3 and example 4.5.

Feasibility of Targets
A host of factors affect the city’s ability to meet its established targets, including changes in who holds the position of mayor from the time the SUEEP process commences to the future year in which targets should be attained. It is in the interest of the city government to establish targets that are within its means and that will be just as feasible for future leaders.

CASE STUDY 4.2: SHANGHAI, CHINA
SHANGHAI STICKS TO ENERGY GOALS
Shanghai’s target is to reduce energy usage by the equivalent of 800,000 tons of standard coal in 2010 with the eventual aim of cutting the standard coal equivalent by as much as 1 million tons.

The city government will strictly control the number of new projects with high energy consumption and curb excessive growth of industries with high emissions. Projects not in line with energy efficient standards will not be approved.

“It is austere to achieve 2010 targets to reduce emissions and save energy,” Mayor Han said. “We have to rigorously stick to this goal and ensure the implementation of rules.”

In 2010, Shanghai reduced energy use by 6.2 percent, beating a 3.6 percent target set at the start of the year.

EXAMPLE 4.4
DISSEMINATING ENERGY GOALS THROUGHOUT A CITY’S SECTORS

The figure represents a sample city’s concept of organization. The energy and emissions plan derived from the SUEEP process is a critical part of the city’s overall vision, but it is not inclusive enough for the city as a whole.

This Guidebook outlines an energy planning framework that ties into other aspects of a city through linkages and synergies, but focuses on energy. The energy framework will have its own process and organization.

Energy goals are outlined for the city as a whole and should be connected to the city’s vision. Energy goals should lead with an action word such as “Reduce,” “Minimize,” or “Align” and should support the city’s vision.

Targets should be established that commit to achievement of quantifiable objectives by a certain date. Key performance indicators should be created to ensure that targets are monitored and the city is on track to achieve them.

Sector key: T = Transportation; I = Industry; C = Commercial buildings; R = Residential buildings; M = City buildings, site lighting, water, waste.
City Boundaries

Boundary issues were discussed in Step 4. Several factors will lie outside the control of a city’s SUEEP process, given the flow of energy across boundaries and sectors:

- Energy grids will be affected by regional energy policies (for example, regional-level promotion of renewable energy and more-efficient and less-GHG-emitting technologies).
- Transportation networks are funded and maintained by national resources but affect the commuting patterns of a city because they cross city boundaries.
- Water and wastewater treatment facilities in outlying areas of a city may be outside a city government’s physical and jurisdictional boundaries.

Understanding these external effects on energy use and emissions in the city will be useful. Similarly, adjacent cities that are altering their emissions and physical or political connections will affect the boundary. Projections will need to be based on the best assumptions that can be made about these external policies and regulations.

How Granular Should Targets Be?

Although the level of detail contained in goals established under the SUEEP process will vary, all successful plans rely on measurable targets. For the first effort at an energy and emissions plan,
targets should be overarching (that is, applicable to sectors, not to specific projects) until more is understood about the potential opportunities and constraints in each sector.

Good examples of measurable targets follow:

- Reduce energy consumption by 20 percent by 2030.
- Reduce city transportation energy consumption by 20 percent by 2030.
- Reduce waste vehicle fleet petroleum consumption by 20 percent by 2030.

See example 4.6 for an illustration of one city’s sector-level targets that will help it to “bend the curve” of citywide energy consumption.

EXAMPLE 4.6
BENDING THE CURVE

The city’s overall SUEEP target is to reduce primary energy consumption by 18 percent from 2010 levels by 2020. The figure illustrates how “bending the curve” is possible by reducing projected energy use across various sectors.

**How Is The Target Set?**

Energy growth by sector was projected based on forecasts of economic trends and population growth. Assuming that the city government continues with current policies, a business as usual scenario is established. Based on policies that the city government has the ability and influence to enact, a “moderate” projection was established that determined the potential energy savings that could be expected across sectors (that is, buildings, transportation, and so forth). This was then used to guide the target statement.

**Why 2020?**

Based on the task force’s work with utility providers and key stakeholders, 2020 was set as the target because the parties could envision results from policies to stem energy growth coming to fruition by then. The targeted year was also far enough in the future that projects could be planned and implemented—but not so far that the year seemed out of reach and too long term.
Inventories have been established, existing conditions and policies have been reviewed, potential projects have been assessed, and goals have been stated. The case has been made for change rather than a business as usual approach. Now initiatives and projects must be implemented to get the city from Point A (today) to Point B (a target tied to the goal statement).

Prioritizing projects takes a combination of common sense, quantifiable targets aligned with goals, and judgment by city leaders who understand the city’s issues and politics.

This section outlines a three-stage approach to project prioritization. (Also see technical assistance opportunity 4.2.) Any of these stages in isolation will likely lead to misuse of resources and long-term failure to achieve the energy goals. All three should be undertaken using a combination of analysis and judgment:

- Stage 1. Eliminate: Remove obvious projects from priority list.
- Stage 2. Prioritize: Create an analytical approach to understanding which projects have the highest potential to meet the city’s goals and targets and rank them.
- Stage 3. Select: Qualitatively review the prioritized projects to select the ones to implement.

See figure 4.2 for an illustration of this process.

**STEP 9**

Prioritize and Select Projects

The SUEEP process is based on a comprehensive approach, but the process outlined in Step 9 could be perceived by cities to be too detailed or more complex than necessary for a city's current stage of energy planning. Depending on a city’s capacity, resources, and priorities, it could engage in energy planning at levels other than the SUEEP. A high-level, rapid assessment could be performed as an introduction (for example, the World Bank’s Tool for Rapid Assessment of City Energy [TRACE]) or deeper sectoral engagements in a few selected areas (for example, public-private partnerships and sector-wide interventions).

TRACE, developed by the World Bank’s Energy Sector Management Assistance Program, offers cities a quick and easy way to assess their energy efficiency and identify underperforming sectors for possible improvement. This tool prioritizes sectors with significant energy savings potential, and identifies appropriate energy efficiency interventions across six city services—urban passenger transportation, buildings, water and wastewater, public lighting, solid waste, and power and heat.

The opportunities for energy efficiency in individual sectors are determined on the basis of the product of the following three factors built into the TRACE software:

- Energy spending information. This information is obtained either directly from the six sectors and city budget offices or through the conversion of energy use across the city into energy spending per sector.
- Energy efficiency opportunity. Opportunities to increase energy efficiency are determined using key performance indicators chosen from the TRACE benchmarking process that are most indicative of energy use across a particular sector or subsector. To define opportunity, the mean value of sectoral energy use of the better-performing cities in the peer group is calculated, and the difference between this value and the city’s current performance provides an improvement target for the city; this is termed the “relative energy intensity” of the sector.
- The control or influence of the city government. This is determined by establishing the extent of influence that the city government has in each sector. This ranges from minimum (national government has greater or even full control) to maximum (city has full budgetary and regulatory control).

The sector prioritization process in TRACE is quick and automatic, but not as flexible as the one in the CD-ROM SUEEP Toolkit in this Guidebook. TRACE identifies sectors that a city should prioritize, as compared with the SUEEP Toolkit, which identifies high-priority projects across sectors. It is not possible to change or add projects in the TRACE software as can be done in the Project Assessment and Prioritization Toolkit. So TRACE is not compatible with the comprehensive SUEEP process, but it may be a realistic alternative that can move the energy planning process forward. (See [http://www.esmap.org/esmap/node/235](http://www.esmap.org/esmap/node/235) for details of the TRACE process.)
Most cities will categorize projects and targets into sectors, therefore, five sectors are used on the energy demand side (the letter in parentheses will be used throughout this section to denote a specific sector):

(T) = Transportation
(I) = Industry
(C) = Commercial buildings
(R) = Residential buildings
(M) = City buildings, site lighting, water, waste

Two other sectors can be useful in organizing projects associated with the supply of energy and the process or organizational structure for developing the energy and emissions plan:

(S) = Supply
(P) = Process

**Toolkit Reference**

*Project Assessment and Prioritization Toolkit*

The CD-ROM Project Assessment and Prioritization Toolkit outlines 78 projects across the five demand-side sectors, as well as supply and process projects. Project characteristics are provided along with the formulas that allow the user to calculate a Project Score (explained in this Step).
**Stage 1: Eliminate**

*Remove obvious projects from priority list.*

This first step is a nontechnical rejection of projects that are obviously inapplicable to the city or are clearly nonstarters (for example, because of a lack of resources or funding). This stage results in an immediate elimination of approximately 30 percent of the projects (78 down to 55).

Through all three stages, the city’s goals and the energy goals for each sector should be clearly understood and kept in mind. For example, assume the goals in the transportation sector are as listed:

**Transportation Sector Goals**

1. Reduce the cost of energy used for transportation
2. Minimize GHG emissions from transportation
3. Maintain reliable energy supply to the transportation sector

**Strategies for Achieving the Sector Goals**
The Project Assessment and Prioritization Toolkit outlines strategies for enhancing energy efficiency across different sectors. Strategies in the transportation sector comprise the following:

- (T)A: Shift to nonmotorized transportation modes
- (T)B: Shift to public transportation
- (T)C: Improve efficiency of existing vehicles
- (T)D: Improve efficiency of new vehicles

Table 4.1 shows the possible projects associated with the strategies for the transportation sector. The city may have lists of potential projects or it can use the list in the CD-ROM Project Assessment and Prioritization Toolkit. The table shows which projects were eliminated in this example, and why. This stage reduces potential projects in the transportation sector to 11. These 11 now move to Stage 2.

**Stage 2: Prioritize**

*Use an analytical approach to understand which projects have the highest potential to meet the city’s goals and targets.*

This stage is more detailed and can take several forms. This Guidebook contains a framework for quantifying the usefulness of the remaining projects for achieving the goals and aligning with the unique qualities of the city. This methodology ranks (from 1 to 55) projects across all sectors based on the set of characteristics.

**TABLE 4.1. ELIMINATION OF PROJECTS IN STAGE 1**

<table>
<thead>
<tr>
<th>Transportation sector projects</th>
<th>Eliminate in Stage 1?</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>A. Shift to nonmotorized transportation modes</strong></td>
<td></td>
</tr>
<tr>
<td>(T) A.1 Bike lane expansion and improvement project</td>
<td>Keep</td>
</tr>
<tr>
<td>(T) A.2 Mixed use planning initiatives</td>
<td>Yes—This exercise was completed recently and politically, it cannot be revisited.</td>
</tr>
<tr>
<td>(T) A.3 Streetscape improvement project</td>
<td>Keep</td>
</tr>
<tr>
<td><strong>B. Shift to public transportation</strong></td>
<td></td>
</tr>
<tr>
<td>(T) B.1 Bus rapid transit lines</td>
<td>Keep</td>
</tr>
<tr>
<td>(T) B.2 Expand rail services</td>
<td>Keep</td>
</tr>
<tr>
<td>(T) B.3 Carpool project</td>
<td>Keep</td>
</tr>
<tr>
<td>(T) B.4 Parking restriction project</td>
<td>Keep</td>
</tr>
<tr>
<td>(T) B.5 Park and ride project</td>
<td>Keep</td>
</tr>
<tr>
<td>(T) B.6 Improve and expand ferry service</td>
<td>Yes—Landlocked city with no ocean or rivers.</td>
</tr>
<tr>
<td><strong>C. Improve efficiency of existing vehicles</strong></td>
<td></td>
</tr>
<tr>
<td>(T) C.1 Vehicle emissions testing and compliance</td>
<td>Yes—Resources needed to administer and enforce this are not available.</td>
</tr>
<tr>
<td>(T) C.2 Motorcycle (2–4 stroke) upgrade</td>
<td>Keep</td>
</tr>
<tr>
<td><strong>D. Improve efficiency of new vehicles</strong></td>
<td></td>
</tr>
<tr>
<td>(T) D.1 Angkot replacement project</td>
<td>Keep</td>
</tr>
<tr>
<td>(T) D.2 4-wheel vehicle fuel efficiency tax</td>
<td>Keep</td>
</tr>
<tr>
<td>(T) D.3 Taxi replacement and efficiency project</td>
<td>Keep</td>
</tr>
</tbody>
</table>
reviewed in Step 6. More on this process and examples are included in the following pages. The characteristics discussed in Step 6 are listed below:

- (C1) Energy savings potential
- (C2) Fuel type savings
- (C3) GHG savings potential
- (C4) Implementation cost
- (C5) Estimated cost savings

