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Energy Efficiency for Local Government Operations

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LOCAL GOVERNMENT CLIMATE AND ENERGY STRATEGY SERIES

Energy Efficiency in Local Government Operations

A Guide to Developing and Implementing Greenhouse Gas Reduction Programs

Energy Efficiency

U.S. ENVIRONMENTAL PROTECTION AGENCY
2011

EPA's Local Government Climate and Energy Strategy Series

The *Local Government Climate and Energy Strategy Series* provides a comprehensive, straightforward overview of greenhouse gas (GHG) emissions reduction strategies for local governments. Topics include energy efficiency, transportation, community planning and design, solid waste and materials management, and renewable energy. City, county, territorial, tribal, and regional government staff, and elected officials can use these guides to plan, implement, and evaluate their climate change mitigation and energy projects.

Each guide provides an overview of project benefits, policy mechanisms, investments, key stakeholders, and other implementation considerations. Examples and case studies highlighting achievable results from programs implemented in communities across the United States are incorporated throughout the guides.

While each guide stands on its own, the entire series contains many interrelated strategies that can be combined to create comprehensive, cost-effective programs that generate multiple benefits. For example, efforts to improve energy efficiency can be combined with transportation and community planning programs to reduce GHG emissions, decrease energy and transportation costs, improve air quality and public health, and enhance quality of life.

LOCAL GOVERNMENT CLIMATE AND ENERGY STRATEGY SERIES

All documents are available at: ***www.epa.gov/statelocalclimate/resources/strategy-guides.html***.

ENERGY EFFICIENCY

- Energy Efficiency in Local Government Operations
- Energy Efficiency in K–12 Schools
- Energy Efficiency in Affordable Housing
- Energy-Efficient Product Procurement
- Combined Heat and Power
- Energy Efficiency in Water and Wastewater Facilities

TRANSPORTATION

- Transportation Control Measures

COMMUNITY PLANNING AND DESIGN

- Smart Growth

SOLID WASTE AND MATERIALS MANAGEMENT

- Resource Conservation and Recovery

RENEWABLE ENERGY

- Green Power Procurement
- On-Site Renewable Energy Generation
- Landfill Gas Energy

Please note: All Web addresses in this document were working as of the time of publication, but links may break over time as sites are reorganized and content is moved.

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EXECUTIVE SUMMARY

Developing and Implementing Energy Efficiency Programs

Saving energy through energy efficiency improvements can cost less than generating, transmitting, and distributing energy from power plants, and provides multiple economic and environmental benefits. As President Obama said in June 2009, "By bringing more energy efficient technologies to American homes and businesses, we won't just significantly reduce our energy demand—we'll put more money back in the pockets of hardworking Americans." Energy efficiency also helps reduce air pollution and greenhouse gas emissions, improves energy security and independence, and creates jobs.

Local governments can promote energy efficiency in their jurisdictions by developing and implementing strategies that improve the efficiency of municipal facilities and operations and/or encourage energy efficiency improvements in residential, commercial, and industrial sectors. The energy efficiency guides in this series describe the process of developing and implementing strategies, using real-world examples, for improving energy efficiency in local government operations (see the guides on K-12 schools, energy-efficient product procurement, combined heat and power, and water and wastewater facilities), as well as in the community (see the guide on affordable housing).

Energy Efficiency in Local Government Operations

This guide describes how local governments can lead by example and achieve multiple benefits by improving the energy efficiency of their new, existing, and renovated facilities and their day-to-day operations. It is designed to be used by facility managers, energy and environment staff, other local government agencies, and mayors and city councils.

Readers of the guide should come away with an understanding of options to improve the energy efficiency of municipal facilities and operations, and to motivate the private sector and other stakeholders to follow suit. Readers should also understand the steps and considerations involved in developing and implementing these energy efficiency improvements, as well as an awareness of expected investment and funding opportunities.

RELATED GUIDES IN THIS SERIES

- **Energy Efficiency:** ***Energy-Efficient Product Procurement***

  Many local governments are saving energy by requiring that the energy-using products they purchase meet energy efficiency criteria. Because energy-efficient product procurement helps reduce energy loads, it can also increase the cost-effectiveness of other energy efficiency activities, such as facility upgrades.

- **Energy Efficiency:** ***Combined Heat and Power***

  Combined heat and power (CHP), also known as cogeneration, refers to the simultaneous production of electricity and thermal energy from a single fuel source. The use of CHP in government buildings and operations can help increase energy efficiency and reduce GHG emissions and criteria air pollutants by decreasing consumption of fossil fuel-based energy.

- **Renewable Energy:** ***On-Site Renewable Energy Generation***

  Local governments can implement on-site renewable energy generation by installing wind turbines, solar panels, and other renewable generating technologies at their facilities. Combining renewable energy generation with energy efficiency improvements that reduce energy loads enables local governments to meet a greater percentage of their electricity with electricity from renewable sources.

- **Renewable Energy:** ***Green Power Procurement***

  Green power is a subset of renewable energy that is produced with no GHG emissions, typically from solar, wind, geothermal, biogas, biomass, or low-impact small hydroelectric sources. Green power purchasing can be used in combination with energy efficiency in government operations to reduce a local government's total use of fossil-fuel power and help it meet GHG reduction targets.

- **Transportation:** ***Transportation Control Measures***

  Transportation control measures (TCMs) are strategies that reduce vehicle miles traveled and improve roadway operations to reduce air pollution, GHG emissions, and fuel use from transportation. Because many of these measures encourage public transportation, carpooling, bicycling, and walking, they can decrease the impacts of employees getting to and from work and help local governments reduce the transportation-related emissions of their operations.

The guide describes the benefits of energy efficiency in local government operations (section 2); a step-by-step approach to improving energy efficiency in new and existing local government operations (section 3); key participants and their roles (section 4); the policy mechanisms that local governments have used to support energy efficiency programs in their operations (section 5); implementation strategies for effective programs (section 6); investment and financing opportunities (section 7); federal, state, and other programs that may be able to help local governments with information or financial and technical assistance (section 8), and finally two case studies of local governments that have successfully improved energy efficiency in their operations (section 9). Additional examples of successful implementation are provided throughout the guide.

Relationships to Other Guides in the Series

Local governments can use other guides in this series to develop robust climate and energy programs that incorporate complementary strategies. For example, local governments can combine efforts to improve energy efficiency in local government operations with **energy-efficient product procurement**, **combined heat and power**, **on-site renewable energy generation**, and **green power procurement** to help achieve additional economic, environmental, and social benefits. Local governments can also reduce their own transportation-related energy use and GHG emissions by implementing **transportation control measures**.

See the box on page iii for more information about these complementary strategies. Additional connections to related strategies are highlighted in the guide.

Energy Efficiency in Local Government Operations

1. OVERVIEW

Energy can account for as much as 10 percent of a local government's annual operating budget (U.S. DOE, 2005), a proportion that is likely to grow as energy prices rise. As President-elect Obama noted when introducing his economic recovery plan in December 2008, reducing energy use in public buildings could save American taxpayers billions of dollars each year. Furthermore, he said, "It will put people back to work."

THE NATIONAL ACTION PLAN FOR ENERGY EFFICIENCY AND VISION FOR 2025: ACHIEVING ALL COST-EFFECTIVE ENERGY EFFICIENCY BY 2025

The *National Action Plan for Energy Efficiency* (Action Plan) recognizes that improving energy efficiency in our homes, businesses, schools, governments, and industries—which consume more than 70 percent of the natural gas and electricity needs in the country—is one of the most constructive, cost-effective ways to address our nation's energy challenges. The Action Plan, developed in July 2006 by more than 50 leading organizations representing key stakeholder perspectives, describes policy recommendations for creating a sustainable, aggressive national commitment to energy efficiency through gas and electric utilities, utility regulators, and partner organizations.

In 2007, Action Plan leaders defined a vision that provides the framework for implementing the Action Plan. This Vision establishes a *goal of achieving all cost-effective energy efficiency by 2025*; describes 10 implementation goals for states, utilities, and other stakeholders; describes what 2025 might look like if the goal is achieved; and provides a means for measuring progress.

The Action Plan documents the importance of lead-by-example (LBE) strategies in its "Vision for 2025" report. The Vision identifies LBE as a critical component of achieving the long-term goal of fully developing all cost-effective energy efficiency resources in the United States by 2025. Local governments are participating in the Action Plan Sector Collaborative to identify opportunities within their sector.

For more information about the Action Plan, visit: ***http://www.epa.gov/cleanenergy/energy-programs/suca/resources.html***.

Sources: National Action Plan for Energy Efficiency, 2010; National Action Plan for Energy Efficiency, 2008.

Improving the energy efficiency of municipal facilities and operations is a cost-effective strategy to help stimulate the economy, create jobs, expand markets for energy-efficient technologies, and reduce emissions of air pollutants and greenhouse gases (GHGs) (U.S. EPA, 2008f; U.S. EPA, 2006b). Local governments can also lead by example through improving energy efficiency in their own operations, motivating the private sector and other stakeholders to follow suit. Engaging the private sector in municipal energy efficiency improvements can also leverage a greater pool of expertise, providing opportunities for education and outreach, and fostering a community-wide discussion about saving energy, money, and the environment.

This guide provides guidance on planning, designing, and implementing an energy efficiency improvement program for municipal operations; engaging stakeholders; and identifying investment and financing options. Case studies and real-world examples are dispersed throughout, with two detailed case studies presented in Section 9. A compilation of examples and information resources is provided in Section 10, Additional Examples and Information Resources.

2. BENEFITS OF ENERGY EFFICIENCY IN LOCAL GOVERNMENT OPERATIONS

Improving energy efficiency in local government facilities and operations can produce energy, environmental, economic, and other benefits, including:

- **Reduce GHG emissions and other environmental impacts.** Improving energy efficiency in government buildings and operations can help reduce GHG emissions and criteria air pollutants by decreasing consumption of fossil fuel-based energy. Fossil fuel combustion for electricity generation accounts for 40 percent of the nation's carbon dioxide (CO_2) emissions, a principal GHG, and 67 percent and 23 percent of the nation's sulfur dioxide (SO_2) and nitrogen oxide (NO_x) emissions, respectively, which can lead to smog, acid rain, and trace amounts of airborne particulate matter that can cause respiratory problems for many people (U.S. EPA, 2008e; U.S. EPA, 2008g).[1]

[1] *According to EPA, energy use in commercial and industrial facilities accounts for nearly 50 percent of all U.S. GHG emissions (U.S. EPA, 2008e).*

St. Paul, Minnesota, has partnered with its electric utility to retrofit heating and cooling systems, purchase ENERGY STAR labeled products, replace street lighting and traffic signals, and implement other energy efficiency improvements. These activities have saved the city nearly $8 million in energy costs annually and reduced its annual CO_2 emissions by more than 73,000 metric tons, equivalent to the annual emissions of 13,000 cars (St. Paul, 2007).

ENERGY CONSUMPTION IN LOCAL GOVERNMENT BUILDINGS

This table presents average annual energy use by local government-owned commercial buildings (any building that is not residential, manufacturing or industrial, or agricultural).*

End Use	Consumption (Trillion Btu)**	As percentage of Whole
Space heating	333	42
Lighting	120	15
Cooling	88	11
Ventilation	83	10
Water heating	61	8
Miscellaneous	56	7
Refrigeration	23	3
Computers	21	3
Office equipment	5	1
Cooking	11	1
Total	**800**	**100**

* Data from the 2003 Commercial Buildings Energy Consumption Survey (CBECS) conducted by the Energy Information Administration (EIA). The CBECS is conducted every four years.

**Figures are rounded to the nearest trillion Btu.

Source: EIA, 2008.

Reducing energy consumption can also contribute to other local government environmental objectives, such as resource conservation. For example, installing an ENERGY STAR labeled energy-efficient dishwasher in an office kitchen to reduce energy costs can also help reduce water utility bills and decrease the amount of used water that enters the wastewater system (U.S. EPA and U.S. DOE, 2008a).

- **Reduce energy costs.** Significant cost savings can be achieved by improving energy efficiency in existing buildings, leasing energy-efficient buildings, and designing new buildings to be energy efficient. Improving energy efficiency in municipal operations such as drinking water systems and wastewater treatment plants represents another opportunity for large cost savings.

For a typical office building, energy represents 30 percent of the variable costs and constitutes the single largest controllable operating cost (National Action Plan for Energy Efficiency, 2008). The text box at left shows how energy is used in a typical government building.

Similarly, wastewater plants and drinking water systems can account for up to one-third of a municipality's total energy bill. A 10 percent reduction in U.S. drinking water and wastewater systems costs would collectively save approximately $400 million and 5 billion kWh annually (U.S. EPA, 2009a).

FAYETTEVILLE, ARKANSAS—REDUCED ENERGY COSTS

In 2007, Fayetteville, Arkansas, created an Office of Sustainability to coordinate energy and environmental programs aimed at reducing utility costs and environmental impacts. Under this mandate, the office coordinated an energy use assessment as part of a comprehensive government GHG emissions inventory.

The office followed this assessment by initiating an energy consumption reduction competition among 17 government facilities. In addition, 10 government facilities were incorporated into an energy performance contract and each completed a range of energy efficiency projects. These energy efficiency investments are producing an annual return of more than $400,000.

Sources: ICLEI, 2008b; Fayetteville, 2008.

The lifetime energy cost savings produced by an energy-efficient building, when compared with a conventional one, can reach millions of dollars. The potential energy savings in government buildings can be significant. For example:

- Energy cost savings on the order of 35 percent or more are possible for many existing buildings (U.S. EPA, 2008f).
- In Story County, Iowa, where the county has designed or substantially renovated three government buildings to improve energy efficiency, energy consumption in the three buildings ranges between 40 and 45 percent less than conventional buildings (NACo, 2007a).
- Many new and renovated buildings designed for energy efficiency offer energy cost savings of as much as 50 percent when compared with conventional buildings (U.S. EPA, 2008d).
- The average office building can reduce energy costs by 10 to 30 percent through low-cost energy efficiency measures and operational adjustments. At an average energy cost of $2.00 per square foot, that equates to savings of 20 to 60 cents per square foot—or $20,000 to $60,000 for a 100,000 square foot building.
- Buildings that have achieved the ENERGY STAR label for superior energy efficiency use 40 percent less energy than average buildings and offer savings of about $0.50 per square foot per year in lower energy costs, based on a conservative estimate (U.S. EPA, 2008d; U.S. EPA, 2006d).[2]

- **Increase economic benefits through job creation and market development.** Investing in energy efficiency can stimulate the local economy and encourage development of energy efficiency service markets. According to the Department of Energy (DOE), approximately 60 percent of energy efficiency investments are put toward labor costs and half of all energy-efficient equipment is purchased from local suppliers (U.S. DOE, 2004).

[2] *A review of the financial benefits of ENERGY STAR labeled office buildings found that in buildings that earned the label for six consecutive years, energy efficiency in the sixth year is on average 20 percent greater than in the first year, an indication of the persistence of energy savings over multiple years (U.S. EPA, 2006d).*

Across the nation, energy efficiency technologies and services are estimated to have created more than eight million jobs in 2006 (ASES, 2007).

The City of New York contributes funding for Sustainable South Bronx (SSBx), an environmental justice organization that works to prepare "green collar" workers through its Bronx Environmental Stewardship Training (BEST) Academy. Three 14-week training sessions are offered in green roof installation and maintenance, environmental restoration, and hazardous waste clean up. Students receive several key certifications and are assisted with job placement. As of 2009, the BEST Academy had more than 175 graduates, of whom over 80 percent were employed and 15 percent had gone on to higher education (Sustainable South Bronx, 2009).

- **Demonstrate leadership.** Local governments can also set an example by improving energy efficiency in their facilities and operations. In particular, investing in energy efficiency epitomizes responsible government stewardship of tax dollars. Many local governments are improving energy efficiency in taxpayer-funded facilities that are frequently visited by the public, such as city halls and public libraries. These improvements not only reassure constituents that tax dollars are being spent wisely, they also serve to showcase real-world applications of energy-efficient technologies.

In 2004, Seattle, Washington, opened its new public library that incorporates energy efficiency features, including energy-efficient lighting and ventilation systems, a high-performance building envelope, and energy-efficient mechanical equipment and appliances, as well as various green building features, such as water conservation and use of low-toxic materials. Because the facility provides excellent demonstration opportunities (approximately 8,000 patrons visit the library daily), the city has installed signage and an information kiosk, featured the building's sustainable features on a special Web site, and conducted public tours to explain the facility's energy and environmental benefits and the benefits of energy efficiency and green building in general. In addition, materials developed for children and teens educate library users on the health and conservation benefits of building sustainably (Seattle, 2008).

- **Improve indoor air quality and productivity in energy-efficient and green buildings.** Energy efficiency upgrades can improve occupant health by enhancing indoor air quality. Installing energy recovery ventilation equipment, for example, can reduce infiltration of air contaminants from outdoors while significantly reducing heating, ventilation, and air conditioning (HVAC) energy loads (U.S. EPA, 2003b). One study on building performance found that the average reduction in illness as a result of improving air quality in buildings is approximately 40 percent (Carnegie Mellon, 2005).

  Enhanced indoor air quality, along with well-designed lighting, greater use of day lighting, and comfortable heating, cooling, and ventilation, can improve employee comfort and reduce fatigue, accidents, absenteeism, turnover, and health costs—all of which can contribute to better employee morale and improved productivity in energy-efficient buildings (U.S. EPA, 2008h).

- **Engage the community.** An even broader impact on emissions can be made by expanding efforts beyond government buildings and operations. Programs that not only educate the public of the benefits of energy efficiency, but also provide tangible assistance in the form of tax incentives and funding opportunities, have been effective in communities across the country. Residential and business sectors both provide good target opportunities.

In 2007, the mayor of Louisville, Kentucky, signed on as an ENERGY STAR partner and took the ENERGY STAR Challenge, setting a goal to reduce energy use in Louisville by 10 percent or more by the year 2010. During two days of kickoff meetings, the mayor and city staff met with city leaders, managers of city-operated facilities, private sector building owners and operators, and important local businesses to provide background information on the ENERGY STAR program for buildings and to share best practices for achieving energy efficiency improvements with ENERGY STAR tools and resources. As a result of these efforts, local commercial real estate associations joined Louisville Metro Government to form the Louisville Energy Alliance, which in 2009 launched the Louisville Kilowatt Crackdown, a year-long competition to promote and recognize commercial building energy efficiency by benchmarking and tracking building energy use via the EPA's Portfolio Manager. The city has also incorporated the ENERGY STAR Challenge into its Go Green Louisville! campaign, an initiative to "go green and save green" by adopting sustainable practices (U.S. EPA, 2009b).

3. PLANNING AND DESIGN APPROACHES TO ENERGY EFFICIENCY IN LOCAL GOVERNMENT OPERATIONS

This section describes approaches for planning and designing projects and programs to improve energy efficiency in local government facilities and operations. These approaches can help local governments achieve the range of benefits described in Section 2, *Benefits of Energy Efficiency in Local Government Operations*. Specifically, this section addresses:

- Improving energy efficiency in existing and new local government facilities.
- Incorporating energy efficiency in new and renovated "green" buildings.
- Improving energy efficiency in local government operations.

Improving Energy Efficiency in Existing and New Local Government Facilities

The most effective way to reduce energy consumption in local government buildings is to engage in a portfolio-wide, systematic approach for improving energy efficiency in owned and leased building space, and to incorporate energy efficiency into the design of new and renovated buildings. A portfolio-wide approach not only results in greater total reductions in local government energy costs and GHG emissions, but also enables local governments to offset the costs of more substantial energy efficiency projects in buildings that have higher upfront costs with the savings from projects in other buildings. In addition, adopting a portfolio-wide approach can help local governments generate greater momentum for energy efficiency activities generally, which can lead to sustained implementation and continued savings.

FIGURE 1 OVERVIEW OF ENERGY STAR GUIDELINES FOR ENERGY MANAGEMENT

The ENERGY STAR Guidelines for Energy Management presents a seven-step approach to achieving superior energy management and savings across a portfolio of buildings.

For detailed descriptions of the above steps, see *http://www.energystar.gov/index.cfm?c=guidelines.guidelines_index.*

The steps include:

1. Make Commitment
   - Establish an Energy Team
   - Institute an Energy Policy
2. Assess Performance
   - Collect and Manage Data
   - Establish Baselines and Benchmarks
   - Analyze Data and Conduct Technical Assessments and Audits
3. Set Goals
   - Estimate Potential for Improvement
   - Establish Goals
4. Create Action Plan
   - Define Technical Measures and Targets For Each Building
   - Determine Roles and Resources
5. Implement Action Plan
   - Create a Communication Plan, Raise Awareness, Build Capacity, and Motivate
   - Track and Monitor Progress
6. Evaluate Progress
   - Measure Results
   - Review Action Plan
7. Recognize Achievements
   - Internal Recognition
   - External Recognition

A good place to start for local governments is EPA's ENERGY STAR program, which has developed a systematic approach for achieving superior energy management in existing buildings. This approach, summarized in the *Guidelines for Energy Management* and in Figure 1 above, *Overview of ENERGY STAR Guidelines for Energy Management*, involves seven steps:

- Step 1. Make Commitment
- Step 2. Assess Performance
- Step 3. Set Goals
- Step 4. Create Action Plan
- Step 5. Implement Action Plan
- Step 6. Evaluate Progress
- Step 7. Recognize Achievements

This subsection provides information on key strategies for each of these steps. While the primary focus of this subsection is to describe an overall approach for improving energy efficiency in a portfolio of *existing* buildings, the basic concepts can be applied to planning and designing energy-efficient *new* and *renovated* buildings. Tools and resources for addressing energy efficiency in these projects are identified. The planning and design approach for improving energy efficiency in local government facilities (described in this subsection) is also one of the most important components of a successful green buildings program (described in the following subsection, *Energy Efficiency in Green Buildings*).

While this subsection describes an approach for implementing a comprehensive portfolio-wide efficiency strategy, there are cases where sufficient resources (e.g., funding and personnel resources) are not available. In these instances, local governments can apply the concepts to one or a few government buildings. Experiences from such demonstration projects can then be used to make the case for further energy efficiency improvements, and subsequently can be applied to a broader building portfolio when additional support and/or resources become available. For more information on how to evaluate the investment required for priority energy efficiency projects, see the subsection on Using a Staged Approach in New and Renovated Buildings.

Table 1, ENERGY STAR Program Resources, summarizes the many tools and resources available to local governments as they plan and implement energy efficiency improvements in existing and new buildings.

TABLE 1 ENERGY STAR PROGRAM RESOURCES

Title/Description	Web Site
ENERGY STAR Tools and Guidance for Existing and New Buildings	
Guidelines for Energy Management. EPA provides the seven-step Guidelines for Energy Management to assist in developing and implementing energy efficiency action plans.	*http://www.energystar.gov/index.cfm?c=guidelines.guidelines_index*
Guidelines for Energy Management Assessment Matrices. EPA has developed an assessment matrix to help energy managers determine if their organization's energy management practices are consistent with the Guidelines for Energy Management. A second matrix allows energy managers to compare current energy management practices to the Guidelines for Energy Management at the site-specific facility level.	*http://www.energystar.gov/ia/business/guidelines/assessment_matrix.xls* *http://www.energystar.gov/ia/business/guidelines/Facility_Energy_Assessment_Matrix.xls*
Portfolio Manager. Local governments can use EPA's Portfolio Manager tool to measure and track the energy intensity of their buildings, normalized for weather and square footage. For certain building types, Portfolio Manager can be used to score building performance on a scale of 1 to 100 relative to similar buildings nationwide, enabling facility managers to assess their own facilities and identify priority energy efficiency improvements.	*http://www.energystar.gov/index.cfm?c=evaluate_performance.bus_portfoliomanager*
ENERGY STAR Label. Buildings that achieve a score of 75 or higher using Portfolio Manager, and are professionally verified to meet current indoor environment standards, are eligible to apply for the ENERGY STAR label. The ENERGY STAR label is available for office buildings, schools, hospitals, courthouses, and other facilities.	*http://www.energystar.gov/index.cfm?c=evaluate_performance.bus_portfoliomanager_intro*
Profiles of ENERGY STAR Labeled Buildings and Plants. EPA has compiled profiles of ENERGY STAR labeled government buildings, accessible at its Web page, ENERGY STAR Labeled Buildings and Plants.	*http://www.energystar.gov/index.cfm?fuseaction=labeled_buildings.showBuildingSearch*
Building Upgrade Manual. The ENERGY STAR Building Upgrade Manual describes a five-step systematic approach to improving energy efficiency in existing buildings, including recommissioning/commissioning, lighting, supplemental load reductions, fan systems upgrades, and heating and cooling system upgrades.	*http://www.energystar.gov/index.cfm?c=business.bus_upgrade_manual*
Target Finder. EPA's Target Finder lets a user establish an energy performance target for a design project or major building renovation based on similar building types and desired energy performance. By entering the project's estimated energy consumption, users can then compare the estimated energy use with the target to see if the project will achieve its goal.	*http://www.energystar.gov/index.cfm?c=new_bldg_design.bus_target_finder*