**(TABLE 4.2. PROJECT SCORE CRITERIA)**

<table>
<thead>
<tr>
<th>Characteristic (C)</th>
<th>Project Score (PS) Criteria (0–10)</th>
<th>The higher the PS the better the project is aligned to meet the city’s SUEEP goals</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>rank</td>
<td>definition</td>
</tr>
<tr>
<td>(C1) Energy savings potential</td>
<td>Low</td>
<td>&lt;10,000 kWh/yr</td>
</tr>
<tr>
<td></td>
<td>Medium</td>
<td>10,000–10,000,000 kWh/yr</td>
</tr>
<tr>
<td></td>
<td>High</td>
<td>&gt;10,000,000 kWh/yr</td>
</tr>
<tr>
<td>(C2) Fuel type savings</td>
<td>Motor gasoline/diesel</td>
<td>LPG</td>
</tr>
<tr>
<td></td>
<td>Grid electricity</td>
<td>Natural gas</td>
</tr>
<tr>
<td>(C3) GHG savings potential</td>
<td>rank</td>
<td>definition</td>
</tr>
<tr>
<td></td>
<td>Low</td>
<td>&lt;1,000 tons/yr</td>
</tr>
<tr>
<td></td>
<td>Medium</td>
<td>1,000–10,000 tons/yr</td>
</tr>
<tr>
<td></td>
<td>High</td>
<td>&gt;10,000 tons/yr</td>
</tr>
<tr>
<td>(C4) Implementation cost</td>
<td>rank</td>
<td>definition</td>
</tr>
<tr>
<td></td>
<td>High</td>
<td>&gt;$5,000,000</td>
</tr>
<tr>
<td></td>
<td>Medium</td>
<td>$100,000–$5,000,000</td>
</tr>
<tr>
<td></td>
<td>Low</td>
<td>&lt;$100,000</td>
</tr>
<tr>
<td>(C5) Estimated cost savings</td>
<td>rank</td>
<td>definition</td>
</tr>
<tr>
<td></td>
<td>Low</td>
<td>&lt;$10,000/yr</td>
</tr>
<tr>
<td></td>
<td>Medium</td>
<td>$10,000–$100,000/yr</td>
</tr>
<tr>
<td></td>
<td>High</td>
<td>&gt;$100,000/yr</td>
</tr>
<tr>
<td>(C6) Recipient of savings</td>
<td>rank</td>
<td>definition</td>
</tr>
<tr>
<td></td>
<td>Low</td>
<td>Energy services company</td>
</tr>
<tr>
<td></td>
<td>Medium</td>
<td>Utility or private entity</td>
</tr>
<tr>
<td></td>
<td>High</td>
<td>City residents</td>
</tr>
<tr>
<td></td>
<td></td>
<td>City government</td>
</tr>
<tr>
<td>(C7) Likelihood of funding</td>
<td>rank</td>
<td>definition</td>
</tr>
<tr>
<td></td>
<td>Low</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>Medium</td>
<td>1–9</td>
</tr>
<tr>
<td></td>
<td>High</td>
<td>10</td>
</tr>
<tr>
<td>(C8) Ease of implementation</td>
<td>ease</td>
<td>definition</td>
</tr>
<tr>
<td></td>
<td>Hard</td>
<td>&gt;10 years</td>
</tr>
<tr>
<td></td>
<td>Medium</td>
<td>1–10 years</td>
</tr>
<tr>
<td></td>
<td>Easy</td>
<td>&lt; 1 year</td>
</tr>
<tr>
<td>(C9) Timing of project implementation</td>
<td>timing</td>
<td>definition</td>
</tr>
<tr>
<td></td>
<td>Slow</td>
<td>&gt; 10 years</td>
</tr>
<tr>
<td></td>
<td>Medium</td>
<td>1–10 years</td>
</tr>
<tr>
<td></td>
<td>Fast</td>
<td>&lt; 1 year</td>
</tr>
<tr>
<td>(C10) Level of city control</td>
<td>rank</td>
<td>definition</td>
</tr>
<tr>
<td></td>
<td>Low</td>
<td>National stakeholder</td>
</tr>
<tr>
<td></td>
<td>Medium</td>
<td>Regional stakeholder</td>
</tr>
<tr>
<td></td>
<td>High</td>
<td>Budget and regulatory</td>
</tr>
<tr>
<td></td>
<td></td>
<td>0</td>
</tr>
<tr>
<td></td>
<td></td>
<td>5</td>
</tr>
</tbody>
</table>

**Review Project Score Criteria**

Table 4.2 shows that a Project Score (PS) Criteria score has been assigned to each characteristic. The
PS criteria will be used to rate projects on each characteristic, from 0 (low) to 10 (high). Taking the energy savings potential characteristic as an example, projects with the potential to provide savings of more than 10,000,000 kWh/yr are scored “10” whereas those with the potential to provide savings of less than 10,000 kWh/yr are scored “0.” For the fuel type savings characteristic, a lower score is given if availability of primary fuel is not an issue in the city. For example, LPG is given a low score of 2 because there is no shortage of LPG in the city, which means that projects that could affect the use of LPG are not as important as those that could affect natural gas, the supply of which is more limited.

**Assign Project Scores**

Table 4.3 shows the process for assigning scores to a specific project. As an example, the table uses Project (T) A.1 *Bike lane expansion and improvement project.*

The methodology should be applied to each project. Rating the projects according to a standard set of characteristics ensures that all projects are rated consistently.

**Assign a Weight to Each Characteristic**

Table 4.4 is a characteristic weighting table, which provides a way to emphasize the importance of various characteristics for achieving the city’s goals. Because the PS will be multiplied by the characteristic weight (CW), the higher the number, the more the city values the characteristic.

### Calculate a Total Weighted Project Score (TWPS)

Each PS is multiplied by the CW, then summed to provide a Total Weighted Project Score (TWPS). Table 4.5 shows the process and calculations, leading in this example to prioritization of Projects 2, 1, and 3 (from greatest to least TWPS). Table 4.5 shows only three characteristics (of 10) to clarify the process for calculating the TWPS. A more comprehensive example appears in example 4.7.

In addition to a sector-by-sector calculation, a PS should be determined for each project across all sectors in Stage 2, that is, run two exercises: First, prioritize projects by individual sector, which will allow you to select the top two or three projects in each sector. Second, combine all projects from all sectors into one larger grouping and prioritize across sectors. The projects with the highest scores from each of these prioritization exercises are the projects that should advance to Stage 3 for final selection.

It is not unusual for a single sector to be heavily weighted in the TWPS process. For example, if 11 Transportation projects and 7 Industry projects make it past Stage 1 (Eliminate), it may prove in Stage 2 that all 11 Transportation projects score higher than any of the Industry projects. Understanding the reasons for this as well as the drivers that lead to this ranking in Stage 2 is important. City governments should take a comprehensive view of the projects, considering the unique attributes of their cities (including constraints faced

### TABLE 4.3. ASSIGNING SCORES TO PROJECT (T) A.1 BIKE LANE EXPANSION AND IMPROVEMENT

<table>
<thead>
<tr>
<th>Characteristics</th>
<th>Project score and description</th>
</tr>
</thead>
<tbody>
<tr>
<td>(C1) Energy savings potential</td>
<td>4—Estimated to be 100,000 kWh/yr</td>
</tr>
<tr>
<td>(C2) Fuel type savings</td>
<td>4—Motor gasoline/diesel</td>
</tr>
<tr>
<td>(C3) GHG savings potential</td>
<td>4—Roughly 4,000 ton/yr</td>
</tr>
<tr>
<td>(C4) Implementation cost</td>
<td>5—Estimated to be ~$1 million</td>
</tr>
<tr>
<td>(C5) Estimated cost savings</td>
<td>4—Roughly $40,000/yr</td>
</tr>
<tr>
<td>(C6) Recipient of savings</td>
<td>6—City residents</td>
</tr>
<tr>
<td>(C7) Likelihood of funding</td>
<td>8—Support groups have been raising funds</td>
</tr>
<tr>
<td>(C8) Ease of implementation</td>
<td>4—Resources are in place, and this is moderately easy</td>
</tr>
<tr>
<td>(C9) Timing of project implementation</td>
<td>5—Estimated total of 2–5 years for entire project</td>
</tr>
<tr>
<td>(C10) Level of city control</td>
<td>8—Mostly within the city’s control, with some minor private entity collaboration.</td>
</tr>
</tbody>
</table>
and the structure of their economies) to achieve a deeper understanding of the factors that could result in the outcomes of Stage 2. A lower-ranked project (an Industry project that does not score as high as a Transportation project) may ultimately be selected for implementation based on the judgment of city leaders. This process occurs in Stage 3.

Based on the analytical exercise in Stage 2, the transportation sector projects in the table in example 4.7 were calculated to have the highest potential to meet the city’s goals. The ultimate rankings are shown in table 4.6. Now doing the analysis across all sectors will result in the ranking of projects across a wide

### TABLE 4.4. WEIGHTING CHARACTERISTICS

<table>
<thead>
<tr>
<th>Characteristic weight (CW)</th>
<th>Importance</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>No importance</td>
</tr>
<tr>
<td>1–4</td>
<td>Increasing importance</td>
</tr>
<tr>
<td>5</td>
<td>Critical to the city</td>
</tr>
</tbody>
</table>

### TABLE 4.5. CALCULATING TWPS

<table>
<thead>
<tr>
<th>Characteristic Weight (1–5)</th>
<th>(C1)</th>
<th>(C2)</th>
<th>(C3)</th>
<th>(C4)</th>
<th>(C5)</th>
<th>(C6)</th>
<th>(C7)</th>
<th>(C8)</th>
<th>(C9)</th>
<th>(C10)</th>
<th>Total Weighted Project Score (TWPS)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>5</td>
<td>2</td>
<td>3</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Project 1 (Ex. (T) A.1)</td>
<td>4</td>
<td>4</td>
<td>4</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>(5x4)+(2x4)+(3x4) = 40</td>
</tr>
<tr>
<td>Example—Project 2</td>
<td>9</td>
<td>3</td>
<td>3</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>(5x9)+(2x3)+(3x3) = 60</td>
</tr>
<tr>
<td>Example—Project 3</td>
<td>3</td>
<td>5</td>
<td>2</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>(5x3)+(2x5)+(3x2) = 31</td>
</tr>
</tbody>
</table>

### EXAMPLE 4.7

PRIORITIZATION OF TRANSPORTATION SECTOR PROJECTS USING THE TOTAL WEIGHTED PROJECT SCORE METHOD
variety of end uses, demand sectors, and organizations. See technical assistance opportunity 4.3.

**Stage 3: Select**

*Provide a qualitative review and select high-priority projects.*

After eliminating (Stage 1) and prioritizing using quantitative analysis (Stage 2), it is time to select high-priority projects (Stage 3). This stage requires the judgment of city leadership (mayor, task force, stakeholders, consultants) to choose projects based on the political and socioeconomic realities of the city.

Highly ranked projects emerging from Stage 2 may not necessarily be implemented because internal and external forces can compel the selection of lower-ranked projects. Such forces will be based on the challenges, constraints, and pressures that the city faces. Sometimes these forces are so powerful or important to the city that an additional “characteristic” should be added to Stage 2 to address these concerns.

For example, in the hypothetical city’s selection process in table 4.7, (T) A.1 *Bike lane expansion and improvement project* received the second-highest TWPS of all the projects considered. (C) E.3 *Public office buildings audit and retrofit* was ranked 21, but the mayor believes that this is a crucial first step, despite its score.

A number of these guiding principles apply to the EAP region, and are outlined in the *Winds of Change*, referred to in Step 7. See example 4.8 for some of the principles city leadership may use in project selection.

---

### TECHNICAL ASSISTANCE OPPORTUNITY 4.3

**PRIORITIZING PROJECTS**

City governments, task forces, and stakeholder groups are the best people to provide the details for developing projects because they understand the internal issues, challenges, and opportunities of each project. But technical advisers who have gone through the project prioritization and selection process before have the best skills and experience for estimating energy savings, costs, and the impacts of each project and thus for assisting with prioritizing projects. Support from industry experts and planners should also be sought.

---

### TABLE 4.6. RANKING BY TWPS

<table>
<thead>
<tr>
<th>Project</th>
<th>TWPS</th>
<th>Rank</th>
</tr>
</thead>
<tbody>
<tr>
<td>(T) B.3 Carpool project</td>
<td>171</td>
<td>1</td>
</tr>
<tr>
<td>(T) B.5 Park and ride project</td>
<td>150</td>
<td>2</td>
</tr>
<tr>
<td>(T) A.1 Bike lane expansion and improvement project</td>
<td>150</td>
<td>2</td>
</tr>
<tr>
<td>(T) B.4 Parking restriction project</td>
<td>143</td>
<td>4</td>
</tr>
<tr>
<td>(T) D.3 Taxi replacement and efficiency project</td>
<td>139</td>
<td>5</td>
</tr>
<tr>
<td>(T) B.1 Bus rapid transit lines</td>
<td>134</td>
<td>6</td>
</tr>
<tr>
<td>(T) B.2 Expand rail services</td>
<td>134</td>
<td>6</td>
</tr>
<tr>
<td>(T) D.2 4-wheel vehicle fuel efficiency tax</td>
<td>125</td>
<td>8</td>
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<tr>
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<td>109</td>
<td>10</td>
</tr>
<tr>
<td>(T) A.3 Streetscape improvement project</td>
<td>103</td>
<td>11</td>
</tr>
</tbody>
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**Finding the Balance**

The city’s aspirations and the project opportunities should both be clear after completion of the previous steps. Complementarities between the energy sector and broader-reaching engagements will have come to light. Most cities will begin by implementing low-cost, easy-win projects that require relatively minimal resources and have traditionally led to high energy reductions in a short time. Examples include

- congestion pricing,
- building codes, and
- street lighting.