TABLE 1 ENERGY STAR PROGRAM RESOURCES *(cont.)*

Title/Description	Web Site
"Designed to Earn the Energy Star" Label. Building designs that achieve a score of 75 or higher using the Target Finder tool are eligible to receive the "Designed to Earn the ENERGY STAR" designation. These buildings can apply for the ENERGY STAR label if their score remains in the top quarter of the energy performance scale after one year of operation.	*http://www.energystar.gov/index.cfm?c=new_bldg_design.new_bldg_design_benefits*
ENERGY STAR Tools and Guidance for Existing and New Buildings	
Target Finder Opportunities Flowchart. EPA helps architects and engineers integrate ENERGY STAR into the design process with this flowchart.	*http://www.energystar.gov/ia/business/tools_resources/new_bldg_design/Design_process_flow_diagram_101404.pdf*
Integrated Energy Design Guidance Checklist. EPA provides a checklist that highlights components in the design process that can lead to ENERGY STAR labeling.	*http://www.energystar.gov/ia/business/tools_resources/new_bldg_design/BuildingDesignGuidanceChecklist_101904.pdf*
ENERGY STAR Financial Calculators	
Cash Flow Opportunity Calculator. This tool can be used to determine how much new energy-efficient equipment can be purchased based on estimated cost savings; determine whether equipment should be purchased now using financing or if it is better to wait and use cash from a future year's budget; and determine whether money is being lost by waiting for lower interest rates.	*http://www.energystar.gov/index.cfm?c=assess_value.financial_tools*
Financial Value Calculator. This tool presents energy efficiency investment opportunities in terms of key financial metrics. It can be used to determine how energy efficiency improvements can affect organizational profit margins and returns on investments.	*http://www.energystar.gov/index.cfm?c=assess_value.financial_tools*
Building Upgrade Value Calculator. This calculator can be used to estimate the financial benefits of improving energy efficiency in office buildings.	*http://www.energystar.gov/index.cfm?c=assess_value.financial_tools*
Savings Calculators. These calculators can be used to estimate the life-cycle and annual costs and savings of a variety of ENERGY STAR labeled products.	*http://www.energystar.gov/index.cfm?c=bulk_purchasing.bus_purchasing*
ENERGY STAR Financial Calculators	
ENERGY STAR for Government. This Web site provides resources for state and local governments to use as they plan energy efficiency activities, including energy management guidelines, information on financing options, and tools and resources to measure and track energy use.	*http://www.energystar.gov/index.cfm?c=government.bus_government*
The ENERGY STAR Challenge. The ENERGY STAR Challenge—Build a Better World 10% at a Time program calls on governments, schools, and businesses across the country to identify energy efficiency improvements in their facilities and improve energy efficiency by 10 percent or more. EPA estimates that if each building owner accepts this challenge, by 2015 Americans would save about $10 billion and reduce GHG emissions by more than 20 million metric tons of carbon equivalent—equivalent to the emissions from 15 million vehicles.	*http://www.energystar.gov/index.cfm?c=challenge.bus_challenge*
ENERGY STAR Free Online Training. ENERGY STAR offers free online training sessions on a variety of energy performance topics.	*http://www.energystar.gov/index.cfm?c=business.bus_internet_presentations*
Off the Charts. Off the Charts is EPA's ENERGY STAR e-newsletter on energy management developments and activities.	*http://www.energystar.gov/ia/business/guidelines/assess_value/Off_the_Charts_Summer_2007.pdf*

STEP 1: MAKE COMMITMENTS

Committing to a policy for improving energy efficiency in a specified portfolio of buildings is an important first step for ensuring success. This step involves: 1) identifying a team of qualified personnel to initiate and lead the energy policy development process; and 2) instituting and committing to an energy policy based on the team's guidance and recommendations.

- **Use a team approach.** Identifying a team of qualified and experienced personnel from across agencies to initiate and lead the policy development process helps to ensure that efficiency programs are carefully crafted. Bringing together a team of interested individuals with diverse backgrounds in local government operations also serves to ensure that energy efficiency programs receive broad support.

In 2007, the mayor of Fort Wayne, Indiana, issued an executive order that created a local government energy policy. The policy stated that the "City of Fort Wayne will include the basic tenet of energy conservation, energy efficiency, and use of renewable energy systems in all city operations and planning," including management and design of city facilities. The executive order also expanded the purview of the existing City Green Team (comprised of the directors of nearly 20 government agencies), giving it additional responsibility to promote the energy policy, track and report on the status of its implementation, and develop plans to achieve a set of specific energy efficiency and renewable energy goals, including reducing energy consumption per square foot in local government facilities by 10 percent by 2010 and 35 percent by 2015, based on 2003 levels (Fort Wayne, 2008).

In addition to using a team approach for developing the overall local government efficiency policy, a team approach should be applied within individual facilities. At the building level, upgrading and designing energy-efficient buildings requires all project team members to be involved early in the pre-design stages, when the project's energy performance targets are set to ensure that future decisions will be made with the project intentions intact. The team works together to identify information needs and share knowledge of each building system to achieve optimal integration.

For more information on using a team approach to continually develop and improve an overall local government energy efficiency program, see Section 6, *Strategies for Effective Program Implementation*.

- **Establish and commit to an energy policy.** Based on input from the energy policy team, the next step is to formalize the local government's commitment to improving energy efficiency. Instituting an energy policy that clearly states a local government's objectives can help secure support from elected officials and buy-in from local government agencies. In addition, committing to a formalized energy policy facilitates accurate and useful tracking of the impacts of energy efficiency programs in terms of energy and dollars saved and greenhouse gas emissions avoided. (For more information on tracking, see *Establish and Maintain a Tracking System* on page 19.)

SECTOR COLLABORATIVE ON ENERGY EFFICIENCY: LOCAL GOVERNMENT COMMITMENTS TO ENERGY EFFICIENCY

The *Sector Collaborative on Energy Efficiency Accomplishments and Next Steps* report describes major findings of the Sector Collaborative for Energy Efficiency through July 2008, including key findings on energy efficiency barriers and potential opportunities. Based on these findings, a number of Sector Collaborative participants and interested parties have adopted sector-specific commitments to improve energy efficiency.

For local governments, this commitment includes a pledge that the participant will undertake one or more of the following initiatives:

- Conduct energy benchmarking for all properties greater than 5,000 square feet.
- Implement all cost-effective strategies to improve energy efficiency.
- Create and/or increase energy efficiency education and awareness within and outside each organization.
- Pursue bulk purchasing of energy-efficient products and services.
- Support expanded efficiency program offerings across states and utilities.
- Support development of standardized electronic utility billing data access by large customers for benchmarking.
- Explore energy efficiency programs offered by federal, state, and local agencies and sector-based associations.

Source: National Action Plan for Energy Efficiency, 2008.

Many local governments have included in their energy policies a range of commitments to specific actions that can eventually lead to easier and more effective implementation of energy efficiency programs. These commitments include:

- ***Improving energy efficiency across an entire portfolio.*** Many local governments have adopted energy policies that include commitments to reducing energy consumption in their facilities by a specific percentage portfolio-wide. These commitments provide a clear objective toward which progress can be continually measured.

As a participant in the ENERGY STAR Challenge, Fort Worth, Texas, has pledged to reduce the energy consumption of its portfolio of buildings by 10 percent or more. Officials are benchmarking all city buildings in Portfolio Manager and using data from this tool to make decisions about energy upgrades and operations within their buildings. They are also incorporating energy efficiency best practices into new building designs. City officials are leading by example and demonstrating to local government agencies and businesses that they too can reduce their energy consumption while continuing to deliver quality services (Fort Worth, 2008).

- ***Using life-cycle cost analysis.*** Because local governments are concerned with long-term—as well as short-term—benefits and costs, they are well positioned to adopt life-cycle cost analyses when making decisions about purchasing energy-using products. Traditional methods for assessing project cost-effectiveness typically focus on the initial design and construction costs in the short-term. The life-cycle cost of a product or service is the sum of the present values of the costs of investment, capital, installation, energy, operation, maintenance, and disposal over the life of the product (U.S. DOE, 2003). Because life-cycle cost analysis reveals whether energy efficiency investments are cost-effective over the long run, it can be an important feature of an overall energy policy.

Some local governments use life-cycle cost analyses to prioritize energy efficiency activities and energy-efficient products based on comparative simple payback periods. Common applications of life-cycle cost analysis employed by local governments include analyses of efficiency targets for civic buildings, machinery, electronic equipment for the office, infrastructure such as that associated with public transportation, land use planning, and regulations for residential and commercial building projects. Life-cycle cost analysis can be particularly useful when evaluating high-cost infrastructure and renewable energy opportunities (Union of British Columbia Municipalities, 2009).

In 2008, Alexandria, Virginia, adopted an eco-city environmental charter to promote energy and environmental initiatives throughout the city. To help implement activities under this charter, the city created an energy committee. Among other activities, the Energy Committee has established a goal of reducing energy use in local government facilities by 3 percent per square foot per year through 2015, for a total reduction of 20 percent below 2007 levels. To ensure that this goal is met, the committee resolved to take several energy efficiency actions, including using life-cycle cost analysis to ensure that the lifetime costs of not implementing energy efficiency projects are considered (Alexandria, 2008).

In 2008, Cobb County, Georgia's, board of commissioners approved a policy drafted by the county purchasing department that enables the department to use life-cycle cost analysis when purchasing products, such as energy-efficient appliances. Historically, the department had been required to accept lowest-bid offers for purchases of $1,000 or more, which would have precluded purchases of some energy-efficient products (Cobb County, 2008).

EPA has developed savings calculators that local governments can use to asses the life-cycle and annual costs and savings of a variety of ENERGY STAR labeled products, which are available at *http://www.energystar.gov/index.cfm?c=bulk_purchasing.bus_purchasing*. For a list of ENERGY STAR labeled products that are relevant for local governments, refer to Table 3, ENERGY STAR Specification Overviews: Energy Savings and Payback Periods on page 35.

- ***Purchasing energy-efficient products.*** Some local governments are making a procurement policy for efficient products an explicit part of their energy policy. Purchasing energy-efficient products can make comprehensive energy efficiency upgrades more cost-effective by reducing building energy loads (and the size of the systems needed to meet those loads), typically by as much as 5 to 10 percent (LBNL, 2002). Table 2 summarizes the potential energy and CO_2 savings associated with purchasing energy-efficient products for five product categories. More information and local government examples on energy-efficient product procurement are provided in EPA's *Energy-Efficient Product Procurement* guide in the *Local Government Climate and Energy Strategy Series*.

TABLE 2 ESTIMATED ENERGY COST AND CO_2 SAVINGS FROM A SAMPLE OF ENERGY STAR PRODUCTS[a]

Action	Annual Energy Cost Savings	Annual CO_2 Savings (Tons)	Lifetime (Years)	Life-Cycle Energy Cost Savings	Life-Cycle CO_2 Savings (Tons)
Replace 5,000 computers and monitors with ENERGY STAR labeled products and activate power management	*$290,210*	*2,177*	*4*	*$663,428*	*8,708*
Replace 10 conventional commercial dishwashers with ENERGY STAR labeled products	*$8,690[b]*	*57*	*10*	*$60,483[b]*	*567*
Replace 50 conventional vending machines with ENERGY STAR labeled products[c]	*$8,544*	*64*	*14*	*$90,250*	*894*
Replace 100 conventional water coolers with ENERGY STAR labeled coolers	*$3,722*	*28*	*10*	*$30,188*	*278*
Replace 500 incandescent exit signs with ENERGY STAR labeled LED exit signs	*$16,737 in energy costs plus $33,696 in maintenance costs*	*125*	*10*	*$484,800 in energy and maintenance savings net price differential*	*1,251*

[a] Figures obtained from calculators on the ENERGY STAR Purchasing & Procurement Web site http://www.energystar.gov/purchasing using default settings and an electricity rate of 10.3¢ per kWh (EIA, 2009). Annual costs exclude the initial purchase price and installation cost. All costs are discounted over the product's lifetime using a real discount rate of 4 percent.

[b] Value includes water savings.

[c] Vending machines assumed to have capacities of less than 500 cans.

- ***Ensuring energy efficiency is a key component of green building programs.*** Energy efficiency can be integrated with other green buildings measures to achieve additional energy, environmental, indoor air quality, and water savings benefits. Designing for superior energy performance is often the first step in green building and can improve environmental performance and overall cost-effectiveness of a green building strategy (U.S. EPA, 2003b; U.S. EPA, 2006c). Many local governments require energy-efficient performance as a feature of their green building policies. See the subsection on *Energy Efficiency in Green Buildings* for additional information.

In 2006, the Washington, D.C., city council passed legislation requiring all publicly-owned and publicly financed buildings be designed to meet the U.S. Green Building Council's Leadership in Energy and Environmental Design (LEED) Silver certification standards for environmental performance. To ensure that these buildings achieve optimal energy performance, the legislation includes a requirement that buildings also be designed to earn the ENERGY STAR using EPA's Target Finder, and to be benchmarked annually using Portfolio Manager. To ensure compliance with these requirements, the legislation mandates reviews by a government agency or a certified third party. The green building program is guided by a Green Building Advisory Committee (Washington, D.C., 2006).

- ***Tracking results of energy efficiency initiatives.*** Tracking results of initiatives is a powerful tool to underscore their efficacy and promote public awareness. Tracked results can also be used as a rationale for obtaining additional funding or for gaining public support for a broader portfolio of programs. (For more information on tracking and evaluating progress, see page 19.)

In 2006, the City of Santa Monica, California, updated its Sustainable City Plan to include a comprehensive set of indicators and targets to achieve the overall intergenerational sustainability goal for the city. The indicators identify the measurable data categories used to evaluate annual progress toward the targets. Energy use per capita is used to measure both resource conservation and avoided GHG emission targets. The city releases an annual report card with grades based on changes in the indicators and on citizen efforts (Santa Monica, 2009).

STEPS 2 AND 3: ASSESS BASELINE ENERGY PERFORMANCE AND SET GOALS

After making a commitment, the next two steps to improve energy efficiency across a portfolio of buildings are to assess baseline energy performance and set goals. Assessing energy performance involves looking at how energy is used in existing buildings and identifying priority opportunities to improve energy efficiency. Setting goals, on the other hand, involves looking at potential savings in new and renovated buildings as well as existing ones.

Assess Baseline Energy Performance in Existing Buildings

Understanding the impacts of improvements in energy efficiency in existing buildings requires periodically reviewing a building's energy performance by comparing its energy consumption to its baseline energy consumption (established at a specified time in the past). Key approaches for assessing baseline building energy performance in existing buildings include:

- **Use available, standardized tools for baseline energy consumption assessments.** Standardized tools can be used to help assess baseline energy performance and track building energy data. For example, Portfolio Manager is an online tool that can be used to assess baseline energy performance in existing buildings and compile data across a portfolio of buildings (U.S. EPA, 2008a).

Cambridge, Massachusetts, tracks energy consumption for all publicly owned buildings in the city, including schools, fire stations, and libraries. The city imports energy consumption data from the local utility, NStar, into software that was designed specifically for Cambridge's use. The software compiles data to then plug into Portfolio Manager each month, allowing for frequent updates on the city's progress (ICLEI, 2009).

- **Benchmark buildings.** Benchmarking involves comparing a building's energy performance to the performance of similar buildings across the country. For certain building types, EPA provides an energy performance scale in Portfolio Manager to compare buildings nationwide on a scale of 1 to 100. For example, a score of 75 means that the evaluated building performs better than 75 percent of similar buildings nationwide. This information can help local governments prioritize buildings for energy efficiency investments and/or a comprehensive energy audit (see the next bullet, below).

- **Conduct technical assessments and audits.** In addition to establishing baseline energy performance and determining a building's relative performance compared to its peers, a thorough energy performance assessment includes comparing the actual performance of a building's systems and equipment with its designed performance level or the performance level of top-performing technologies. These technical assessments can be conducted as part of a whole-building energy audit conducted by an energy professional and used to identify priority energy efficiency investments.

  Many local governments have incorporated these energy audits into energy performance contracts, which are contracts that offer a one-stop process for purchasing, installing, maintaining, and often financing energy-efficiency upgrades at no upfront cost. EPA has developed a directory of energy professionals, energy service companies (ESCOs), and other companies that can provide local governments with expert advice and technical assistance on conducting energy audits and entering energy performance contracts.[3] For more information on energy performance contracting, see Section 7, *Investment and Financing Opportunities*.

[3] *See http://www.energystar.gov/index.cfm?c=spp_res.pt_spps for a directory of energy service and product providers.*

In Bangor, Maine, the city government worked with an ESCO to conduct an energy audit of its facilities in 2007. The audit surveyed local government buildings and provided recommended energy efficiency measures with estimated energy cost savings. The contractor provided an itemized list of feasible energy efficiency upgrades for each of the city's buildings. While the cost to initially upgrade properties was approximated at $1.5 million, the operational and energy savings over a 20-year period are projected to be $4.3 million, a net savings to taxpayers of $2.8 million (Bangor, 2007).

Set Goals for Existing and New Building Portfolios

Local governments can establish portfolio-wide energy efficiency goals for existing and new buildings to help maintain momentum for energy management activities, guide daily decision-making, and track and measure progress. For existing buildings, these portfolio-wide goals can be based on the results of the baseline energy performance assessment and the priority investments identified through that process. For new buildings, goals can be based on output from energy performance projection tools and best practices.

Key considerations for setting goals for improving portfolio-wide energy efficiency in buildings include:

- **Consider potential savings.** Assessing potential energy savings helps to determine appropriate portfolio-wide energy efficiency goals that are clear and measurable. Local governments can use information collected during energy performance assessments and technical audits to determine potential energy savings from priority investments. Local governments can also evaluate a building's benchmarking results to estimate potential savings based on the energy performance of similar buildings.

For new and renovated buildings, local governments can consider the potential savings of each new or renovated building by using tools such as the Target Finder to set energy performance targets and assess building designs (e.g., local governments can aim for each new or renovated building to achieve a specific energy performance scale using Target Finder). In addition, local governments can consider the savings achieved by similar organizations. EPA estimates that most new and renovated buildings can achieve energy savings on the order of 30 percent as compared to conventional buildings (U.S. EPA, 2008d).

- **Determine appropriate scope.** Goals for improving energy efficiency across a portfolio of buildings can be established at different levels, ranging from sub-agency and agency level up to portfolio-wide goals. These goals can also be established over varying time periods. Many local governments have established both short-term and long-term goals for improving energy efficiency in buildings that can lead to quick cost savings that continue to accrue far into the future.

Goals for improving energy efficiency in a portfolio of local government buildings can be part of a larger goal that incorporates multiple clean energy activities. For example, energy efficiency goals can be part of a broader goal for reducing local government GHG emissions. For information on how local governments can procure clean power for their facilities and throughout the community, see EPA's *Green Power Procurement* guide in the *Local Government Climate and Energy Strategy Series*.

STEP 4: CREATE AN ACTION PLAN

A regularly updated action plan can serve as a roadmap toward meeting portfolio-wide energy efficiency goals by systematically improving energy efficiency in existing buildings and designing energy-efficient new and renovated buildings. Creating an action plan involves establishing energy performance targets for each building, identifying the technical measures that can help meet that performance target, identifying resources necessary to implement the action plan, and determining the responsibilities of internal and external parties.

Action plans for improving energy efficiency are sometimes created in response to a local government mandate. Such mandates, including executive orders and city council resolutions, can clearly articulate the purpose of the action plan and can identify key personnel to be involved in creating the plan. More information on mechanisms that can be used to initiate energy efficiency programs is provided in Section 5, *Foundations for Program Development*.

ENERGY PERFORMANCE TARGETS LEAD TO "DESIGNED TO EARN THE ENERGY STAR" LABEL

The Poudre School District in Fort Collins, Colorado, used the ENERGY STAR Target Finder when designing its new Operations Building. By adjusting the design throughout the process, the design team was able to produce a design that repeatedly achieved projected ratings in the 80s and earned the designation "Designed to Earn the ENERGY STAR." Completed in 2002, the building earned the ENERGY STAR label after one year, and in 2005 achieved a perfect rating.

Sources: U.S. EPA, 2008b; U.S. EPA, 2008k.

A resolution passed by the Montgomery County, Maryland, county council in 2008 directed the county Sustainability Working Group to develop an energy baseline, energy unit savings plan, and energy cost savings plan for each county building by January 2009. The resolution included a requirement for each building's energy cost savings plan to include a plan to use an energy performance contract, where cost-effective. It also directed the Sustainability Working Group to annually report to the county executive and county council on steps taken to implement these plans (Montgomery County, 2008).

In New York City, the mayor issued an executive order in October 2007 directing the city government to reduce its GHG emissions by 30 percent by 2017, based on 2006 emissions levels, by improving energy efficiency in its facilities and operations. The order established a steering committee to develop short- and long-term plans for reducing the city's energy consumption. The steering committee's long-term plan demonstrates that while the cost of achieving the 30 percent GHG reduction goal will be high (approximately $2.3 million), it is expected that the city will break even on its investment in five years due to the projected energy cost savings (New York City, 2008).

Local governments looking for information to help them prepare an action plan can obtain information on best practices from other organizations that have improved energy efficiency in their facilities. For example, *ENERGY STAR Labeled Buildings and Plants* is an EPA-maintained list of the more than 4,000 buildings that have earned the ENERGY STAR label for energy performance (U.S. EPA, 2008j). In addition, many ESCOs have experience with proven technical energy efficiency measures and can incorporate these measures into an action plan through the energy performance contracting process. EPA has developed a directory of service product providers that can provide local governments with expert advice and technical assistance on entering energy performance contracts.[4]

Key strategies for creating an action plan include:

- **Develop whole building energy performance targets.** Once a local government has evaluated its portfolio's performance and set portfolio-wide goals, it can establish energy performance targets for each existing and new building. Establishing energy performance targets for each building allows local governments to clearly articulate to building occupants and other key personnel the expected results of energy efficiency investments in each facility, and enables local governments to track progress and measure results. Whole building energy performance measurements can be developed for existing buildings using the Portfolio Manager tool, which enables users to identify baseline energy performance and set targets based on the ENERGY STAR energy performance scale (U.S. EPA, 2008a). For new buildings, a tool called the Target Finder can be used to set whole building performance targets (U.S. EPA, 2008b). For building types not covered by these tools, EPA has developed a list of reference energy performance targets based on national averages.[5]

- **Use a staged approach to identify technical measures for improving energy efficiency.** A staged approach is a systematic method to gradually improve energy efficiency in existing buildings and incorporate energy efficiency in new and renovated buildings, which can lead to greater overall energy cost savings. This approach starts with steps that are cost-effective and feasible for the near term and follows with longer-term projects, so that decision-makers can gradually implement energy efficiency. The subsections below provide information on using a staged approach in existing and new facilities, including a number of resources that offer guidance on selecting technical measures to incorporate into energy efficiency action plans.

Using a Staged Approach in Existing Buildings

For *existing* buildings, a staged approach that sequences building upgrades in a logical, systems-oriented way, can lead to the greatest energy savings for the available budget. When following this approach, local governments can identify appropriate technical measures for each step in the process, which are most likely to improve energy efficiency in a cost-effective way.

EPA recommends using a five-stage approach to upgrading facilities (see the text box on page 16 for a more detailed description of this approach). This approach includes the following stages:

1. Conduct retrocommissioning.
2. Install energy-efficient lighting.
3. Reduce supplemental loads (e.g., by purchasing ENERGY STAR labeled equipment).
4. Install fan system upgrades.
5. Install heating and cooling system upgrades.

[4] *See http://www.energystar.gov/index.cfm?c=spp_res.pt_spps for a directory of energy service providers. For more information on performance contracting, see Section.7, Investment and Financing Opportunities.*

[5] *For more information, see http://www.energystar.gov/ia/business/tools_resources/new_bldg_design/2003_CBECSPerformanceTargetsTable.pdf*

Figure 2 illustrates the benefits of implementing energy efficiency upgrades based on several of these EPA-recommended stages. As shown in the figure, cooling capacity can be reduced by up to 5 percent for a typical office building when implementing HVAC measures *after* upgrading operations and maintenance (O&M) practices and improving lighting system efficiency. The figure also shows that implementing upgrades in appropriate stages reduces the overall cooling capacity needed, which can enable local governments to purchase "right-sized" equipment. "Right-sized" equipment is sized to meet the necessary load after efficiency measures are implemented, as opposed to oversized equipment that serves the load, but at a higher upfront cost. Figure 3 on page 17 illustrates how implementing upgrades in a staged fashion can reduce a building's energy loads and result in an overall energy consumption reduction of 30 percent (National Action Plan for Energy Efficiency, 2008).

Energy efficiency upgrade and design guidance materials are helpful for identifying and prioritizing technical measures to incorporate into a local government's energy efficiency action plan. For example, the ENERGY STAR *Building Upgrade Manual* provides guidance on using the staged approach for upgrading existing buildings (see the text box regarding the staged approach on page 16).

FIGURE 2 BENEFITS OF USING A STAGED APPROACH TO IMPLEMENTING ENERGY EFFICIENCY UPGRADES IN AN OFFICE BUILDING (250,000 FT^2)

Sequence of Upgrade Measures	1st Upgrade	2nd Upgrade	3rd Upgrade	Cooling Capacity	Reduction in Cooling Capacity
Good	*HVAC*	*O&M*	*Lighting*	*760*	*0%*
Better	*O&M*	*HVAC*	*Lighting*	*752*	*1%*
Best	*O&M*	*Lighting*	*HVAC*	*722*	*5%*

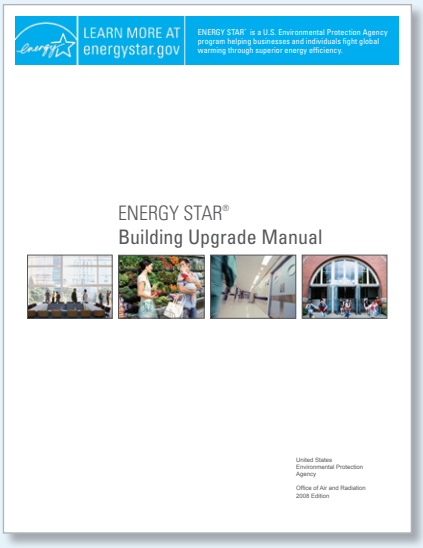
Source: National Action Plan for Energy Efficiency, 2008.