However, all cities’ aspirations, resources, and commitments are different, so the choice of projects to meet energy goals will be unique to the city. If carbon reduction is a priority, resources should focus on shifting fuel types, providing incentives for distributed generation, and perhaps encouraging renewable energy solutions. If air pollution is a major issue, projects could be focused on congestion pricing, constructing new bike lanes, or upgrading building codes for exhaust locations.

**Stick to the Vision**

Prioritizing means choosing what is right for the city within the resources available. When in doubt,
CHAPTER 4: GOAL SETTING | 47

EXAMPLE 4.8
SOME GUIDING PRINCIPLES IN THE SELECTION STAGE

1. Fuel type stress
External supply constraints on a particular fuel may lead to the prioritization of projects that address this constraint, despite potentially higher capital costs. The costs of not implementing these projects will be higher than taking on projects that may have scored high in Stage 2.

Example: Natural gas constraints drive a low-ranked energy efficiency residential air conditioning project.

2. Political expedience
Sometimes people speak out, protest, or petition, and selection of a lower-ranked project is the politically wise action. The selection and successful implementation of one project instead of another may allow for political leverage.

Example: Concerns about air quality around a school yard leads to support for regulations to ensure industrial process efficiency.

3. Strong donor opportunity
A third-party group or private investor may push for a public-private partnership in which both groups benefit economically and the city grows closer to reaching its goals.

Example: A developer wants to invest in a transit hub on its new property, supporting transit projects that could not previously be funded.

4. Synergy with other urban problems
The mayor or other senior leader recognizes connections with other city qualities that can benefit from the implementation of projects.

Example: Safety issues drive a streetscape plan that includes street lighting and bike lanes.

the city government should return to its vision and goal statements. Projects should be chosen to achieve the goal and communicate the success using the goal statement; for example,

“New Dedicated Bike Lane Project Positions City to Achieve Carbon Emissions Reduction Targets.”

Easy Wins Versus Repositioning for Change
Short-term wins make for good press. They give credibility to the SUEEP process and to the city’s goals. Quick achievements should continue to be exploited, discussed, and communicated as successes. But prioritizing projects should not just mean selecting projects that give the best short-term results—those that position the city for long-term success are also crucial.

Know the Strengths of the City and the People
What can finally be implemented depends on what the administrative groups can achieve based on their resources, knowledge base, and influence. The success of the projects and the overall SUEEP process will be determined by the groups designated to lead and administer these projects.

Understanding the current strengths of the departments, the public sector, or nonprofit presences should influence project prioritization. Relying on an unmotivated or unqualified individual to lead a priority project will not work. Empowering strong leaders will increase the odds of success.
### TABLE 4.7. PROJECT SELECTION

<table>
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<tr>
<th>Rank</th>
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<th>TWPS</th>
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<td>1</td>
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<td>2</td>
<td>(T) B.5 Park and ride project</td>
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<td>3</td>
<td>(T) A.1 Bike lane expansion and improvement project</td>
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<td>4</td>
<td>(C) C.1 Commercial building operator awareness training</td>
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<td>5</td>
<td>(T) B.4 Parking restriction project</td>
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<td>6</td>
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<td>(T) B.2 Expand rail services</td>
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<td>11</td>
<td>(R) C.1 Residential unit metering project</td>
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<td>17</td>
<td>(M) A.1 City building audit and retrofit project</td>
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<td>(T) A.3 Streetscape improvement project</td>
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<td>19</td>
<td>(C) B.1 Update commercial building energy code</td>
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<td>20</td>
<td>(P) A.1 City government energy task force</td>
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<td>(C) E.3 Public office buildings audit and retrofit project</td>
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<td>(P) D.4 Partner with grants-funding agencies</td>
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<td>24</td>
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Planning

This chapter outlines the process for compiling the energy and emissions plan. This document will represent the city’s vision and will be what the public and the international community will see. Therefore, the document should be clearly written, summarizing the city’s current situation and its aspirations for achieving a sustainable energy future. The energy and emissions plan should summarize why an alternative energy future is important, and it should make the case for the specific initiatives and projects that will be implemented in the coming years.

A good energy and emissions plan can garner internal support from throughout the city government and help to motivate city workers to support the mission and the purpose of new programs. A good energy and emissions plan can convey the city’s sophistication and organization to international funding agencies and private sector energy businesses. This is a critical part of the SUEEP process and should be developed with care and attention.

STEP 10
Draft the Plan

This section describes the crafting of the SUEEP process into a public document that summarizes and synthesizes the planning efforts made thus far. The energy and emissions plan is the midpoint of the planning process—it marks the end of the analysis and inventory phase and the beginning of the implementation and action phase.

Purpose of the Energy and Emissions Plan

The energy and emissions plan synthesizes the work undertaken on energy planning and outlines the steps a city will take to alter the course of its energy consumption.

The document should inform the public of new initiatives, explain convincingly why an alternative energy future is important, inspire city residents and businesses to take action and contribute to improving the city, and show the international donor community that the city is organized and serious about implementing energy projects. The energy and emissions plan is typically not a legal document, although the energy plans it espouses may be formally adopted by legislative bodies.

The energy and emissions plan is different from the SUEEP status report outlined in Step 17. The energy and emissions plan is created before projects are implemented and sets out the long-term vision, goals, and strategies of the city’s leadership. In contrast, the status report provides updates about progress toward the goals set out in the energy and emissions plan.

Audience for the Energy and Emissions Plan

The energy and emissions plan has a wide audience including city residents, city workers, private sector businesses, international energy services companies, financial institutions, international donor agencies, and peer cities that may follow in your city’s footsteps. Because this audience is wide and diverse, the document must be straightforward and intelligible, not heavily weighted with data, but also not simply a compendium of generalities and platitudes. It should be easy to read and contain specific goals and targets that are achievable and relevant to stakeholders.

Who Should Write the Energy and Emissions Plan?

The lead agency or energy task force within the mayor’s office will be the central point of contact and coordination for the entire SUEEP process. Thus, this lead agency should pull together all the
data, projects, benchmarking, and background required for the energy plan. This agency should also have close ties to the mayor or the city council, who will ultimately approve the energy and emissions plan. The agency should also seek stakeholder input on the document before it is finalized. The actual writing of the energy and emissions plan may be done by staff of the agency, or a local or international consultant may write and compile the document depending on the capacity, budget, and time available to the agency. The first energy and emissions plan is more likely to be written by nonpermanent staff, whereas future energy and emissions plans may be written in house once city government officials become more familiar with the process and can tailor the plan to local experiences.

Style and Length

Because the energy and emissions plan is meant to be public and easily comprehended by a wide variety of stakeholders, it should be a graphically compelling document that illustrates data and policies using figures and diagrams that make energy data interesting and easy to read. (See technical assistance opportunity 5.1.) It should contain comparisons with other cities and should refer to aspects of everyday life that help nontechnical readers understand the targets and how the goals can be reached. Its description of the urgent need to change the course of the city’s energy consumption should be inspirational and should showcase the thought and efforts put into setting the goals, targets, and strategies. These elements of the document should be tailored to the city so that readers believe that they are achievable. Most energy plans are between 50 and 100 pages and are produced in both digital format and hard copy.

Contents of an Energy and Emissions Plan

All SUEEP processes are different, and as it develops, the contents of the energy and emissions plan will evolve to fit the process. See resources 5.1 and case study 5.1. Some energy and emissions plans will be produced earlier, during the data collection and analysis steps, and some cities will have done significant background research and planning before writing the document. Example 5.1 provides a general template of the contents of a typical energy and emissions plan. Although a city’s first energy and emissions plan may not be a fully comprehensive document, it should at the very least incorporate the results of the energy balance and GHG inventory to profile the city’s energy use, outline its targets and projects to change energy use patterns, and flesh out an action plan to demonstrate the steps the city will take to begin to implement the energy and emissions plan.

TECHNICAL ASSISTANCE OPPORTUNITY 5.1

Graphic Design and Report Writing

Some city governments have graphics departments that can publish a compelling document, but even large cities such as Chicago and London hire external consultants to put the SUEEP information into a format and style that is attractive and readable. Conveying technical data in graphically simple ways requires graphic design software and unique experience. This may also be a resourcing requirement because permanent staff may already be busy with existing obligations and the SUEEP process is a biannual activity.

RESOURCES 5.1

Sample Energy and Emissions Plans for Reference

Examples of how other cities have developed their plans are in the references below:

- **Singapore**: “Climate Change and Singapore: Challenges. Opportunities. Partnerships”
- **New York, New York, USA**: “PlaNYC”
- **Birmingham, UK**: “Birmingham 2026, Our Vision for the Future”
- **Toronto, Canada**: “Climate Change, Clean Air and Sustainable Energy Action Plan: Moving from Framework to Action”
- **Huntington Beach, California, USA**: “City of Huntington Beach Energy Action Plan”
- **Dublin, Ireland**: “Dublin City Sustainable Energy Action Plan 2010–2020”
- **Tbilisi, Georgia**: “Sustainable Energy Action Plan – City of Tbilisi for 2011–2020”
- **Cape Town, South Africa**: “Moving Mountains: Cape Town’s Action Plan for Energy and Climate Change”
- **Christchurch, New Zealand**: “Sustainable Energy Strategy for Christchurch 2008–18”
Chapter Summaries

1. Inventory and Benchmarking

The first chapter of the energy and emissions plan (after an executive summary) should summarize the energy balance and GHG emissions inventory and highlight the major energy users by sector. Data should be put into context using historical trends and previous goals set by the mayor relating to the use of energy. Progress indicators for specific sectors should also be compared with those for similar cities and peer cities. Data should be illustrated in an interesting and informative manner using graphs and charts.

This chapter should also describe likely opportunities for improvement.

(Collecting data for and calculating the energy balance and the GHG inventory are described in Step 4 of this Guidebook.)

2. Energy and Emissions Growth Projections

This chapter describes the wide variety of future energy consumption scenarios that a city could face. Using the diagnostics of the current inventory year, it makes a number of assumptions about how energy consumption will change in the coming 10 to 20 years. Such assumptions should take into account trends that accompany economic growth in the East Asia and Pacific region, such as the growth of energy consumption as a result of shifts from two-wheel vehicles to cars; from industrial manufacturing to tourism and knowledge work; from multigenerational housing to higher quality single family housing; and from traditional naturally ventilated buildings that use relatively little energy to higher quality, international-style office space with air conditioning, computers, and overhead lighting.

Because growth and trends for the future are uncertain, a number of alternative scenarios for high and low growth should be examined. Assumptions should also include trends such as densifying urban centers versus city expansion via low-density development on the outskirts of town.

(The process for developing growth projections and scenarios is described in Step 8 of this Guidebook.)

3. Energy and Emissions Goals

The energy and emissions plan should state the city’s goals and priorities for an alternative energy future to clarify the vision and to set targets for energy and emissions reductions. These goals should coincide with the mayor’s agenda, helping to prioritize projects and make decisions about which investments will create the most significant change in pursuit of the desired goals. Goals and targets are specific and should apply to citywide performance as well as to each sector.

(Setting goals is described in Step 8 of this Guidebook.)

4. Priority Projects

The final three chapters set out the specific steps for achieving the city’s goals. This chapter summarizes how all possible projects were evaluated and which were given priority. The mix of high-priority projects should include some quick and easy projects...
for quick wins, some long-term big picture projects, and projects that cut across all sectors. This chapter will briefly describe each project. Projects can range from energy efficiency to organizational or institutional development projects. Some projects may also be the establishment of policies that set the stage for the viability of future energy projects. (Prioritizing and selecting projects can be found in Step 9 of this Guidebook.)

5. Financial Resources
This chapter summarizes the costs and benefits of proposed high-priority projects. It also shows how the city plans to pay for each project, but it is not

EXAMPLE 5.2
SAMPLE 10-YEAR ENERGY AND EMISSIONS ACTION PLAN

Organization
Leadership and Management

FIRST YEAR
- Establish energy task force
- Partner with funding agencies

2011 2012 2013 2014

Process and Reporting
Planning, Implementation, and Reporting

Allocate city budget resources for energy planning
Implement Priority #1 projects

GHG inventory

$ Energy Budget Review

Status Report

EEP #1 Implementation Phase
meant to be a detailed cost exercise with extensive figures or analyses. Because costs and benefits of various projects accrue to multiple stakeholders, including those outside the city, the energy and emissions plan should address this issue in a compelling way. This chapter should also make a strong financial case for the plan’s benefits to the city’s macroeconomic situation and how it will boost rather than hinder economic growth. (Financing mechanisms for energy projects can be found in Step 14 of this Guidebook.)
6. Action Plan
The final chapter outlines the short- and long-term actions required to implement the plan using a time-based sequence of activities. The action plan will show the institutional and policy changes necessary as a result of the SUEEP process. Seeing the 1-year action plan as well as a 10-year outlook helps to put the process into perspective for readers who want to know what is happening and when it is happening.