OVERVIEW OF EPA BUILDING UPGRADE MANUAL STAGED APPROACH FOR IMPROVING ENERGY PERFORMANCE

The staged approach outlined in the 2008 *ENERGY STAR Building Upgrade Manual* provides a systematic method for planning energy efficiency upgrades in buildings that accounts for interactions between building energy systems, enabling organizations to achieve significant energy savings. This approach involves the following stages:

1. **Retrocommissioning**: Commissioning is the process of ensuring that a new building is designed, installed, tested, and capable of being operated and maintained according to the owner's needs. Commissioning a new building can produce energy cost savings of $0.02 to $0.19 per square foot (Mills et al., 2004). Commissioning can also produce non-energy benefits, such as improved occupant comfort and indoor air quality. One study estimates that the average value of non-energy benefits for every $1 spent on commissioning ranges from $1 to as high as $2.30 when accounting for energy efficiency rebates. Nonenergy benefits resulting from commissioning are estimated to be $0.50 per square foot (Mills et al., 2004; Jennings and Skumatz, 2006).

Retrocommissioning buildings that were never commissioned is a key step in identifying technical measures for a staged approach to improving energy efficiency. This process can identify no- and low-cost technical measures for improving energy efficiency and can result in energy cost savings between $0.11 and $0.72 per square foot (Mills et al., 2004). Recommissioning is the process of commissioning a building that has already been commissioned.



2. **Lighting Upgrade**: Improving the energy efficiency of the building's lighting system can reduce lighting energy costs. Lighting systems can account for up to 40% of a building's total energy use. Improving energy efficiency can halve lighting energy consumption while improving lighting quality and reducing unwanted heat gain. Improving lighting system energy efficiency involves the following steps:

- Design light quantity and quality to meet task and occupant needs.
- Maximize lamp and ballast efficiency.
- Install automatic controls to turn off or dim lighting.
- Establish schedules for group re-lamping and fixture cleaning.
- Purchase ENERGY STAR labeled lighting products.
- Use responsible disposal practices.

3. **Supplemental Load Reductions**: Purchasing ENERGY STAR labeled office equipment and improving the energy efficiency of building envelope components (e.g., installing window films and adding insulation or reflective roof coating) reduces supplemental load energy consumption. Reducing supplemental loads enables organizations to install smaller fan, heating, and cooling systems that cost less and use less energy.

4. **Air Distribution System Upgrades**: Air distribution systems account for approximately 7% of an office building's total energy use. Technical measures, such as right-sizing fan system equipment and converting to a variable-air-volume system, can significantly reduce air distribution system energy costs. For example, reducing a fan's speed by 20% (e.g., by using a variable-speed drive) can reduce its energy consumption by 50%.

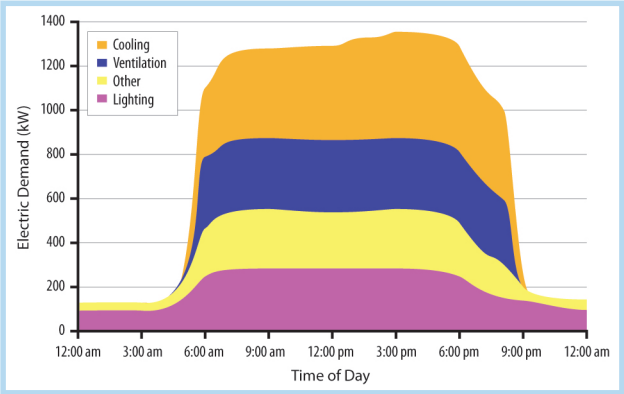
5. **Heating and Cooling System Upgrades**: Heating and cooling systems typically account for one-fourth of a building's energy use. Improving energy efficiency in these systems can produce significant savings. A strategy for improving heating and cooling system efficiency involves:

- Measure heating and cooling loads
- Right-size heating and cooling systems
- Install energy-efficient chillers
- Upgrade other heating and cooling system components
- Install variable- speed drives on pumps and cooling tower fans
- Optimize operations

Source: U.S. EPA, 2008f.

FIGURE 3 TYPICAL OFFICE BUILDING LOAD PROFILE

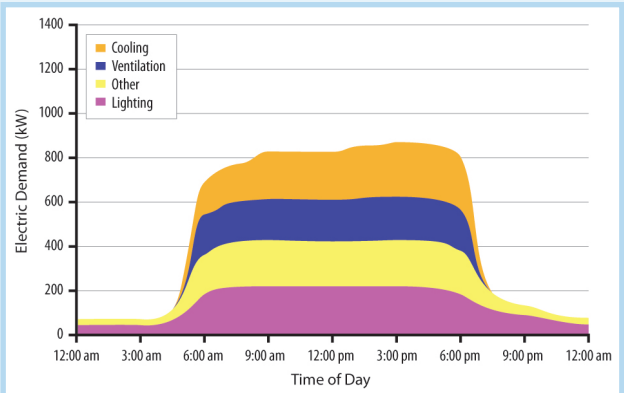
The graphic below illustrates a typical 250,000 ft2 office building's load profile for cooling, ventilation, lighting, and other energy demand on a summer day in Chicago, Illinois.



Implementing a suite of energy efficiency upgrades could significantly reduce the building's energy consumption. The graphic below illustrates the energy loads for the same building after implementing several upgrades, including:

- O&M/re-commissioning measures (e.g., optimizing temperature setpoints, HVAC scheduling, etc.).
- Lighting measures (CFLs, daylighting controls, etc.).
- HVAC measures (high efficiency chillers, premium efficiency motors, etc.).

Implementing these upgrades noticeably reduces each energy load. The total resultant energy decrease is approximately 30 percent.



Source: National Action Plan for Energy Efficiency, 2008.

Using a Staged Approach in New and Renovated Buildings

While the preceding staged approach makes sense for existing buildings, many local governments follow a different approach for new buildings. To help local governments design new building systems and materials as an integral network that will improve energy performance, EPA has developed the ENERGY STAR *Integrated Energy Design Guidance to Design* (U.S. EPA, 2008c). This guidance document can help local governments identify cost-effective energy efficiency investments that consider the environment, climate, building orientation, and other features that affect performance in new facilities. It is important to conduct commissioning during the construction process and to continue commissioning through occupancy to verify that the new building functions as intended.

For new and renovated buildings, local governments can also use the *Whole Building Design Guide*, a resource developed with EPA and DOE support by the National Institute of Building Sciences, which provides information on energy-efficient building design and offers numerous case studies, tools, and guidance documents (WBDG, 2008).

- **Secure necessary funding.** When designing an action plan for improving energy efficiency in local government buildings, it is important to identify the capital costs of implementing the action plan and to evaluate funding opportunities. The following financial tools, presented in Table 1, *ENERGY STAR Program Resources* (see page 6), are available through EPA's ENERGY STAR program to evaluate the investment required for priority energy efficiency projects and to help make the financial case for energy efficiency investments:

  - ***Cash Flow Opportunity Calculator.*** This tool can be used to determine how much new energy-efficient equipment can be purchased based on estimated cost savings, whether equipment should be purchased now using financing or if it is better to wait and use cash from a future year's budget, and whether money is being lost by waiting for lower interest rates.

- ***Financial Value Calculator.*** This tool presents energy efficiency investment opportunities in terms of key financial metrics. It can be used to determine how energy efficiency improvements can affect organizational profit margins and returns on investments.[6]

CASH FLOW OPPORTUNITY CALCULATOR

The ENERGY STAR Cash Flow Opportunity Calculator is a decisionmaking tool that can be used to influence timing of energy-efficient product purchases. The tool can be used to determine:

- The quantity of energy-efficient equipment that can be purchased and financed using anticipated savings;
- Whether it is most cost-effective for the purchase to be financed now, or to be paid with future operating funds; and
- The cost of delay: whether money is being lost while waiting for a lower interest rate.

www.energystar.gov/ia/business/cfo_calculator.xls

Source: U.S. EPA, 2003a.

- ***Building Upgrade Value Calculator.*** This calculator can be used to estimate the financial benefits of improving energy efficiency in office buildings.[7]

Once a local government has determined the size of the investment required to implement priority energy efficiency upgrades, it can consider a range of financing options. Financial assistance for improving energy efficiency in local government buildings can be secured through a number of sources. Many states administer programs that provide incentives to local governments for investments in energy efficiency, while a number of local governments have identified and secured funding resources from external sources. Energy performance contracts, for example, can be used to implement energy efficiency upgrades at no upfront cost, often through a financial arrangement with an ESCO. For more information on funding energy efficiency improvements, see Section.7, *Investment and Financing Opportunities*.

In cases where local governments do not have sufficient resources to improve energy efficiency across a broad portfolio of buildings, they can concentrate resources to systematically improve energy efficiency in one or a few buildings. Experiences from such pilot projects can be applied to a broader set of buildings when additional resources become available. In addition, many local governments have found that implementing pilot projects and studies can be an effective strategy for gathering information on the benefits and costs of priority investments and can be used to increase public awareness of energy efficiency activities. Pilot projects can also help identify potential full-scale implementation challenges.

NEW YORK CITY ENERGY SAVINGS PILOT PROGRAMS

The New York City Short-Term Action Plan for Reducing Energy Consumption and Greenhouse Gas Emissions in City Municipal Buildings and Operations establishes plans for multiple pilot projects, including:

- A pilot to audit energy consumption in 10 buildings that will inform a comprehensive project involving many city buildings.
- A pilot to apply the LEED-EB rating system in at least five existing city buildings.
- A pilot to test energy tracking hardware and software in at least 10 buildings.

Information gathered through these pilots will be used to develop a database of information on city building energy consumption.

Source: New York City, 2007.

Ocean City, New Jersey, began its energy conservation program with a pilot project at its city hall that involved a range of energy efficiency measures, including lighting retrofits, energy use monitoring, and ENERGY STAR equipment purchases. In addition, the city conducted a number of public education programs aimed at increasing constituent awareness of local government energy efficiency activities (Ocean City, 2007).

6 *For more information on the Financial Value Calculator, visit: http://www.energystar.gov/index.cfm?c=assess_value.financial_tools*

7 *For more information on the Building Upgrade Value Calculator, visit: http://www.energystar.gov/index.cfm?c=assess_value.financial_tools*

STEPS 5 AND 6: IMPLEMENT THE ACTION PLAN AND EVALUATE PROGRESS

Step 5 of the ENERGY STAR Guidelines for Energy Management, Implement the Action Plan, involves gaining the support and cooperation of individuals at different levels within the local government. The Guidelines identify five steps for ensuring the effective implementation of the action plan:

- Create a communication plan
- Raise awareness
- Build capacity
- Motivate
- Track and monitor

Section 6, *Strategies for Effective Program Implementation* on page 30, provides information on strategies that local governments have used to address the first four steps, including strategies for gaining buy-in from key personnel.

MODEL ENERGY EFFICIENCY PROGRAM IMPACT EVALUATION GUIDE

The Model Energy Efficiency Program Impact Evaluation Guide, developed for the National Action Plan for Energy Efficiency, provides detailed information on the processes and approaches for quantifying energy and demand savings, and avoided emissions resulting from energy efficiency programs. While the guide focuses on impact evaluations, it also presents information on process and market evaluations.

Source: National Action Plan for Energy Efficiency, 2007.

Establish and Maintain a Tracking System

Part of the fifth step in implementing an action plan is the development of a tracking system that can be used to continuously track and monitor energy use data. Tracking key indicators is critical for evaluating program progress and begins from the comprehensive assessment of baseline energy performance through benchmarking and other tools, such as onsite building audits. Maintaining an effective centralized tracking system involves the following actions:

- **Perform regular updates.** Data can be collected and incorporated into the tracking system at regular intervals, typically weekly or monthly. Regular data updates ensure that the system provides helpful output when it comes time to evaluate program progress.
- **Conduct periodic reviews.** Periodic reviews of progress made toward meeting interim goals and milestones can help ensure that an energy program will meet its ultimate performance goals (as established in *Steps 2 and 3, Establish Baseline Energy Performance and Set Goals*) when the energy team conducts a complete program progress evaluation.
- **Identify necessary corrective actions.** Periodic reviews can also be used to identify corrective actions the energy team can take before a formal program evaluation.

Evaluate Progress

Implementing an action plan for improving energy efficiency does not in itself guarantee that a facility will achieve its intended energy performance target. Step 6 of the *ENERGY STAR Guidelines for Energy Management*, Evaluate Progress, describes a process for evaluating the progress of an energy program using information collected during the tracking and monitoring process described above. The *Guidelines* identify two critical steps involved in evaluating an energy efficiency program:

CONDUCTING IMPACT EVALUATIONS OF ENERGY EFFICIENCY PROGRAMS

Impact evaluations of energy efficiency programs in municipal buildings involve determining and quantifying the benefits of the program. Direct benefits include net energy savings, cost savings, and emission reductions, while indirect benefits can include other economic, energy system, and environmental impacts such as job creation, system reliability, and health benefits.

Evaluations can be conducted at the individual project level (e.g., an energy-efficient lighting retrofit or a single building) or at the program level (e.g., a portfolio of municipal buildings). When evaluating an individual project, a process called measurement and verification (M&V)[a] is often used to determine energy savings. The International Performance Measurement and Verification Protocol provides a framework and definitions that can help users develop M&V plans for their projects. It includes guidance on current best practice techniques available for determining energy savings and verifying the results of energy efficiency, renewable energy, and water efficiency projects in commercial and industrial facilities. When evaluating an entire program, savings from a sample of individual projects can be determined using M&V methods and then applied to all of the projects in the program.

[a] Measurement and verification (M&V) is a subset of the evaluation process that refers to determining the direct benefits associated with reduced energy demand and/or efficient or cleaner generation at a single project or site (e.g., an energy-efficient lighting retrofit in a state facility) using one or more techniques ranging from simple estimates of savings to actual measurements and computer simulations.

Sources: IPMVP, 2002; National Action Plan for Energy Efficiency, 2007.

- **Measure results.** Comparing the performance of a portfolio of buildings at the time of evaluation to the baseline performance enables local governments to determine whether they have met their portfolio-wide goals (see *Steps 2 and 3, Assess Baseline Energy Performance and Set Goals*). Measuring results involves gathering data on energy use and costs from the continuous tracking system (see *Step 5, Implement the Action Plan*) and analyzing these data to determine energy efficiency achievements. Third-party verification of these data can be a helpful step towards ensuring that buildings achieve their intended energy performance. Third-party verification by a certified professional engineer (PE) is also required in order for buildings to become ENERGY STAR labeled. PE verification offers an unbiased and ethical assessment that energy savings claims are accurate. Local governments can obtain third-party verification from a number of sources, including ESCOs and energy service providers.[8] Certified PEs can sometimes be found within the organization that owns the building, which can avoid the cost of hiring an outside engineer.

Once the data are compiled and verified, local governments can conduct a formal evaluation based on established performance metrics and then benchmark their facilities to compare their achieved energy performance against similar facilities. A number of resources are available to local governments to help plan and conduct evaluations that analyze the impacts of their energy efficiency program. For example, the Leadership Group of the National Action Plan for Energy Efficiency has developed a *Model Energy Efficiency Program Impact Evaluation Guide* that identifies a structure and several industry-standard approaches for calculating the impacts of energy efficiency programs. The guide provides detailed information on the processes and approaches for quantifying energy and demand savings and avoided emissions resulting from energy efficiency programs (National Action Plan for Energy Efficiency, 2010). For more information on conducting evaluations, see the text box on page 20.

A final step in measuring results involves benchmarking energy performance. As described under *Steps 2 and 3, Assess Baseline Energy Performance and Set Goals*, benchmarking can occur earlier in the energy management process to estimate potential savings in order to help develop a baseline and set goals. Benchmarking can also be conducted during the evaluation process. Using EPA's national energy performance scale (e.g., using Portfolio Manager) allows local governments to:

- Compare their new performance score to their baseline performance score,
- Compare their achieved performance against established goals for environmental performance or financial savings, or
- Compare their achieved energy performance to peers to establish a relative understanding of where a local government's performance ranks.

[8] See http://www.energystar.gov/index.cfm?c = spp_res.pt_spps for a directory of energy service providers.

- **Review the action plan.** Once a local government has determined the results of its energy efficiency investments, both in terms of energy savings and benchmarking, it can use this information to evaluate the effectiveness of its action plan. If the results indicate that the local government did not reach its goals, the local government can consider revising the action plan (e.g., to focus on implementing energy efficiency upgrades in additional priority buildings). If the results indicate that the local government did reach its goals, the local government can consider setting higher goals for achieving greater energy cost savings, and revise the action plan accordingly.

STEP 7: RECOGNIZE SUCCESS

One way to sustain momentum and support for energy efficiency activities is to obtain recognition for achieving performance goals. As a complement to opportunities for recognizing success internally, third-party recognition options include:

- **ENERGY STAR Labeled Buildings.** Buildings achieving an energy performance score of 75 or greater are eligible to apply for the ENERGY STAR label. Buildings that have earned the ENERGY STAR label use, on average, 35 percent less energy as compared to conventional buildings (U.S. EPA, 2008j).

- **ENERGY STAR Awards.** EPA also provides recognition to organizations that meet important energy savings milestones, such as improvements of 10 percent, 20 percent, and 30 percent relative to their initial baselines.

RECYCLING-ENERGY RELATIONSHIP

Recycling one pound of steel saves 5,450 Btu of energy, enough to light a 60-watt bulb for over 26 hours.

Recycling one ton of glass saves the equivalent of nine gallons of fuel oil.

Recycling aluminum cans requires only 5% of the energy needed to produce aluminum from bauxite. Recycling just one can saves enough electricity to light a 100-watt bulb for 3½ hours.

Source: Pennsylvania, 2007.

Energy Efficiency in Green Buildings

This subsection focuses on approaches for ensuring that green building policies and activities are designed to improve energy efficiency and achieve the associated environmental and financial benefits that come with combining energy efficiency and other green features.

"GREEN BUILDINGS"

Many terms are used to describe buildings that incorporate energy efficiency and other environmental features, including *green buildings*, *high performance buildings*, and *sustainable buildings*, among others. Regardless of the definitions, there is often a public perception that energy efficiency and "green" are interchangeable, and that green buildings are energy efficient. However, this is not always the case; some "green" buildings are not adequately energy efficient.

This section uses the term "green building" as an all-encompassing description of buildings that incorporate energy efficiency plus other energy and environmental features where cost effective and practical, including:

- Renewable energy supply
- Combined heat and power (CHP)
- Sustainable site design that minimizes stress on the local landscape
- Water efficiency and quality
- Green materials and resources that minimize consumption and waste
- Indoor air quality

BENEFITS OF GREEN BUILDINGS

By incorporating energy efficiency into green buildings and green building policies, local governments can achieve all of the energy efficiency benefits described in Section 2, *Benefits of Energy Efficiency in Local Government Operations*. In particular, the reduced energy costs associated with incorporating energy efficiency in green buildings can help local governments achieve overall cost-effectiveness in green building design (U.S. EPA, 2008d; U.S. EPA, 2006d).

Green buildings can provide several additional environmental benefits, including:

- Lower GHG emissions
- Reduced construction/demolition debris
- Ecosystem protection
- Natural resources conservation

GREEN BUILDING AND ENERGY STAR

When upgrading existing buildings or designing new buildings, local governments are looking to green building certification programs such as U.S. Green Building Council's (USGBC) Leadership in Energy and Environmental Design (LEED) design-based rating system and the Green Globes rating system. These rating systems standardize the elements of green building by conferring design certification based on requirements for 1) energy and atmosphere, 2) site sustainability, 3) water efficiency, 4) materials and resources, 5) indoor air quality, and 6) innovative design process.

Depending upon the rating system, it can be important to add requirements for energy performance, such as achieving EPA's ENERGY STAR program levels. It is also important to require third-party verification, which is required to earn the ENERGY STAR label on commercial buildings.

Some local governments, such as in Denver, Colorado, are ensuring that green buildings achieve superior energy performance by adopting policies that require local government facilities to meet both LEED and ENERGY STAR criteria.

Sources: LEED, 2005; U.S. EPA, 2008l; Denver, 2008.

Some green building environmental features can also have secondary energy-saving benefits. For example, many green buildings incorporate water efficiency measures that reduce water heating energy consumption while conserving a natural resource (U.S. EPA, 2008h). The benefits of green buildings depend upon the environmental features incorporated into the designs, which can depend on the green building rating system (e.g., LEED) and whether the building operates as designed.

PLANNING AND DESIGN APPROACH FOR INCORPORATING ENERGY EFFICIENCY IN GREEN BUILDINGS

When planning and designing for green buildings, local governments can follow the steps outlined in the preceding subsection on improving energy efficiency in local government facilities. Incorporating energy efficiency into green buildings can also include the following actions:

EPA WATERSENSE LABEL

The EPA WaterSense Program label is for products that are independently tested to meet water efficiency and performance criteria. Labeling criteria have been established for plumbing fixtures (toilets, faucets, showerheads, and urinals), new homes, and training programs for irrigation professionals. In general, products that receive the WaterSense label are 20% more water-efficient than conventional products. In addition to conserving water, these products can reduce the amount of energy required to deliver and treat water.

Source: U.S. EPA, 2007a.

- **Ensure that energy efficiency is specifically included in green building policies.** Energy efficiency is a critical element of green building and is a key feature of the design process. Local governments have found that requiring a combination of energy performance tools and green building approaches from the onset can ensure that new and renovated buildings meet both energy performance and environmental criteria. An increasingly common strategy is to use the EPA'S ENERGY STAR platform in conjunction with the LEED rating system for green building design. For more information on incorporating energy efficiency in green building polices, see the text box on page 23.

In Denver, Colorado, the mayor issued an executive order establishing a green building policy for new construction and major renovations of existing and future city-owned and operated buildings. In order to maximize the environmental performance and energy efficiency, the executive order requires municipal buildings be built and certified to at least the LEED-Silver standard, Designed to Earn the ENERGY STAR using Target Finder, and benchmarked with Portfolio Manager (Denver, 2008).

- **Use energy efficiency investments to reduce the cost of using renewable energy sources.** Many local governments are improving the environmental profile of their green buildings by incorporating on-site renewable energy generation systems into building designs. These systems, however, can have a high upfront cost. Many local governments have found that reducing energy consumption in green buildings through energy efficiency allows them to meet their renewable energy goals with smaller and less expensive generation systems. In addition, the energy cost savings from energy efficiency investments can be used to offset the cost premiums of using renewable energy sources. For more information on using on-site renewable energy generation systems, see EPA's On-site Renewable Energy Generation guide in the Local Government Climate and Energy Strategy Series.

INCORPORATING ENERGY EFFICIENCY INTO GREEN BUILDING POLICIES

Energy efficiency can be incorporated into green building policies in different ways, depending on the green building rating system used. Local governments can take the following steps to incorporate energy efficiency into green building policies.

LEED for Existing Buildings (LEED-EB)

- Require that the actual energy use of buildings meets aggressive energy performance targets, based on the most energy-efficient existing buildings in the market.
- For building types covered by the Portfolio Manager rating system, the target should be at least 75, the level at which a building is eligible to earn the ENERGY STAR label. This is more stringent than the LEED-EB requirement and will result in greater energy efficiency. See *Develop Whole Building Performance Targets* under Steps 4 and 5 in *Planning and Implementation Strategies for Improving Energy Efficiency in Local Government Facilities* for guidance for building types not covered by Portfolio Manager.
- Strive to achieve the greatest possible quantity of credits in the LEED energy and atmosphere section.
- Once a building has been operating for one year, compare the building's actual performance to the energy target used during the design phase and confirm that the building is eligible for the ENERGY STAR, where available.

LEED for New Construction (LEED-NC)

- Require design teams to meet an aggressive energy performance target, based on the most energy-efficient existing buildings in the market. For building types covered by EPA's ENERGY STAR Target Finder, the target should be at least 75, the level at which a building is "Designed to Earn the ENERGY STAR." See *Develop Whole Building Performance Targets* under Steps 4 and 5 in *Planning and Implementation Strategies for Improving Energy Efficiency in Local Government Facilities* for guidance for building types not covered by Target Finder.
- Strive to achieve the greatest possible quantity of credits in the LEED energy and atmosphere section.
- Once a building has been operating for one year, compare the building's actual performance to the energy target used during the design phase and confirm that building is eligible for the ENERGY STAR, where available.

Green Globes Rating System for New Buildings or Significant Renovation

- Strive to achieve the highest possible rating using the Green Globes rating system, which requires new building designs to achieve a rating of 75 (to be eligible for the ENERGY STAR) or better using EPA's ENERGY STAR Target Finder. See *Develop Whole Building Performance Targets* under Steps 4 and 5 in *Planning and Implementation Strategies for Improving Energy Efficiency in Local Government Facilities* for more detailed guidance and strategies for building types not covered by Target Finder.
- Once a building has been operating for one year, compare the building's actual performance to the energy target used during the design phase and confirm that the building is eligible for the ENERGY STAR, where available.