An action plan must be time-based and a schedule must be set for meeting major milestones. The energy and emissions plan is only one step along the path, but it should include an action plan summary.

Components of the Action Plan
The action plan has two major components:
- the institutional or organizational activities required for implementation, and
- actual project implementation phasing, annual monitoring and reporting activities, and cycles of financial planning and recalibration of implementation plans.

Example 5.2 shows an action plan with major milestones set out over a 10-year horizon along with regular GHG inventories, budget allocations, and status reports.

STEP 11
Finalize and Distribute the Plan

Once the energy and emissions plan has been drafted, it must go through a stakeholder review and input process. This review has many purposes, including getting technical corrections and clarifications. Most important, the review serves to get buy-in from stakeholders. It may be difficult to get support for the plan if a stakeholder who is expected to implement high-priority projects has not seen the plan or agreed to implement the projects. In contrast, stakeholders who have been in regular dialogue with the energy task force and have been involved in project review and assessment would likely support initiatives that are related to or need to be implemented by them.

Revise and Synthesize the Plan
All comments should be collected, recorded, and evaluated to ensure that all inputs are considered. Comments should be prioritized based on relevance, the technical or experiential basis of the comment, the priority of the stakeholder making the comment, and compatibility of the comment with the city’s broader goals. Once the changes to the plan have been determined, it can be revised to incorporate the most important comments.

Finalize the Plan
The final step in developing the energy and emissions plan is to gain approval from the mayor and the energy task force. Finalizing the document should be straightforward once the diagnostics have been completed, goals have been set, projects have been prioritized, and stakeholders have been consulted. However, if the mayor has not been involved in the day-to-day SUEEP process, time should be taken to explain the process and its outcomes to the final decision makers.

Most energy and emissions plans begin with a personal letter from the mayor introducing and supporting the plan. Once the plan has received final approval, it should be printed for distribution and published digitally for uploading to the city’s website to be accessible to a wider audience.
Get the Word Out—Locally

Once the energy and emissions plan has been published and posted on the city’s website, the public, private businesses, local NGOs, and all other stakeholders who will be interested in participating and benefiting from the SUEEP projects should be informed. News articles in local papers, press releases, events to introduce aspects of the plan, and other publicity-generating activities should be pursued. (See technical assistance opportunity 5.2.) One of the main reasons that mayors develop energy plans is that they believe such plans will support the public’s expectations for improved quality of life and environmental stewardship of the city. Therefore, if the plan is written and implemented, but the public remains unaware of it, much of its benefit will be lost.

Get the Word Out—Internationally

Because some of the stakeholders in the SUEEP process are international businesses, donor agencies, and peer cities, the energy and emissions plan needs to be publicized beyond the city and even the country. The commitments made and thoughtful planning demonstrate the city’s capability to implement a progressive agenda and could make the city more economically competitive. If the energy and emissions plan is credible, it can attract financial, technical, and political support for implementing the projects. A well-written energy and emissions plan will also attract interest from international organizations, which are on the lookout for good projects and cities’ capacity and ability to implement the projects.

TECHNICAL ASSISTANCE OPPORTUNITY 5.2
PUBLIC RELATIONS PRESS RELEASE

Once the energy and emissions plan is complete, professional support may be needed for getting the word out. Some cities have strong public relations and community outreach capabilities, but these are often confined to the city itself. Professional public relations firms can help to expand the reach of publicity for the energy and emissions plan regionally, nationally, and internationally. This is particularly important if a city is looking for international donor funding and needs to show how serious the SUEEP process is to the mayor. Publicity may even attract funding that was not in the picture before the press release.
CHAPTER 6
Implementation

The implementation stage is where good planning pays off. The strong foundation for city action established in the previous steps enables the city to take on the challenges associated with SUEEP. The information presented in this chapter will help address the basics of overcoming policy and financing barriers. Because this Guidebook maintains a high-level overview of the issues associated with implementation, numerous external resources are referenced in the text. The references provide valuable information and would be useful sources of information during project implementation.

STEP 12
Develop Content for High-Priority Projects

This section outlines issues to consider when developing the most common types of energy efficiency and energy planning projects. The high-priority projects were selected in Step 9 of the SUEEP process to be implemented first. The details of every energy project are different, so a considerable amount of experience and time are required to turn a project idea into a project that can be fully implemented. See technical assistance opportunity 6.1.

The following descriptions provide greater detail for four common types of projects:

- incentive projects,
- major single projects,
- organizational development, and
- policy projects.

(See resources 6.1 for more information on developing a policy-based energy and emissions plan.)

Incentive Projects

Many energy efficiency projects encourage uptake of better, more expensive equipment by paying the purchaser the difference between the low cost–high energy product and the high cost–low energy one. Examples include high-efficiency air conditioners, boilers, lighting, and pump motors, or fuel-efficient cars.

Technology Assessment

The first step is to rigorously assess the technologies to find the ones that are better suited to the circumstances of the city. The advantages of, for instance, particular lights, pump motors, or air conditioners over typical equipment should be determined.

Target Customers

Businesses, residents, or manufacturers that would be interested in an incentive project should be identified. Interviews to understand what would motivate them to engage in the project, and factors that would dissuade them, should be conducted. The number of customers that could plausibly participate in the project should be estimated and targets for the uptake of the project set (for example: 1,000 incentives [rebates, discount coupons] for very high efficiency scooters will be distributed every year for five years).

Set Incentive Levels

Incentive levels can be set once the available energy efficient technologies are understood, including how much they cost and how much energy can be saved. Typically, incentive levels
are set at 50–100 percent of the difference in cost between baseline equipment and high-efficiency equipment. The energy and emissions task force will have to set the level of incentives based on the group of consumers being targeted. If the time consumers spend in the application and validation process is greater than the energy cost savings they expect to accrue, they will have no incentive to become more energy efficient. For example, if the incentive for a dimmable T5 light bulb does not completely cover the cost differential with a typical T12 light bulb, consumers will need to believe that the energy savings will pay for the additional cost within a short time.

Allocate Funding
Once incentives, target rollout volumes, and project administrative staffing levels have been estimated, a total project budget can be developed. Armed with a solid plan that identifies the budget, the projects, and the potential energy or GHG savings, you can approach the city council, donor agencies, and specialized financing bodies (for example, energy efficiency funds) for financing support. Step 14 provides details on financing options.

Develop Application and Selection Process
A good incentive project could be oversubscribed, so a process should be developed to select recipients based on need, speed of implementation, and other characteristics that make them attractive.

Validate Installation
Most incentive projects require that the purchase, installation, and correct use of the equipment be validated. This follow-up also ensures that the technology is appropriate and delivers the energy savings predicted in the initial technical assessments.

Major Single Projects
Some projects are potent enough to change the way a city uses energy. Examples include a large-scale district combined heat and power facility, a bus rapid transit line, or a citywide water network leak detection and reduction program. These projects do not need to engage a large number of businesses or residents but do require the involvement of many intergovernmental agencies and funding sources, as well as substantial planning, approvals, and political support.

Conceptual Design
The ideas behind a project with the potential to achieve one or more of the city’s energy goals should be refined to provide a high-level understanding of its primary concepts. A firm grasp of major characteristics—overall cost of construction and operation; annual revenue potential; stakeholders involved (including property owners, local
businesses, residents, NGOs, and city agencies); and timeline for full design, construction, and implementation—is critical.

**Project Feasibility**
With a conceptual design, a project feasibility study can be undertaken. Analyses should include costs and benefits, technical components, environmental and social considerations, political roadblocks, and financing issues.

**Project Approvals**
If a project is deemed feasible, a more detailed design should be formulated and approved by the regional or national electrical, regulatory, and environmental bodies. For example, a large-scale renewable power generation facility (wind, solar, geothermal, biomass, or the like) should be approved by the regional or national electrical regulatory body, and should gain environmental and legislative approvals.

**Project Financing**
Throughout the development of a major project, the project leader should be aware of different financing structures, and engage lenders, partners, and donor agencies. Many of the major project examples shown in this Guidebook were implemented using innovative financing methods such as public-private partnerships (PPPs), design-build-transfer, design-build-operate-transfer, and other methods to bring in private sector technical and financial expertise and risk sharing.

**Project Bidding**
Once the project is approved and the procurement strategy has been designed, the project should be put through a competitive bid process. The request for bids should be publicized as widely as possible to bring in a large pool of potential bidders. The bidding process may require multiple stages; the initial stages might request only statements of capabilities and team structure, with subsequent stages requesting more detail about finances and implementation plans.

**Project Implementation Plan**
Before a final bidder is selected, a rough implementation plan should be drawn up by the city and circulated to all stakeholders to ensure they have been consulted on implementation hurdles.

**Organizational Development**
Successful energy planning goes beyond identifying and developing incentive projects or major impact projects. Good energy planning increases the capacity within the city government to implement future projects. Increasing energy-related capacity includes building knowledge of successful projects from throughout the region, building a network of contacts for technical support and advice, and changing the mindset of city employees to work collaboratively toward the city’s wider energy goals.

**New or Improved Organization**
Whether formation of a new agency or group to undertake responsibility for the SUEEP process and status reports is required, or an existing organization could simply be improved to be more effective, should be determined. The city government should ensure that the new or existing agency, groups, or organization is properly funded and provided with the authority to make decisions and implement projects; otherwise, the initiative will be ineffective.

**Staffing Requirements**
The minimum number of staff required to make the organizational improvement should be determined. Keeping staffing cost low is critical to minimizing project administration overhead.

**Training Requirements**
The most cost-effective available training (including conferences for key staff, professional consultancy, training programs for energy services, and donor-funded capacity-building activities) should be identified. Many donors look for opportunities to provide technical assistance through capacity building rather than direct consultancy, so cities should take advantage of these opportunities.

**Policy Projects**
Finally, policy projects can lay the groundwork to ensure that tactical energy projects are successful. For example, fuel subsidies for private vehicles could be decreased or eliminated in tandem with access and affordability improvements in public transportation.

**Policy Analysis**
The cost of the new policy or regulation to stakeholders should be assessed; this analysis should be
used to ensure that its benefits outweigh the costs. Finding the right balance between regulation or policy changes and economic development and improvement in citizens’ quality of life, safety, and security is critical.

**Stakeholder Consultation**
Changes to the existing policy environment will affect residents and businesses, so it is important to gain buy-in on the changes before they are implemented.

**STEP 13**
**Improve Policy Environment**

Cities need to recognize the close relationship between the policy environment and the success of the SUEEP process. Each city is shaped by its unique political environment, which means that the intricacies of adapting policies to the SUEEP process will be similarly specific. This step aims to help a city understand how its current policy environment will affect the SUEEP process, the policy options that are potentially beneficial to the SUEEP process, and how policy recommendations can be established. This step also describes the process a city can use to analyze how current policies can be improved to streamline energy and emissions-related policy, remove potential bottlenecks or conflicts with the SUEEP process, and preempt issues arising from mismatched policy. This is achieved through a three-stage process:

- **Review baseline policy**
- **Develop policy options**
- **Establish policy recommendations**

**Legislation, Regulation, and Enforcement**
Sometimes incentives are insufficient to bring the energy efficiency agenda to fruition. In these cases, city governments may choose to put in place legislation or regulations; for example, building codes may need to be formalized to make it compulsory for buildings to be designed in an energy efficient manner.

A regulatory policy must be both enforceable and enforced to create change, so ensure resources are allocated and a reasonable process is set up to monitor compliance.

**Current Policy and Project Review**
The first step in the review is to take stock of existing policies, initiatives, projects, and programs at the national, regional, and city levels (see example 6.1). Initiatives and projects developed by utilities, NGOs, and other organizations should be included in the review.

The results of the review can be presented as a list, table, memo, presentation, or any other suitable format. This review will serve as the basis for policy analysis, so the information should be clear and easy to analyze.

**Policy Support and Conflict**
Once the policy and project review is completed, it is important to identify how the policies interact.

**EXAMPLE 6.1**
**LEVEL OF GOVERNMENT AND POLICY TYPE**

- National level: Renewables policy
- Regional level: Mass transit
- City level: Building codes
A supportive policy relationship allows different policies to augment each other’s desired effect. For example, for a densely populated city, Singapore has remarkably low traffic congestion and good air quality. These attributes resulted from the implementation of a number of policies that work together, including a high tax on gasoline, congestion charging, and stringent automobile standards. See case study 6.1 for another example of mutually reinforcing policies.

However, policies also have the potential to conflict with each other if they have not been formulated strategically. For example, a city might want to improve the fuel efficiency of its vehicle fleet and has identified fuel mileage as a key concern. However, existing procurement guidelines might preclude the use of fuel efficiency as a product selection criterion. In this case, the city may need to consider updating its vehicle procurement guidelines to enable achievement of its goal.

In addition, when considering policy support and conflict, pointing out the many additional benefits that come along with energy and emissions policies is important. For example, energy and emissions policies can result in

- public health improvements,
- cost savings and increased efficiency,
- reliability of energy supply and infrastructure improvements, and
- improved quality of life.

Using the baseline policy review as a way to cross-check policies against each other will help the city understand the relationships between different policies. Some instances of policy symbiosis and conflict may arise with policies that are not related to energy and emissions, and these relationships should be noted for reference because they may prove to be important later on. See example 6.2 for a suggested framework for assessing policy support and conflicts.

**Gap Analysis**

A gap analysis builds on the policy and project review to understand the arenas in which further policy action is required for the effective implementation of projects identified by the SUEEP process. A gap analysis consists of mapping current policies and projects against a set of categories or areas that need to be addressed to plan for effective energy and emissions management.

**Tip 6.1, “Common Policy Gaps,”** lists areas that are typically not fully covered by energy and emissions policies. This list is useful as a starting point, but an individual analysis is essential for each city given the wide variability in activity.

**Develop Policy Options**

The outcome of the baseline policy review sets the stage for the development of policy options with the potential to achieve the city’s goals. The aim is to identify a wide range of alternatives and then narrow them down to those that are most suited to the city's situation.
Consider Multiple Policy Approaches
Establishing multiple policy approaches to achieve a desired outcome is a good strategy for policy reinforcement. For example, if the city has identified reduced water use in buildings as a policy objective, then a two-prong policy approach that includes fixture flow rate requirements in building codes and public education initiatives on water savings is an effective way to achieve the city’s goals. Although this is a simplistic illustration, all the potential avenues available to the city to establish, reinforce, and support change should be considered.

In developing multiple policy approaches, potential measures should be aligned with the desired outcome. This will allow policy planners to match the policy’s goal with the means available to achieve it.

Stakeholder Engagement
As discussed in Step 3: Identify Stakeholders and Links, gaining policy insights from stakeholders and securing stakeholder buy-in are essential to developing energy and emissions policies. Stakeholders contribute to the city’s understanding of the necessary policies and enable a multidisciplinary
approach to policy development. They also play a variety of roles related to energy efficiency and emissions policy development, including

- developing and writing policies (for example, Department of Energy),
- enabling project delivery (for example, energy services companies [ESCOs]),
- coordinating strategic planning (for example, city Chamber of Commerce),
- implementing projects (for example, building operators),
- receiving services from the city and participating in public consultation (for example, citizens), and
- enabling knowledge sharing (for example, local academic institutions).

In particular, engagement with the national government is key, given that national policies, especially those that cut across sectors, affect policies implemented at the city level. For example, electricity tariffs, which are usually determined by the national government, could potentially impede the city’s efforts to enhance energy efficiency should the price of electricity be subsidized or set particularly low.

(Further discussions of stakeholders and how they can be engaged can be found in Step 3.)

Establish Policy Recommendations
Establishing policy recommendations for the energy and emissions plan requires that the list of policy options identified in the previous steps be reduced. This reduction will be based on an analysis of the city’s capacity to act, the partnerships that may enable policy implementation, and the empirical database underpinning development of the energy and emissions plan.

Capacity to Act
The first consideration in establishing policy recommendations is the city’s capacity to act. Capacity to act refers to the city’s scope of influence with respect to energy and emissions policy. For example, cities generally have the power to regulate, enforce regulations, invest in infrastructure upgrades, provide subsidies, and educate the public. See example 6.3 for more information on how cities can classify their powers to accomplish the goals of the energy and emissions plan.

EXAMPLE 6.3 Capacity to Act

A city’s capacity to act and its level of influence determine how it can affect the energy and emissions plan. This matrix can be used to classify initiatives and clarify how they can best be implemented.

<table>
<thead>
<tr>
<th>Type of Mayoral Lever</th>
<th>Local authority</th>
<th>Provincial or state government</th>
<th>National government</th>
<th>Private sector</th>
<th>Households and individuals</th>
<th>NGOs and others</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rulemaking</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Regulatory oversight</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Direct expenditures and procurement</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Financial incentives</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Information gathering, dissemination, convening, facilitation, advocacy</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

There are four major roles that a city can take with respect to energy and emissions (see example 6.4):

- energy consumer,
- regulator,
- energy producer and supplier,
- motivator.

For each role, the city’s capacity to act is limited in a specific way. For example, the city should have significant control over its own energy consumption and can introduce policies to retrofit city building stock, develop procurement policies that prioritize energy efficiency, and educate civil servants on energy efficient behavior.

However, as a regulator, the city’s control is more limited. For example, if the city aims to reduce per capita energy consumption in homes, the available policy levers are generally information dissemination through educational campaigns or regulation through building codes. (See case study 6.2.) These are not likely to be as effective as policies that are outside the city’s authority, such as a progressive electricity tariff structure.

Each policy in the baseline review will relate to one of the city’s roles. Identifying the extent of the city’s influence and its policy levers in the proposed projects will allow it to determine if it is using its full capacity to act within each role, or whether some policy levers should be favored over others. (See example 6.5 for a description of available policy levers.) This review will also enable a city to consider indirect methods of enacting change if the analysis shows that some outcomes it desires are not within its scope of influence.

**EXAMPLE 6.4**

**POLICIES ACCORDING TO CITY ROLE**

<table>
<thead>
<tr>
<th>Role</th>
<th>Policies</th>
</tr>
</thead>
<tbody>
<tr>
<td>Energy Consumer</td>
<td>Air conditioning turned off during certain hours, City building retrofit project</td>
</tr>
<tr>
<td>Regulator</td>
<td>Building codes, City planning requirements</td>
</tr>
<tr>
<td>Energy Producer and Supplier</td>
<td>Tariff structure, Fuel procurement policy</td>
</tr>
<tr>
<td>Motivator</td>
<td>Energy efficiency publicity campaigns, Energy efficiency pilot projects</td>
</tr>
</tbody>
</table>


**EXAMPLE 6.5**

**AVAILABLE ENERGY EFFICIENCY AND GHG POLICY LEVERS**

Below are examples of policy levers available to city leadership:

- **Rulemaking and enforcement**
  - Building performance standards and green building codes
  - Industrial efficiency standards
  - Green procurement policy

- **Direct capital expenditure**
  - Improved vehicle testing
  - Audit and upgrade for different building types
  - Efficient technologies program
  - Efficiency in government operations
  - Demonstration projects

- **Financial incentives**
  - Subsidies, tax deductions, or loans with favorable rates for energy efficient products, for example, roof insulation
  - Renewable technology rebates

- **Awareness and knowledge sharing**
  - Online information portal
  - Consumer guide to energy efficient products
  - Energy efficiency, GHG mitigation awards
  - Energy efficiency partnerships
  - Training for energy efficiency professionals

- **Funding**
  - Energy efficiency and GHG funds

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**CASE STUDY 6.2: MEXICO**

**GREEN BUILDING CODES**

Mexico has had a mandatory building energy standard for commercial buildings since 2001 that was developed by CONUFE, the national energy conservation agency, with support from the Lawrence Berkeley National Laboratory. The code has not yet been incorporated into the country’s construction regulations, but it is recognized that this is necessary to encourage its effective implementation.

See case study 6.3 for an illustration of many of the concepts in this section.

**External Partnerships**
Some policies cannot be implemented without the help and support of external partnerships. ESCOs and PPPs are good examples of external partnerships that have enabled energy efficiency policies to be successful in cities across the world.

In addition, development banks, international organizations, and NGOs can potentially help plan for a rollout of the energy and emissions plan. The potential for external partnerships is discussed in more detail in Step 3: Identify Stakeholders and Links.

**Empirical Base**
The foundation of the SUEEP process is an empirical base of periodic energy and emissions data collection and analysis, enabling systematic measurement and monitoring of policy successes and failures. This information allows a city to adjust policies where required and develop an efficient approach to energy and emissions management by eliminating unsuccessful or redundant policies. The empirical base of the SUEEP process can be leveraged by a city to analyze its policy structure, especially after one iteration of the SUEEP process has been completed.

**SUEEP Policy Process**
This section covers the key factors that enable the development and implementation of the energy and emissions plan to be successful.

**Transparency**
Transparency is a critical part of policy development because a process that is communicated well to all stakeholders builds support and ensures widespread understanding of the city’s intent. Transparency is also strongly linked to perceived regulatory risk from the perspective of potential investors. By improving transparency, the city is reducing this perceived risk and improving its position to attract financing.

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**CASE STUDY 6.3: SEATTLE, WASHINGTON, USA**

**GREEN BUILDING PROGRAM**

Through a collection of successful regulatory standards, measures, and incentives for the building industry, Seattle now has one of the highest concentrations of sustainable buildings in the United States and a powerful sustainable building industry worth $671 million.

Having initially established a Green Building Team in 1999, Seattle regrouped its green building experts to form a single business unit called City Green Building in 2005. Its main program is funded through interdepartmental resources and staffed by green building experts in residential, commercial, institutional, and city capital projects. Using its strong relationships with the city’s water and energy utilities and their incentive programs, it connects developers, design teams, and building permit applicants with green building resources and helps eliminate code barriers to building green.

A fundamental element of the city’s green building program is the promotion and measurement of the environmental impact of buildings and third-party verification. Seattle’s successful programs include the following:

- **Sustainable Building Action Plan.** The action plan identified key strategies for promoting green buildings in the marketplace. The two most important strategies identified were to lead by example and to develop a standard for green building.

- **Sustainable Building Policy.** This policy requires new municipal buildings of more than 5,000 square feet to meet a minimum Leadership in Energy and Environmental Design (LEED) Silver standard. Through 2011, an investment in state-of-the-art sustainable buildings of more than $500 million has resulted in 10 LEED Certified projects owned by the city (5 Gold, 3 Silver, 2 Certified), with a further 28 projects planned or in development.

- **City LEED Incentive Program 2001–05.** The city of Seattle provided support to green buildings through its City LEED Incentive Program, with incentives of more than $2 million for energy conservation, more than $2 million for natural drainage and water conservation, and more than $300,000 for design and consulting fees for LEED projects. The program was launched in 2001 as a joint program of Seattle City Light and Seattle Public Utilities. It provided up-front soft-cost assistance to projects committing to LEED. Funds can be used for additional design and consulting fees and for participation in the LEED program. Funding levels were $15,000 for LEED Certified, and $20,000 for LEED Silver or above.

- **Density Bonus.** The density bonus offers downtown commercial, residential, and mixed-use developments greater height or floor area (or both) if a green building standard of LEED Silver or higher is met. Projects must also contribute to affordable housing and other public amenities. Three projects have so far registered, and five projects are currently considering registration as of 2011.

Source: C40 Large Cities Climate Summit (2007 Case Study), “Seattle Sets the Standards for Green Buildings.”
**Codification of the Energy and Emissions Plan**

Formalizing the legal status of the energy and emissions plan embeds it into the long-term citywide strategy. The projects are no longer at the mercy of political cycles and the responsibility to follow through on the plan must be taken seriously. For example, New York’s PlaNYC has been codified, cementing the city’s commitment to take on the actions identified in the plan. Although codification of PlaNYC has been effective in New York, cities in the EAP region will have to consider if a similar approach would be effective in entrenching the SUEEP process in city planning.

**STEP 14**

**Identify Financing Mechanisms**

This section provides a high-level overview of the basics of energy efficiency and emissions project financing. Energy efficiency and emissions reduction projects tend to suffer from a financing viability gap when compared with conventional projects. The information presented here will help you address this challenge. However, because energy efficiency and emissions projects cover a diverse range of sectors, stakeholders, and technologies, developing financing strategies for these projects is complex and cannot be fully addressed in this Guidebook. To augment the information presented here, a selection of supplementary information is presented in resources 6.2.

This section is structured according to a general process a city can use to assess a project’s financial viability as shown in the diagram below:

- **Categorize Projects**
  - Once a collection of projects has been identified and prioritized by a city, the projects must be categorized according to specific criteria that will streamline the approach to financing. Projects in different categories may be eligible for different forms of investments and incentives. The matrix

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**RESOURCES 6.2**

**FURTHER READING**

- **Financing Energy Efficiency: Lessons from Brazil, China, India, and Beyond.** World Bank. 2008.
shown here is a generic approach to categorizing projects by size (small or large) and nature (centralized or decentralized); however, if a city’s prioritized projects tend to fall into the same category, more detailed levels of categorization may be required, for example, breaking down projects by infrastructure capital investment versus operational measures.

<table>
<thead>
<tr>
<th>Decentralized</th>
<th>Large Scale</th>
<th>Small Scale</th>
</tr>
</thead>
<tbody>
<tr>
<td>Green building codes</td>
<td>Efficient lighting</td>
<td>Household solar hot water</td>
</tr>
<tr>
<td>Improved public transportation</td>
<td>Householder solar hot water</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Centralized</th>
<th>Large Scale</th>
<th>Small Scale</th>
</tr>
</thead>
<tbody>
<tr>
<td>Renewables development</td>
<td>Biomass energy</td>
<td>Landfill gas capture</td>
</tr>
<tr>
<td>Water treatment system location</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Using a categorization matrix is helpful for mapping projects to a city’s investment environment. This will enable viable projects to be matched to available financing and ensure that a financial analysis can be undertaken within each category’s market segment. Unless additional energy-specific incentives are provided to investors, projects will be evaluated head-to-head against non-energy projects—but the energy projects will be perceived as having a higher risk profile because financial institutions tend to be unfamiliar with energy efficiency projects.