Sources: LEED, 2005; LEED, 2007; U.S. EPA, 2008l; Green Globes, 2008.

ENERGY-EFFICIENT DESIGN VERSUS PERFORMANCE

While using design standards can be helpful for implementing energy efficiency measures in new and renovated buildings, not all design standards guarantee energy-efficient performance. For instance, facilities designed to exceed building energy codes will not necessarily achieve superior energy efficiency, since codes prescribe minimum design criteria for certain facility components but do not predict whole building energy performance. Studies have shown that exceeding building codes is not a guarantee of future energy performance.

Source: U.S. EPA, 2006c.

- **Include requirements for third-party verification of energy performance.** Third-party verification is an important step towards ensuring that green buildings are energy-efficient. While some green building certification only considers a building's design, third-party verification of energy performance can determine whether a building is performing as intended. A number of local governments have included provisions in their green building policies requiring third-party verification to confirm that, once they become operational, buildings meet the energy performance targets established during the planning and design phases. Local governments can obtain third-party verification from a number of sources, including ESCOs and energy service providers.9

- **Consider conducting a demonstration project.** When resources and/or support for implementing a green building policy for local government facilities are limited, local governments can develop a single green building to serve as a demonstration project. These projects can be used to showcase the energy efficiency and environmental benefits of green buildings, while helping to make the case for implementing a portfolio-wide green building approach as additional support and/or resources become available.

9 *See http://www.energystar.gov/index.cfm?c=spp_res.pt_spps for a directory of energy service and product providers.*

Energy Efficiency in Local Government Operations

Many local governments are expanding the scope of their energy efficiency activities to target opportunities to improve energy efficiency in operations that occur outside local government facilities. These opportunities include:

- **Energy-efficient landscaping.** Local governments can achieve building energy load reductions by landscaping for energy efficiency. According to the Lawrence Berkeley National Laboratory (LBNL), peak energy demand for air conditioning increases by 1.5 to 2 percent for every 1°F increase in temperature in cities with populations of 100,000 or more (Akbari et al., 1992). Planting trees and vegetation can significantly reduce building energy consumption by blocking unwanted sun in the summer, allowing sun in the winter, and providing a winter wind shield.

Research by LBNL through the EPA Urban Heat Island Pilot Project found that potential energy cost savings from energy-efficient landscaping and other heat island reduction measures in Salt Lake City, Utah; Baton Rouge, Louisiana; and Sacramento, California, could reach $4 million, $15 million, and $26 million, respectively (Konopacki and Akbari, 2000).

ANN ARBOR, MICHIGAN—LED STREET LIGHTING

Approximately 25 percent of Ann Arbor, Michigan's, energy budget has historically been spent on traffic signals and street lighting (8 percent and 92 percent, respectively). In its 2005-2006 budget, the city established a moratorium on new street lights to reduce energy costs.

The city began saving $49,000 annually in energy costs from installing LED fixtures in traffic and cross-walk signals beginning in 2000. Building on this experience and the success of a pilot project to test LED streetlights on one city block, the city is in the process of equipping all 1,000 downtown streetlights with energy-efficient LED fixtures. This measure, which is expected to reduce street lighting energy costs by $100,000 annually, is funded in part through a grant from the Ann Arbor Downtown Development Authority.

Source: Ann Arbor, 2008.

- **Energy-efficient street lighting.** Many local governments are retrofitting street lights with energy-efficient equipment that reduces energy, maintenance, and procurement costs, since the fixtures use less energy and require less frequent maintenance and replacement. Using energy-efficient lamps and proper fixture spacing can also reduce local government capital costs by requiring fewer lighting poles and lamps. In addition, replacing inefficient lamps with energy-efficient ones can often result in reduced glare and improved visibility (NYSERDA, 2002).

Medford, Massachusetts, has worked with its utility to convert the city's old mercury vapor lamps to high-pressure sodium ones, which are 32 percent more efficient (NCS, 2007).

KEENE, NEW HAMPSHIRE—LED TRAFFIC SIGNALS

Keene, New Hampshire, is implementing measures to reduce energy consumption and GHG emissions to meet the goals of the ICLEI Cities for Climate Protection campaign. It has replaced inefficient traffic signals with energy-efficient LEDs at a cost of $29,000. The town continues to achieve energy cost savings of nearly $4,000 annually. A $10,000 rebate from the local utility reduced the cost, enabling the town to achieve a payback period of five years. The energy savings translate into 15 tons of CO_2 emissions avoided each year, an amount equal to what 11 acres of pine or fir forests can sequester in one year.

Sources: CACP, 2007; U.S. CTC, 2007.

- **Energy-efficient traffic signals.** Many local governments are reducing energy costs by replacing conventional traffic signals with energy-efficient light-emitting diode (LED) traffic signals. Traffic signals that use LEDs typically consume 80 to 90 percent less energy than conventional traffic signals, and because traffic signals operate continuously, LED traffic signals can reduce peak energy demand. In addition, LED traffic lights can have safety and maintenance benefits because they are less likely to burn out than conventional lights (CEE, 2007).

Retrofitting 380 traffic signals in Clackamas County, Oregon, has produced annual energy savings of $10,000, which will offset the costs of the measure within four years (NACo, 2007b).

- **Exterior signage.** Exterior signage, such as signs with programmable, automatically changing messages, can be selected based on energy efficiency. Some exterior signs operate on LEDs, making them significantly more efficient than conventional signs (Flex Your Power, 2008).

In Seattle, Washington, the municipally owned utility has offered bonuses to local businesses that use LEDs in exterior programmable signs (Seattle, 2007).

4. KEY PARTICIPANTS

Local governments are working with a range of participants to plan and implement programs to improve energy efficiency in their facilities and operations. This section provides information on the types of participants who are involved in local government efforts to improve energy efficiency in facilities and operations, and includes descriptions and examples of how each can contribute unique authority or expertise.

- **Mayor or county executives.** Local government executives can provide key support for an energy efficiency program by mobilizing resources and ensuring program visibility. Many local government executives have appointed local energy committee members to provide guidance on improving energy efficiency in local government facilities and operations.

In an effort to make Milwaukee, Wisconsin, the "greenest city" in the country, the mayor established the Milwaukee Green Team and directed Team workgroups to provide recommendations on cost-effective opportunities for improving energy efficiency, reducing environmental impacts, and creating jobs (Milwaukee, 2005).

ATLANTA ENERGY CONSERVATION POLICY

In 2002, the Atlanta city council initiated the Energy Efficiency Project to reduce energy consumption in city facilities. A comprehensive audit in 2003 revealed potential energy cost savings of approximately $455,000 in 2003 and $367,000 in 2004 and subsequent years. Following this audit, the city's chief operating officer drafted a memo that established a goal of reducing city government energy consumption by 10 percent by 2010 (based on 2001 levels).

Source: Atlanta, 2007.

- **City or county councils.** In many local governments, the city or county council must approve energy efficiency improvements, especially if substantial funding or a change to existing policies or codes is required. In addition, many city and county councils have initiated energy efficiency improvements by establishing policies that require departments to reduce energy consumption. Many local government legislative bodies have passed resolutions to participate in regional, national, and international campaigns to improve energy efficiency and reduce impacts on the climate.

In 2007, the city council of Santa Barbara, California, adopted an energy ordinance that requires local government facilities to be designed to be 10 percent more energy efficient than required by the state building energy efficiency standards, which already exceed national standards by about 20 percent (Santa Barbara, 2007).

- **Energy and environment staff.** Staff who work in energy- and environment-related local offices can offer unique expertise that facilitates the implementation of a range of energy efficiency activities, such as identifying priority investments and evaluating the impacts of energy efficiency improvements.

Arapahoe County, Colorado, hired an energy conservation manager and established an energy efficiency team to support its involvement in the ENERGY STAR Challenge and create an energy-conscious culture in the county through education, awareness, and accountability. Using ENERGY STAR resources and tools, such as Portfolio Manager, the team has earned the ENERGY STAR for eight of the county's facilities since 2007. One administration building has reduced its energy consumption by almost 30 percent, and an energy performance contract for nine of the county's buildings achieved verified savings of more than $900,000 in the first contract year (Arapahoe County, 2009).

ENERGY EFFICIENCY CHAMPIONS

Many local government agencies do not have staff members assigned specifically to energy efficiency activities or have staff simultaneously assigned to multiple programs. Some local governments have found that identifying an energy efficiency "champion" can help ensure that energy efficiency activities are implemented within each department. In Atlanta, Georgia, a coordinator is appointed from each department to oversee implementation of the Energy Conservation Program.

Source: Atlanta, 2007.

Some local governments have designated an energy manager to coordinate energy efficiency activities, often as part of a comprehensive clean energy program. This person is often appointed to monitor government energy consumption, identify opportunities for improvement, and engage the private sector in energy efficiency initiatives.

Waitsfield, Vermont's, energy coordinator sits on the town energy committee, works with the town planning commission to include energy policies in the town comprehensive plan, oversees energy audits of local government facilities, and coordinates energy efficiency upgrades (Waitsfield, 2007).

- **Local planners.** How and where communities are developed has a significant impact on eventual energy consumption. Planners, who are responsible for creating the plans that determine how and where development occurs, often serve as advisors to the policy makers who develop local energy efficiency policies. Planners can directly affect local energy consumption through developing energy-efficient building standards, enforcing local ordinances, and developing long-term plans that address clean energy and climate action issues, including energy efficiency in local government facilities and operations.

In March 2007, the Epping, New Hampshire, planning board presented an *Energy Efficiency and Sustainable Design Ordinance* at a town hall meeting. The ordinance, which was passed by voters, establishes energy efficiency design requirements for commercial and government building envelopes, HVAC systems, and other operational features (e.g., lighting systems) (Epping, 2007).

- **Facility management teams.** Many local governments rely on facility management teams to ensure that energy efficiency improvements continue to produce results, since these individuals have considerable hands-on experience with energy-using equipment and are well positioned to operate and maintain equipment and facilities for energy efficiency. Some local governments provide training to these teams to assist them in maintaining and operating equipment and systems in an energy-efficient manner (U.S. EPA, 2008f).

Madison, Wisconsin, adopted city sustainability guidelines that include a requirement that facility managers be trained in building commissioning (Madison, 2005).

Flower Mound, Texas, has developed a guide to assist its Facility Management Division in meeting the town's energy conservation goals (Flower Mound, 2002).

In 2008, the Public Works Facilities Maintenance team in Charlottesville, Virginia, conducted an energy audit of local government and school district facilities. The team used this audit to develop a set of recommendations for the city to incorporate into an energy performance contract with a qualified ESCO. The projects included in the performance contract (which was completed in October 2008) encompassed 22 municipal buildings and are expected to produce annual energy cost savings of nearly $220,000 (Charlottesville, 2008).

- **Other local governments and regional entities.** Some local governments have enhanced the effectiveness and public awareness of their energy efficiency programs by working with other local governments and regional entities. Such partnerships allow local governments to compare approaches and benefits and share information on potential barriers to implementation.

The Denver-area Metro Mayors Caucus signed a memorandum of understanding pledging to work together to reduce energy consumption in local government facilities and operations, promote energy efficiency and conservation for businesses and residences, and increase public awareness of clean energy (Metro Mayors Caucus, 2006).

- **State energy offices.** Many local governments have borrowed from state government experience in planning and implementing energy efficiency programs and often receive technical and financial assistance from states (U.S. EPA, 2006a).

In Nampa, Idaho, local elected officials worked with the Idaho Energy Division to retro-commission the city hall, which was built in 1980. The Energy Division contracted with an ESCO to have the facility retro-commissioned, and arranged to have the cost of the project paid for through the Northwest Energy Efficiency Alliance's Commissioning in Public Buildings Project. The project produced annual energy cost savings of approximately $17,000 (PECI, 2007).

- **Utilities and other energy efficiency program administrators.** Many local governments have partnered with investor-owned utilities and other energy efficiency program administrators (e.g., independent or non-profit energy services providers) to obtain technical assistance for facility managers and building design teams and also to take advantage of energy efficiency rebates and incentives that many of these utilities offer.

  In California, the three largest investor-owned utilities are required by law to include a system benefits charge on ratepayers' bills to fund energy efficiency programs that provide assistance to local governments and customers (California, 2007).

  In New York City, local government agencies have worked with an energy efficiency program administered by the state-owned New York Power Authority to improve energy efficiency in local government facilities. The utility offers the city low-cost financing on energy performance contracts and provides technical assistance on specific projects. The cumulative savings from this program exceed $14 million across more than 160 projects throughout the city (New York City, 2004).

  In addition, a number of local governments own and manage municipal utilities that are responsive to local customer interests rather than stakeholders' interests. In some cases, as in Ashland, Oregon, municipally owned utilities are required by local law to support local clean energy activities (Ashland, 2007).