**Financing Barriers**

From a banking perspective, financial attractiveness boils down to risk and return on investment (ROI). Financing decisions are based on comparisons of investment options and an analysis of the trade-offs between the risks and returns expected from those projects. However, the public sector must also incorporate socioeconomic goals into the decision-making process when considering the financial viability of a project. It is important that this additional layer of complexity be acknowledged when pursuing project financing.

Because sustainable energy and emissions management is still novel, streamlined mechanisms for financing associated projects are not yet available. Planners should consider the impacts of the most common financial barriers to energy efficiency initiatives (“Financing Energy Efficiency: Forging the Link between Financing and Project Implementation,” Joint Research Centre of the European Commission, May 2010). These barriers include the following:

- high development and transaction costs for small projects,
- lack of awareness of energy efficiency projects and technologies on the part of investors,
- lack of energy efficiency financing experience,
- high perceived end-user credit risks,
- long marketing cycles,
- low collateral asset value,
- energy savings not considered a revenue source,
- high up-front costs,
- short payback period requirements,
- budgetary rules that make it difficult to finance projects from energy savings,
- energy efficiency financing coming from the investment budget whereas savings are credited to the operational budget,
- lack of consideration of life-cycle costs, and
- ambiguous ownership and operation of major energy assets.

Not all of these barriers will apply to every project category and, conversely, some categories may experience additional challenges. However, addressing these potential impediments during the planning process will reduce the risk that they later prevent the implementation of an energy efficiency or emissions mitigation project.

Using the categorization matrix, a like-for-like comparison of financial risks and attractiveness is possible within each project category. Comparing projects across categories does not necessarily provide insight into the best potential project options because the criteria for financial viability will differ.

**Determine Project Financial Viability**

Broadly speaking, projects are financially viable if the ROI reaches an agreed-on threshold, or “hurdle rate,” and the identified risks are tolerable and might be mitigated during implementation. Therefore, before financing options are identified,
a thorough risk assessment and financial analysis must be undertaken.

**Risk Assessment**

The level of risk associated with a project influences the hurdle rate required to make the project viable. A city can encourage private sector investment by mitigating certain risk elements of a prioritized project, for example, by providing loan guarantees for initial seed funding of investments or by fast-tracking regulatory permits. In developing-world economies, the perceived risks are elevated, especially for newer technologies in the energy efficiency sector, and can lead to higher hurdle rates. Therefore, a city would be well served by developing favorable investment policies early in the project assessment phase that will mitigate key risks and thereby help to channel private sector capital into prioritized projects.

Risk assessment is a critical component of project financing, but generic methodologies may not apply to energy efficiency projects. The risk profile of the different categories of projects will also vary considerably, so a custom approach will be required for each category.

Generic risks commonly associated with energy efficiency projects that should be considered during the SUEEP process include (Covenant of Mayors, 2010; and author’s experience) the following:

- **Project-related risks:** cost and time overruns, poor contract management, contractual disputes, delays in tendering and selection procedures, poor communication between project parties
- **Government-related risks:** inadequate approved project budgets, delays in obtaining permits, changes in government regulations and laws, lack of project controls, administrative interference
- **Technical risks:** inadequate design or technical specifications, technical failures, poorer-than-expected performance, higher-than-expected operating costs
- **Contractor-related risks:** poorer-than-expected performance, higher-than-expected operating costs
- **Market-related risks:** increases in wages, shortages of technical personnel, materials inflation, shortages of materials or equipment, variations in the price of energy carriers

Unique risks, by category, might include the following:

- **Technology risk:** Is the technology proven? Technologies that appear in the early stages of the adoption curve will incur higher risk premiums and inflated hurdle rates (see tip 6.2).
- **Timing risk:** Is the project planning and construction time too long or too short to attract the type of financing required? The availability of financing must meet the timeline requirements of project cash flows.
- **Country risk:** How does the perceived risk of deploying capital in the host country impact investment decisions? The host country risk profile (credit ratings, GDP, consumer price index, corruption perceptions index, and the like) will have an impact on the hurdle rate.
- **Regulatory risk:** If incentives are offered, are they sustainable? What is the likelihood that regulation will be consistent into the future?

Risk assessments will incorporate a multitude of project-specific elements that are difficult to generalize. Elements of the assessment identified above will give a reasonable picture of the level of risk attributable to each project type and therefore an understanding of the likely hurdle rate for each project. Once this is known, project-specific ROI analyses should be undertaken to enable benchmarking of project ROI rates versus investors’ required hurdle rates. This will determine the proposed project’s financial viability.
Return on Investment
ROI analysis is typically undertaken to determine whether investment capital deployed will deliver a return that meets an agreed-on hurdle rate. The ROI should be analyzed for every proposed project. The analysis will map project cash flows (costs vs. receipts) over the project’s lifetime to determine its overall profitability.

Hurdle rates acceptable in the private sector, to a bank or financial institution, for example, are often different from those acceptable to a city. A private financial institution would not typically accept an ROI lower than a government bond rate, whereas a city authority might consider investments with very low or even negative returns if the socioeconomic benefits are significant.

If a project exceeds market-wide benchmark ROI, project financing options will be more plentiful. If it does not, additional incentives will be required to attract investments (see example 6.6). In the majority of cases, the ROI for energy efficiency projects will not meet market-wide hurdle rates because of the inherently high levels of perceived risk. However, additional incentives might be available to these projects that do not exist in the wider market. These incentives may include structured and nonstructured climate or energy efficiency schemes promoted by regional, national, or supranational governments, for example, carbon credits or subsidies.

Once the ROI analyses are complete, like-for-like comparisons of projects’ financial attractiveness within categories may be undertaken and the financing options can be considered.

Consider Financing Options
City decision makers will use risk and ROI analyses to assess proposed projects and determine how projects can best be financed. In some cases, the analysis will show that certain projects are not viable. For those that are, cities must determine the most attractive sources of financing available to them, plus the incentives that may be available (see case study 6.4). The categorization of projects is important for subsequent identification of sources of financing. Although not comprehensive, and varying from country to country, examples of types of financing available for certain project categories are shown in the following diagram.

### EXAMPLE 6.6
Energy Efficiency Project Considerations

<table>
<thead>
<tr>
<th>Project return on investment (ROI) %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Technology 1: Energy intensive</td>
</tr>
<tr>
<td>Technology 2: Energy efficient</td>
</tr>
<tr>
<td>Hurdle rate (%)</td>
</tr>
</tbody>
</table>

The additional incentive allows Technology 2 to surpass the hurdle rate and offer a more attractive revenue stream than Technology 1.

### CASE STUDY 6.4: MALDIVES
Public-Private Partnership

In May 2011, the government of Maldives, with the help of the World Bank as lead transaction adviser, implemented a solid waste management public-private partnership. The transaction was structured as a 20-year build-operate-transfer project and mobilized $50 million in private investment that will improve waste collection, transportation, and disposal; reduce marine and air pollution; and generate power through a 2.7 MW waste-to-energy plant. The project will benefit 120,000 people, process up to 70 percent of the country’s solid waste, and reduce annual GHG emissions by 16,000 tons. This project supports the Maldivian government’s goal of becoming carbon-neutral by 2020, while helping it to comply with good global practices for the treatment and disposal of solid waste.
Self Funding

In many circumstances, self funding by a city may appear simpler and less time consuming than seeking outside funding. But if sources of price-competitive financing are available on the open market, supported by risk-mitigating incentives, it is often more efficient to take advantage of these funds. Then, city budgetary funds can be used for high-priority projects that were demonstrated to be financially untenable.

If a city decides to implement energy efficiency and emissions reduction projects using its own funds, financing most often will be drawn from revenues derived from fees and taxes, business activities, privatization of city property, and state budget subsidies. See case study 6.5.

Self-funded projects give a city the greatest level of control over implementation, but also require the highest level of involvement and use of internal resources. See case study 6.6.

Generating Alternative Funds

City funds and resources are often not sufficient for energy efficiency projects requiring high capital expenditure or risk. In these cases external funding will be required and other means of financing must be sought, such as credits, PPPs, leasing and concessions deals, third-party financing, donations,
and so forth. A key consideration for generating alternative or external funds is the time horizon for the availability of financing. Timing may be established in the early analysis of funding options. If funding timelines do not match project timelines, these sources should be discarded at an early stage unless guarantees can be obtained from project implementers that project-related timelines will be adhered to.

If an ROI analysis shows that returns from a project will exceed a market-linked hurdle, private sector financing may be sought at prevailing market rates. Private sector financing is often preferable to energy efficiency–specific financing that has links to incentives, which may prove more time consuming and costly to attain.

If an ROI analysis demonstrates that the proposed project is not competitive with projects in nonenvironmental sectors, tailored financing may be sought from investors experienced in environmental project risk and who have obligations to direct capital into certain market segments. Socially responsible investing (SRI) funds are a good example. SRI funds deploy capital according to criteria that include environmental and social performance indicators. The managers of these funds, although still hoping to achieve a good ROI, are more cognizant of project risk in the environmental sector (see SRI Fund Portal Asia: www.asria.org). The SRI sector includes climate-specific and ecology funds (for example, Jupiter Ecology Fund, HSBC Global Investment Fund – Climate Change), and fund managers have a more detailed understanding of energy efficiency project risk, which can save valuable time. See resources 6.3 for additional options.

Although it is not possible to list all options in this Guidebook, a few examples of alternative arrangements are identified in example 6.7.

**Criteria for Assessing Funding Arrangements**

A wide variety of potential funding mechanisms are available for energy efficiency projects. A city must understand the criteria important to its assessment of financing options, which may include the following:

- cost of capital,
- transaction costs,
- funding timing and project milestones,
- required project delivery vehicle,
- credit ratings of potential investors and lenders,
- securities required,
- equity demands, and
- ethical considerations.

**Project Delivery Vehicle**

Thought should be given to the appropriate vehicle for delivery of each project. This entity will be linked to the method of financing; for example, if funds are sought for decentralized, small-scale projects, a project-specific NGO might make the most efficient use of the funds because it would be able to take advantage of particular tax-efficient benefits. A cost-benefit analysis should be made of each delivery vehicle to ascertain the most efficient mechanism for the project category. Vehicles might include the following:

<table>
<thead>
<tr>
<th>Large Scale</th>
<th>Small Scale</th>
</tr>
</thead>
<tbody>
<tr>
<td>Decentralized</td>
<td>Centralized</td>
</tr>
<tr>
<td>ESCO Limited liability company</td>
<td>Special purpose vehicle (linked to utility or city)</td>
</tr>
<tr>
<td>NGO Development organization</td>
<td>ESCO Private company</td>
</tr>
</tbody>
</table>

**Incentives**

To counter any time or cost impacts of obtaining financing specifically for environmental projects, available incentives—which will vary by project category—should be fully assessed. These incentives can mitigate project risk and increase
the likelihood of attracting additional external financing. Incentives often take the form of mezzanine financing that ensures the project’s development while longer-term, more substantial project financing is sought. Incentives can originate from regional, national, and supranational sources and be on a structured or nonstructured basis. Structured incentives might include carbon credits, such as those from the Clean Development Mechanism (CDM) (see example 6.8 and resources 6.4), whereas nonstructured incentives might include ad hoc loan guarantees from development organizations.

Incentives may be available at many levels, ranging from local tax incentives to national government subsidies and international development seed funding. Technical assistance for accessing financing is also available, such as the CTI Private Finance Advisory Network (www.cti-pfan.net), supported by the UN Framework Convention on
**EXAMPLE 6.8**
CLEAN DEVELOPMENT MECHANISM PROJECT DEVELOPMENT

The CDM is a specific alternative financing approach developed for projects that address climate change in developing nations. The CDM is an arrangement under the UNFCCC allowing industrial countries with GHG reduction commitments under the Kyoto Protocol to invest in projects that reduce emissions in developing countries as an alternative to more expensive emission reductions in their own countries (ICLEI, 2009, *Sustainable Urban Energy Planning: A Handbook for Cities and Towns in Developing Countries*). (CDM is addressed separately from other alternative funding sources because it is applicable to many of the priority projects identified in energy and emissions plans.)

The CDM allows emissions reduction projects in developing countries to earn CER credits, each equivalent to one ton of carbon dioxide. These CERs can be traded and sold, and can be used by industrial countries to meet a part of their emissions reduction targets under the Kyoto Protocol (UNFCCC at http://cdm.unfccc.int/faq/index.html).

The CDM provides an additional incentive for financing environmental projects by allowing CERs to be traded at a market-determined price, as well as indirect advantages such as publicity value and lower risk perception, hence, lower cost of capital.

Procuring CDM funding takes a number of stages, each involving different stakeholders. The CDM Executive Board (CDM EB), under the UNFCCC, plays a vital role at the registration and CER issuance stages. Projects must apply a preapproved project methodology (see figure), obtain an approval from the host party government, and undergo a series of independent audits by UN-approved designated operational entities (DOE) before registration by the CDM EB. This process is exceptionally transparent—all project design documents, including ROI analyses, must be published on the UNFCCC’s public website for review and comment by global stakeholders.

The ongoing monitoring of emissions reductions is emphasized in CDM projects, and monitoring plans are core to any project design. The application of monitoring plans is central to the issuance of CERs. Verification of emissions reductions by DOEs are completed at the end of every monitoring period, and it is the DOE’s verification report that forms the basis of CER issuance requests made to the CDM EB.

(continued on the following page)
**EXAMPLE 6.8 (CONTINUED)
CLEAN DEVELOPMENT MECHANISM PROJECT DEVELOPMENT**

Additionally, CDM PoAs allow project concepts to be registered with preapproved approaches to additionality assessments, monitoring plans, emissions reductions calculations, and so forth. During the period in which the PoA is accruing credits, individual program activities can be included as separate small-scale projects. PoAs are intended to reduce transaction costs and development time for smaller-scale projects. Different program activities can be coordinated and managed by separate entities on the ground, but included in the same PoA. This is an efficient approach to implementing decentralized, small-scale energy efficiency projects while taking advantage of available carbon finance.

Typically, carbon finance available for CDM projects will hinge on the project developer’s ability to secure an Emissions Reduction Purchase Agreement with a CER buyer. These agreements often consist of an agreed-on price for the future delivery of a stated volume of CERs during the project’s crediting period. If the agreement contains either a fixed price or a floor price for CERs, cash flows can be extrapolated for the project’s ROI analysis because emissions reduction estimates are available from the project design documents (taking into account monitoring and issuance risks). Many CER buyers are willing to make risk-adjusted, up-front payments for future CER deliveries, depending on the forward CER price curve.

At present, the majority of CER demand originates in the European Union’s Emissions Trading System. The third phase of this scheme will begin in 2013 and conclude in 2020. The number of CERs eligible to enter the scheme is limited, but during the third phase any new CDM project that delivers CERs into the scheme must originate in a developing country.

When considering CDM, cities must be aware of the exposures inherent in the process:

- **Conventional project exposures:** cost overruns, market risks, counterparty credit risk, underperformance, currency risk, and force majeure
- **Host country exposures:** confiscation, expropriation, and nationalization; civil war; contract repudiation or frustration; host country sovereign risk; administrative barriers; lack of institutional capacity in host country
- **CDM process exposures:** CDM EB nonapproval; timing and delays; CER supply-demand dynamics; monitoring and verification risk; institutional barriers; CER legal ownership

*a. Additionality assessments demonstrate that a carbon reduction project actually reduces carbon emissions and that it would not have already been performed without the project’s intervention.*

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**RESOURCES 6.4
CDM FUNDING SOURCES**

The United Nations Adaptation Fund: The Adaptation Fund is financed through CDM project activities and other sources of funding. The share of proceeds amounts to 2 percent of CERs issued for a CDM project activity.

Pure carbon funds: World Bank Prototype Carbon Fund; Certified Emission Reduction Unit Procurement Tender; GTZ fund (German government development fund).

Carbon equity funds: FE Clean Energy Group, Inc.’s Asian Clean Energy Services Fund; Asia Pacific Carbon Fund of the Asian Development Bank.

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**Perform Due Diligence**

Once financing options have been considered and a finance provider engaged, due diligence will likely be required by investors. Transparency in documentation and process is essential to give a potential investor confidence in claims that were made at the project financial viability stage.
For example, investors are usually unfamiliar with energy efficiency projects. If the methodology used to establish potential energy savings is not transparent and well documented, investors will not be able to understand the risks of the project and might well respond by withdrawing funds or requiring a higher hurdle rate to mitigate the perceived risk.

Similar documentation will be necessary in applying for incentives if the incentive is linked to energy savings or GHG emissions reduction. Without clear documentation and application of reliable methodologies, incentives are unlikely to be granted.

Parameter values used in ROI analyses must be supportable with clear documentary evidence, preferably audited by reliable third parties. This will help to educate investors who are unclear on the specifics of energy efficiency projects and thereby help to mitigate perceived investment risks.

Due diligence is the final step in identifying financing mechanisms and will be used by potential investors to scrutinize management control over the project and the concomitant risk profile.

### STEP 15
**Roll Out Projects**

This step describes the process of rolling out projects once they have been identified, developed, and funded. This is the last step in the implementation phase and may require months or years to accomplish, particularly for a major project. Although implementation processes for the various types of projects may differ (for example, incentive projects, major projects, organizational development programs, and policies and regulations), several standard factors should be considered as projects are being rolled out. These are explored in Step 15. See example 6.9 for a high-level rollout plan.

**Identifying Needed Skills**

It is important to acknowledge that new skills and time are critical to roll out and deliver the energy and emissions projects. City government departments should not be expected to undertake new projects on top of their existing tasks without training and additional manpower. The skills needed to implement each project should be identified. For example, the personnel required to inventory street lamps, research lamp types, and update a database to implement a street lighting audit and retrofit project should be identified. Afterward, additional manpower requirements—beyond the standard street lighting maintenance team—to replace old lamps with new high efficiency lamps should be estimated. Personnel requirements should also consider the qualifications and experience needed for each position.

**Developing Skills and Manpower**

The planning and analysis for the SUEEP process up to this point may have been accomplished by a few people in the energy task force, or by technical consultants. However, city government staff

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**EXAMPLE 6.9**

**TYPICAL INCENTIVE PROJECT ROLLOUT PLAN**

**Publicize Project Availability**

Set a level of publicity appropriate to the attractiveness of the incentive and demand for the project. Conduct radio ads for residential projects with large funding, for example. Or simply reach out directly to large industrial customers that might best take advantage of a small industrial energy project.

**Select Applicants**

Develop an application submission and selection process that complies with city procurement rules. Be careful not to make the application process too onerous—you do not want the cost to apply to outweigh the benefit of the incentive.

**Confirm Specifications**

Review final designs or purchase orders to confirm that the energy efficiency equipment conforms to the list of equipment for which incentives are provided.

**Perform Audits**

If the incentive project is based on a series of audits, for example, hospitals or electrical substation transformer upgrades, perform the audits quickly and efficiently. You do not want to lose the best customers and you do want to capture the benefits.

**Validate Installation and Distribute Incentive**

Most incentive projects require a validation process in which the managing organization verifies that the new equipment was installed correctly so that the energy savings will actually occur.
will have primary responsibility for implementation and validation of projects—they are experts in their own systems and may need only minimal training to become project champions. More important, they know how to get the bureaucracy to run.

Staff may need one-on-one training from experts in the region who have implemented similar projects. They may also attend relevant conferences and embark on study trips to learn about similar projects in the region.

In-house training also provides an opportunity for city government staff from different disciplines and agencies to network, serving as a platform for future collaboration.

Bringing in Skills and Manpower
Hiring new staff with special energy programming or sector experience may be the least expensive way to build capacity. Part of the new staff members’ assignments could be to train those around them in new ways of thinking, procurement methods, or technologies.

To keep a lid on budgets, contract staff may be the lowest-cost option for when a large number of employees are needed for a short time to execute a portion of a project, such as an audit or equipment inventory.

Identifying Needed Resources
Skilled and motivated people are the most important factors for the success of a rollout plan. However, if they lack equipment, funding, or time to implement projects, even the best staff will not be effective. It is therefore important to acknowledge that both resources and time are necessary to undertake new projects, and to make provisions to enable adequate staffing to implement the sustainable urban energy and emissions plan.

Project Management
An execution plan for each project and an oversight process that will ensure each step is delivered on time and on budget should be developed. In particular, managers should be made responsible for the success of the project to ensure that agencies prioritize its implementation, rather than leave it on the back burner while administering important day-to-day city services.

Communication Plan
Communication with stakeholders occurs throughout the project development and implementation stages. Affected stakeholders should be informed of their roles before projects are rolled out. To increase buy-in for the policy or to increase the uptake of an incentive project, public outreach efforts can be extended even while the project is midway through the implementation phase. Just as important, projects that are successfully completed should be publicized.

Monitoring and Reporting
Project monitoring should be part of project design and should commence, together with the collection of data and assessment of performance, when the project is rolled out. Stakeholders should be aware of the metrics used to measure success.

Stay Positive
Defining the “successful implementation” of the project will be something only you can do, as the leader of the city’s energy and emissions plan. Stay optimistic about the ways these projects can affect your city and that optimism will resonate with the stakeholders and community. Remember, although this is an “energy” plan, the wide reach and positive impacts of successful projects will be felt throughout your city, well beyond the realm of energy and emissions.

Tip 6.3 summarizes the “must haves” of successful projects.

See resources 6.5 for additional information on implementing projects.
Monitoring and Reporting

Regular collection, compilation, and understanding of the progress of the plan is critical to its success. The tasks outlined in this chapter focus on engagement with the leaders of the projects, working together to collect various levels of data and to understand what the data are revealing about the projects and the status of the city beyond just “energy.” Using the data, and the feedback from leaders of the projects and industry stakeholders, a city evaluates the progress of its program and decides on the stories to communicate in a status report to the city, stakeholders, and all interested parties.

STEP 16
Collect Information on Projects

The lead agency for the energy and emissions plan should continuously monitor the city’s overall energy program and evaluate each project annually. Coordination with implementing agencies and stakeholders is no small task, so successfully gathering performance data will require planning and organization. Although progress will be monitored in a variety of ways across projects and cities, the information will consist of hard data, anecdotes from end users, and stakeholders’ observations of outcomes as a result of the implementation of specific projects.

This section describes a series of tasks and organizational actions that will lead to successful collection of data from the various projects. The examples can be referred to for clarity. See example 7.1 to start.

Collect Project Data

Specific hard data will have to be collected in each project operations phase. In some cases, data will be collected in the natural course of running the project (requiring little effort) and the annual data for that project can be collected in one meeting or report. In other cases, a variety of resources and additional data collection processes will be required to ensure that project data are sufficient to measure progress.

EXAMPLE 7.1
THREE SAMPLE PROJECTS

Three examples are used throughout this chapter to demonstrate how particular projects can be monitored and reported.

Project 1. Commercial Building Energy Code
The rollout, adoption, and enforcement of a commercial building energy code, to mandate energy efficient construction practices for new buildings and retrofits.

Project 2. Bus Rapid Transit (BRT) System
The phased installation of a BRT line from a popular suburban residential neighborhood into the downtown, financial district of the city.

Project 3. Street Light Efficiency Project
The phased installation of more efficient and well-designed (spaced and implemented) street lighting throughout the city.

Comparability of Data
Chapter 3 described the need to establish data trends and to ensure clarity about the source of data. This step builds on chapter 3 and requires the collection of data over similar time scales, boundaries, and users so that trends can be established to enable a city to assess its progress in implementing energy and emissions projects. See example 7.2.

Creating Key Performance Indicators
Chapter 3 describes how key performance indicators (KPIs) are established to track energy performance over time. Project-specific KPIs should also be established to demonstrate the performance of individual projects.

KPIs may be energy specific, but they should also be related to the underlying drivers of energy
or other city qualities, such as health or economic development. The challenge for the energy task force is to acknowledge these links between various metrics and understand how they measure progress in the context of the unique circumstances of the city. See example 7.3.

Sometimes KPIs will require that data be combined in a way that ensures the appropriate metrics are used to track success, for instance, the denominator of a KPI, which allows for consistency over time, such as area (gross square meters) or occupants (riders). To be consistent with other KPIs that use similar denominators, the energy task force should ensure that the denominator (for example, occupant or area) is consistent for various metrics.

External Data
Although a city’s primary efforts will be to collect useful and accurate data and information from its constituencies and stakeholders, data from external parties will also be needed. Priority projects could affect not only the city, but regional or national policies and actions. Thus, the city will also have to work with utility providers, national organizations, and external stakeholders to ensure that regional data (for example, electricity fuel mix, transportation trends, and larger-scale economic growth and trends beyond the city’s boundary) are collected as well.

Assess KPIs against Targets
Assessing KPIs regularly is critical to understanding the results of either a specific project or the energy and emissions plan overall. See case study 7.1. KPIs should be assessed to determine whether they meet the targets for a particular year. If the KPI suggests that the targets will not be met, an effort should be made to find out why. Alternatively, if KPIs are easily met, then perhaps more aggressive targets should be set.

Remember the Context
Data alone do not indicate success or failure. Data and KPIs have to be put into context. For example, external factors such as population increases or boundary changes may have prevented targets from being met, affecting the KPI of a specific project. In such a case, insufficient efforts from the implementing agency were not the cause of the failure to make progress. Hence, establishing connections between targets and the city’s context is key to assessing progress. See example 7.4.

Engage Stakeholders
Although data are necessary for an understanding of performance levels and trends, qualitative information and feedback from stakeholders are crucial to assessing the success of a project. A city needs to consider which stakeholders to engage and to what extent, based on the stakeholders’ influence on projects and on the effect projects have had on them. Feedback from a good sample of users, organizations, and industry leaders will help a city to understand and implement measures to improve projects. See example 7.5.
Summarize and Learn

A city selects projects not only to reduce energy use or carbon emissions, but also because the projects have the potential to contribute to realization of the city’s vision. It is important to emphasize the links between energy projects and the city’s wider goals and objectives. With data and feedback from stakeholders in hand, key lessons can be learned and projects could be revamped to contribute to the overall success of the energy and emissions plan.

Find the Lessons Learned

The energy leadership should now have a good idea of the project’s challenges (planning, implementation, and enforcement) as well as of the factors that contributed to its success. Such information, including key messages from the information collected, should enable a city to draw lessons from each project.

Although experiences differ across projects, lessons learned from experiences in specific projects are at times relevant to other projects and different audiences. Thus, sharing these lessons across relevant organizations will enable the city to benefit from an all-encompassing view of the lessons learned across projects. Compiling the lessons learned and communicating them clearly to current and future leaders will drive future successes.

Highlight Key Success Stories

A well-executed plan to implement priority projects is likely to bear fruit. Although accomplishments during the first year of the energy and emissions plan may be limited, sharing success stories will encourage parties implementing projects to intensify their efforts in attaining targets and goals. And success stories need not be based exclusively on the reduction of a city’s energy use and carbon emissions—contributions to a healthier and more economically prosperous city can also be highlighted. See case studies 7.2 and 7.3.

CASE STUDY 7.1: LONDON, UNITED KINGDOM
CONGESTION CHARGING

In 2003, London introduced a daily congestion fee for vehicles traveling in the city’s central district during weekdays. This fee was meant to ease traffic congestion, improve travel time and reliability, and make central London more attractive to businesses and visitors. According to the city’s analysis, the program largely met its objectives. After four years of operation, traffic entering the charge zone was reduced by 21 percent; congestion, measured as a travel rate (minutes per kilometer), was 8 percent lower; and annual fuel consumption fell by approximately 3 percent. These changes translated into annual reductions of 110,000–120,000 tons of CO₂, 112 tons of nitrogen oxides, 8 tons of particulate matter, and some 250 fewer accidents. The identified benefits exceeded the costs by more than 5 percent.

In addition, the scheme brought a steady net revenue stream for transport improvements, of which 80 percent was reinvested in improving public bus operations and infrastructure. The city proved to be innovative and resourceful by ensuring key elements of the congestion-charging project were in place, including technical design, public consultation, project management, an information campaign, and impact monitoring. These factors led to the successful implementation of the project.

Source: http://www.esmap.org/esmap/node/1279.
Be Transparent and Honest, but Find the Wins

Stakeholders respect transparency and honesty. Packaging the data will require significant effort, and assumptions on boundaries, time scales, and conversion factors should be clearly stated either in the body of the report or in an appendix. Industry technical leaders and even international groups referring to the energy and emissions plan and status reports will notice inconsistencies or alterations to the data that falsely show successes, resulting in the loss of credibility of the city’s efforts in the SUEEP process.

(Re)Defining Success

Although data and information on projects in their first year of implementation may be limited, efforts should be made to collect as much as possible from all projects to provide snapshots of progress and to evaluate the status of the overall energy and emissions plan implementation efforts.

KPIs should be reviewed in conjunction with the wider city projections of growth and economic development, and vision and goal statements should be revisited. This may not be the time to actually amend them—this task is a better fit for an upcoming version of the larger energy and emissions plan. The data and information collection process will be a time to understand the congruity of “reality” (the current and trending quantities and qualities of the city) with the exercise of projecting energy use based on the impact of the SUEEP team’s actions.

With a better understanding of the city’s capability to achieve its target KPIs, previous definitions

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**CASE STUDY 7.2: CURITIBA, BRAZIL**

**BUS RAPID TRANSIT NETWORK**

The popularity of Curitiba’s BRT has effected a modal shift from automobile travel to bus travel. Based on 1991 traveler survey results, it was estimated that the introduction of the BRT had caused a reduction of about 27 million auto trips per year, saving about 27 million liters of fuel annually. Other policies have also contributed to the success of the transit system. Land within two blocks of the transit arteries is zoned for high density, because high density generates more transit ridership per square foot.

Compared with eight other Brazilian cities of similar size, Curitiba uses about 30 percent less fuel per capita, resulting in one of the lowest rates of ambient air pollution in the country. As of 2010, about 1,100 buses were making 12,500 trips every day, serving more than 1.3 million passengers—50 times the number of 20 years ago. Some 80 percent of travelers use the express or direct bus services. Best of all, Curitibanos spend only about 10 percent of their income on travel—much lower than the national average.

All data were provided by 10 private bus companies in partnership with the local department of transportation. This illustrates a multidisciplinary, comprehensive approach to an energy- and carbon-saving solution.

Source: [http://urbanhabitat.org/node/344](http://urbanhabitat.org/node/344).
of success should be revisited to determine whether the data, trends, and information collected are sufficient and whether the original targets had been too ambitious or not ambitious enough. It may be too early to redefine success until more data and information are obtained—it is recommended that the vision or goal statements *not* be altered in haste.

Now with the data and feedback in hand, the story of the energy and emissions plan success can be told.

**CASE STUDY 7.3: SEATTLE, WASHINGTON, USA
STREET LIGHTING EFFICIENCY PROGRAM**

The publicly owned utility Seattle City Light successfully installed more than 6,000 street lights. The project is part of a plan to replace 41,000 residential street lights in Seattle by the end of 2014, a program that is already saving the city $300,000 per year (www.ledsmagazine.com/news/8/7/11). Once completed, the city council estimates a $2.4 million reduction in operating costs will be achieved.

Edward Smalley, manager of streetlight engineering at Seattle City Light, said the decision to install light-emitting-diode-based street lighting was the result of the technology’s demonstrated illumination performance, controllability, and operational efficiency (48 percent energy savings), all needed to satisfy the city’s lighting needs. Council members were also swayed by the tremendous savings in maintenance costs. “Every two years, we would pay workers overtime to quickly replace the high-pressure sodium lamps before the winter came,” Smalley said. “Now that cost has been essentially eliminated.”


**STEP 17**

**Publish Status Report**

Data and information have been collected and successes have been outlined. This step now describes how to write and release an SUEEP status report.

**Identify Reporting Entity**

Compiling information into a concise, well-structured, and organized document requires significant resources. To ensure responsibility for delivery of the document, a group or an individual should be assigned to prepare the report.

The most appropriate entity to lead preparation and production of this report will depend on a city’s internal resources, skill sets, and structures. This status report is jointly owned by the energy task force and the person or agency that has been assigned to prepare it, with the latter acting as “lead” to oversee all contributions and resourcing.

Sometimes a city hires third-party organizations to compile the data, information, and key success stories and produce a report that attracts stakeholders’ (including financial institutions’) attention. If a third party is used, it will have to report to a representative on the energy task force or high-level mayoral staff member to ensure that the report is accurate and conveys messages that the city government wants to spread. Production of the report commences once there is clarity on the party responsible for delivery of the document.

**Scheduling the Report**

Many cities publish an annual status report for the energy and emissions plan that reviews the outcomes resulting from implementation of selected projects. If a city does not have the resources to publish an annual report, it could vary the format and timing for the release of data to still provide useful indicators of progress.
Select Data and Draft the Report

*Use Illustrative Data*

The task force should use appropriate metrics to communicate the progress of the energy and emissions plan. An example may be the communication of data at a project level (the results of a street lighting project, for instance). Alternatively, the task force may want to provide overarching information on the energy and emissions plan (such as citywide reductions in carbon emissions).

This Guidebook suggests the type of data to report, but an appropriate set of city-specific indicators should be used to communicate progress of the energy and emissions plan, its component projects, and their impact on the city.

*Acknowledge Lessons Learned*

The report should showcase success stories but also highlight the hard lessons learned and hurdles the city had to overcome. The report should then propose actions to remediate shortcomings in the plan.

Pull It All Together

Tip 7.1 gives an indicative list of contents generally expected in a successful status report. Although formatting and style make the report more attractive, ensuring that the messages are clear and understood by the general public is key. Technical terms should be explained and jargon should be minimized. The more important messages should be clear enough for a grade school student to comprehend.

Release, Follow-Up, and Future Actions

*Finalize and Release the Status Report*

The draft report should be reviewed and approved before it is published. After all reviewers’ comments have been dealt with, the report can be made available in a variety of forms (see tip 7.2).

*Follow Up with Stakeholders*

Stakeholders are crucial to the SUEEP process, and the release of the status report can be used as an opportunity to strengthen relationships with them. Special invitations to events, or photo opportunities

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**TIP 7.1**

**TYPICAL CONTENTS OF AN SUEEP STATUS REPORT**

Every SUEEP status report is different, but the following is a typical table of contents covering the primary components of the report.

<table>
<thead>
<tr>
<th>Overview</th>
<th>Project Updates</th>
</tr>
</thead>
<tbody>
<tr>
<td>Background and executive summary of the status of the plan. Introduce goals, objectives, and important messages.</td>
<td>Elaborate on the success of the priority projects and perhaps discuss future actions.</td>
</tr>
</tbody>
</table>

*Energy Balance and GHG Inventory*

Include the numbers, and tie them to the overarching goal statement. Details of the inventory should be included in an appendix.

*Key Performance Indicators*

Link the GHG inventory and data collected for each project to the sector and project KPIs (as you see fit).

*Major Highlights*

Document the fun facts, links to successes in other sectors, and qualities of the city that are changing for the better as a result of the energy and emissions plan.
with high-level staff, will reinforce the city’s appreciation of their participation in the SUEEP process.

**Give Credit Where Credit Is Due**
Appreciation should be shown to city staff, including the members of the energy task force, who have spent countless hours on the SUEEP process and implementation of the plan. Although city governments may not be able to match private sector salaries, acknowledging the efforts of public employees helps to motivate the individuals who have chosen to drive change.

**Plan for Future Actions**
The release of the first status report is a solid step, but it is only the beginning of the city’s long and continuing journey toward attaining its vision of a sustainable future. City governments should maintain the momentum and develop programs and projects to ensure that future challenges can be tackled. See case study 7.4.

See resources 7.1 for more information on monitoring and reporting.

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**CASE STUDY 7.4: PORTLAND, OREGON, USA**
**REPORTING ONE YEAR AFTER THE CLIMATE ACTION PLAN**

Portland released a report showing the city’s progress toward reducing local carbon emissions and the status of efforts made in the first year of implementing the Climate Action Plan. The report outlines improvements in several sectors, and in the specific focal area of buildings and energy, the city’s Climate Action Plan contains four objectives for 2030:

1. Reduce total energy use of all buildings,
2. Achieve zero net GHG emissions in all new buildings,
3. Produce some energy from on-site renewable and clean district energy systems, and
4. Ensure that buildings can adapt to a changing climate.

The “Highlights” section of the plan describes successes and ties program status to the objectives.

The city also created an easy way to track the status of all the projects (or “Actions”) by developing a rating system, using colored dots to signify the following:

- **RED**: Action has not yet been initiated and/or little progress has been made
- **YELLOW**: Action is under way, but may face obstacles
- **GREEN**: Action is on track for completion by 2012
- **BLUE**: Action is completed

RESOURCES 7.1
MONITORING AND REPORTING REFERENCES

The following resources can help you to determine effective performance metrics and reporting processes. Examples of other cities’ annual status reports are given below.

**Singapore:** Singapore Green Plan
Measurement, Reporting and Verification
(http://app.mewr.gov.sg/data/ImgCont/1342/sgp2012.pdf)

**City of Berkeley, CA:** Climate Action Plan
Metrics and Website Communication
(http://www.cityofberkeley.info/climate/)

**New York, NY:** PlaNYC
Greenhouse Gas Inventory and Status Reports

**City of Fort Collins, CO:** Climate Action Plan
2009 Status Report

**Papers**

Measurement, Reporting and Verification (MRV) of GHG mitigation
(http://www.oecd.org/document/50/0,3746,en_2649_34361_42546674_1_1_1_1,00.html)


**A Protocol**

The GHG Protocol is the most widely used accounting tool for government and business leaders for understanding, quantifying, and managing GHG emissions.
(http://www.ghgprotocol.org)

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**The Beginning**

This Guidebook outlines a pathway, a framework, and relevant tools that a city could use to effect changes to promote a sustainable future.

The steps summarized here are based on experiences gained through pilot studies and on industry knowledge. This Guidebook serves as a platform for cities to commence their own SUEEP processes, but the Guidebook alone is insufficient—each city must tailor its program to its own needs.

As this Guidebook reaches your desk, projects within your city are probably already ongoing—some version of an inventory may have been undertaken and leadership frameworks might have been outlined. Only you, as a leader in your city, will be able to outline a process, schedule, and an overall energy and emissions plan that is compatible with your city’s needs and aspirations. It is a big task, and help is available.