- **Energy service companies (ESCOs).** Many local governments have contracted with ESCOs to conduct energy audits and perform energy efficiency upgrades on a performance-contracting basis. Under a performance contract, local governments can often avoid using capital budgets to pay for the upfront costs of energy efficiency improvements, which are paid for over time using energy cost savings. For more information on energy performance contracts, see Section.7, *Investment and Financing Opportunities*.

  Tyler, Texas, entered into a performance contract with an ESCO to upgrade city traffic signals, implement water efficiency measures, and retrofit the city's 29 facilities (including lighting system retrofits, energy management system installations in the city's major offices, and air conditioning unit replacements). Within three years these investments produced a combined savings and increased revenues that exceeded the goal of $2.3 million (Johnson Controls, 2008).

- **Non-profit organizations.** A number of local governments have partnered with non-profit organizations to plan and implement energy efficiency projects in their facilities and operations. These organizations can offer local governments technical and financial assistance and can direct them to information resources.

  The Greener Hopkinton Committee in Hopkinton, New Hampshire, performed an initial energy performance assessment of several town facilities using Portfolio Manager. The town will be working with the Jordan Institute, a non-profit organization that focuses on promoting clean energy, to identify potential energy efficiency investments to reduce the town's energy expenditures. The non-profit recently entered into a project with the New Hampshire Office of Energy and Planning to create a revolving loan fund for energy efficiency projects in all sectors (initially starting with school districts and local governments) using grant money from DOE (Hopkinton, 2008; Jordan Institute, 2008).

5. FOUNDATIONS FOR PROGRAM DEVELOPMENT

Local governments have employed a variety of mechanisms to initiate programs for improving energy efficiency in their facilities and operations. This section provides information on a range of these mechanisms, including descriptions and examples of how participants have used different types of mechanisms to motivate the creation or development of energy efficiency programs and policies.

- **Mayor or executive initiatives.** Mayors and county executives can have a great deal of influence over the creation and development of energy efficiency programs. Many local government executives have initiated energy efficiency programs through executive orders and policy agendas.

CHICAGO, ILLINOIS—MAYOR'S AGENDA

The Mayor of Chicago announced his first Environmental Action Agenda in 2005, committing the city to a number of energy and environmental goals. The 2006 Agenda highlights nearly 200 achievements since 2005, including:

- Incorporating building energy management systems in all new buildings.
- Commissioning four existing facilities.
- Using the LEED rating system for all new city facilities, including 22 LEED certifications.
- Installing green or reflective roofs on all facilities undergoing roof repairs.

Overall, the city has conducted energy efficiency retrofits for more than 15 million square feet of public facilities, including the city housing and transit authorities, city colleges, and the city's public libraries—the equivalent of three Sears Towers.

When finished, the project should save $6 million annually and eliminate 30,000 tons of CO_2 from entering the atmosphere.

Source: WERF, 2009.

In Lansing, Michigan, the mayor issued an executive order that directed the city to improve energy efficiency at the city hall and required all city departments to power-down non-essential electricity use in all city buildings during non-business hours (Lansing, 2006).

- **Local government resolutions.** Many city or county councils have initiated energy efficiency policies via resolutions or bills. City councils in a number of local governments, such as Baltimore, Maryland; Philadelphia, Pennsylvania; and Salt Lake City, Utah, have established policies requiring that new buildings and major renovations be designed in accordance with specific energy efficiency performance standards (Baltimore, 2007; Philadelphia, 2008; Salt Lake City, 2005).

Madison, Wisconsin, used a city council resolution to adopt The Natural Step, a sustainable development method that promotes energy efficiency. The resolution also requires that staff be trained in how to implement The Natural Step and how to commission facilities (Madison, 2005).

- **Local government planning processes.** Many cities and counties have developed energy plans that guide decision making on energy-related issues. These plans often include recommendations or requirements to improve energy efficiency in local government facilities and operations. Other local governments, such as Boulder, Colorado, have incorporated energy efficiency components into climate change action plans (Boulder, 2006). Local governments have also used other planning documents, such as land use, transportation, and waste management plans, as vehicles for establishing energy efficiency goals in their facilities and operations.

Concord, Massachusetts, developed a Comprehensive Sustainable Energy Plan that proposed recommendations based on model energy efficiency programs in other local governments (Concord, 2007).

- **Zoning ordinances.** Zoning ordinances determine how and where development can occur. Incorporating energy efficiency as a priority into the zoning process can lead to improved energy efficiency in community design plans. A number of local governments have adopted ordinances that mandate energy-efficient street lighting and require buildings to meet specific energy performance and environmental design criteria.

GREENSBURG, KANSAS—MASTER PLAN

In 2007, Greensburg, Kansas, developed a master plan to rebuild the city after a tornado destroyed more than 90 percent of the buildings and infrastructure. In the plan, the town committed to a comprehensive green approach to rebuilding that focused on energy efficiency, renewable energy, and sustainable design.

The master plan includes recommendations for reexamining the city's preexisting permitting processes, zoning ordinances, and building codes. Potential policy barriers to more energy efficient building strategies will be reevaluated and opportunities for implementing incentives will be explored.

Greenburg's master plan has become a model for building a green city from the ground up. The town has been highlighted in the National Building Museum in Washington, D.C., as part of the "Green Community: How We Plan, Design, and Construct the World Between Our Buildings" exhibit as a model for building and maintaining a sustainable community.

Sources: Greensburg, 2008; BNIM, 2008a; BNIM, 2008b; BNIM, 2008c.

White Lake Township, Michigan, has included specifications for energy-efficient fixtures for street lighting in amendments to zoning ordinances (White Lake, 2008).

6. STRATEGIES FOR EFFECTIVE PROGRAM IMPLEMENTATION

Local governments have significant opportunities to promote energy efficiency by investing in their own facilities, promoting participation by community members and constituents, and using their "bully pulpit" to act as a valuable educator and outreach coordinator for spreading the positive message about the benefits of energy efficiency. Inherent advantages, however, do not preclude numerous barriers from potentially hindering effective implementation of all types of energy efficiency programs. Barriers can be overcome by considering and employing several useful strategies, such as:

- **Engage management.** Enforcing the benefits of energy efficiency through life-cycle cost analysis, building an experienced interagency team, and creating a well-defined energy policy or plan can help secure support from elected officials and local government agency managers.

- **Provide adequate information.** ENERGY STAR offers many information resources and case studies for local governments interested in implementing energy efficiency initiatives (U.S. EPA and U.S. DOE, 2008b).

- **Utilize measurement tools and methodologies.** Setting up an energy efficiency program can be daunting, especially for local governments that are making decisions on behalf of their constituents. Employing effective measurement tools and methodologies can address this barrier and help make the case to begin or expand energy efficiency programming. ENERGY STAR offers a number of resources that can help measure progress, including Portfolio Manager for buildings, which allows building managers to track upgrades and energy savings resulting from those upgrades.

- **Pursue creative financing options.** Local governments, in contrast to the private sector, often have less access to creative financing structures and mechanisms such as performance contracting (National Action Plan for Energy Efficiency, 2008), and often face limitations for use of public funds. However, several funding vehicles and opportunities exist, such as energy performance contracts, lease-purchase agreements, public bonds, or utility-based incentives, and are outlined under Financing on page 36–40 (Section 7).

- **Develop political consensus.** Local government decisions are often subject to consensus and therefore can run into barriers brought on by differing opinions or political perspectives, which can in turn prolong the development or adoption of an energy efficiency program. However, by incorporating energy efficiency goals into preexisting related initiatives, local governments can avoid some of the difficulties associated with building political consensus.

Once a local government has initiated a program for improving energy efficiency in its facilities and operations (see Section 5, *Foundations for Program Development*), it can use a number of specific implementation strategies to strengthen the program and address the barriers identified above. These strategies can serve two purposes:

- Developing the energy efficiency program to enhance its effectiveness, and
- Engaging the community to leverage additional resources and increase program visibility.

Strategies to help overcome financial obstacles are discussed in Section 7, *Investment and Financing Opportunities*.

Strategies for Developing the Energy Efficiency Program

This subsection describes implementation strategies that local governments have used to develop and enhance the benefits of their energy efficiency programs after they have been initiated. These strategies are similar to those involved in planning and designing the program (see Section 3, *Planning and Design Approaches to Energy Efficiency in Local Government Operations*). For example, when planning and designing energy efficiency improvements in local government facilities, it is important to use a team approach to develop an energy policy and to create an action plan. Similarly, when implementing the program for improving energy efficiency in local government facilities, it is important to use a team approach to guide the continual development, refinement, and successful execution of the program.

- **Coordinate energy efficiency programs with climate change goals.** Many local governments are taking active roles in developing climate policy by committing to reduce GHG emissions. Incorporating energy efficiency activities into their climate policies can help local governments meet their GHG emission reduction commitments and often reduce the costs of doing so. In addition, by making the link between climate change and energy efficiency, local governments are in a better position to gain support for both programs.
- **Integrate energy efficiency upgrades with other clean energy objectives.** Local governments have enhanced the benefits of overall clean energy programs by integrating energy efficiency with other clean energy activities, such as green power purchases. Integrating energy efficiency with other clean energy activities can help local governments increase the visibility of their clean energy activities and can increase the cost-effectiveness of an overall clean energy program by leveraging interactions between activities. For example, local governments can improve the energy and environmental profile of their electricity supply by using the continuing energy cost savings from energy efficiency upgrades to purchase larger percentages of their electricity from green power sources, once the initial costs of the upgrade are recovered. Combining clean energy activities in this manner can lead to increased political support for activities that require a larger upfront investment. For more information on how local governments have planned and implemented green power purchases, see EPA's *Green Power Procurement* guide in the *Local Government Climate and Energy Strategy Series*.

Story County, Iowa, was able to recover the cost of installing geothermal energy storage equipment at a new facility within five years by coupling the installation with technical energy efficiency measures, including lighting upgrades, water heater retrofits, and window glazing. Aggregate energy cost savings over the first five years of the building's operation were greater than $200,000, which exceeded the cost of purchasing and installing the geothermal equipment by $25,000 (Story County, 2007).

- **Train staff to ensure energy efficiency improvements are sustained.** A number of local governments coordinate training sessions for agency employees and facility maintenance teams. These sessions can be conducted by the local government, or by external organizations, such as EPA's ENERGY STAR program. ENERGY STAR offers free online training sessions for local governments on a range of topics, including *Promoting Energy Efficiency in Your Community* and *ENERGY STAR and the LEED Rating System* (U.S. EPA, 2008m).[10]

[10] *See http://www.energystar.gov/index.cfm?c=government.bus_government_local_training for more information.*

- **Use a team approach to continually improve the energy efficiency program.** Building a team of individuals with diverse areas of expertise can be a critical step in implementing and continually developing a successful energy efficiency program.

Many local governments, such as Medford, Massachusetts, have established scoping teams or energy efficiency advisory committees, to create a forum for discussion to guide decision-making related to existing energy efficiency programs. Medford's team members come from a number of backgrounds, including a meteorologist, a public relations professional, an IT manager, a utility professional, teachers, students, and a community organizer, a representative diversity that helps the team plan with most sectors of the community in mind. To date, the committee has aided in the installation of a wind turbine at an elementary school, which provides 10 percent of the school's power needs, and solar panels for city hall; plans are underway for the installation of an additional $100,000 in solar panels for city property (Medford Clean Energy Committee, 2008).

Strategies for Engaging the Community

Local governments have also used implementation strategies that engage the community, the private sector, and other potential partners. Engaging multiple constituent groups serves to broaden the reach of the program message and participation, as well as access to ideas and tools. To help facilitate these partnerships, EPA has developed a Web site that provides information on how school districts, local governments, and other organizations can leverage community resources to support energy efficiency programs and promote energy efficiency.11 The Web site outlines a five-step process for engaging the community. In addition, it provides examples and information resources, including a fact sheet on examples of community-wide ENERGY STAR events and key strategies for working with different types of groups within the community (U.S. EPA, 2008n).

Local governments can gain access to additional resources and increase the visibility of their programs for improving energy efficiency by using some of the following strategies:

- **Achieve more cost-effective energy efficiency improvements by increasing economies of scale in purchasing.** Making small-scale or piecemeal energy efficiency upgrades can be beneficial, but may impose higher upfront costs on local governments. Working together with nearby cities, towns, and counties to aggregate purchases can reduce costs through bulk discounts. Partnering can also create a network of colleagues for the exchange of ideas and best practices while helping to coordinate local and regional goals and policies.

- **Advance energy efficiency in the private sector.** Local governments have generated community-wide benefits by extending the scope of their energy efficiency activities beyond their own facilities and operations to assist local businesses and residents in improving energy efficiency in their buildings. Programs for advancing energy efficiency in the private sector can include mandatory energy efficiency criteria for new buildings, expedited review as an incentive for energy-efficient development, and direct financial incentives for incorporating energy efficiency in facility design. Many local governments offer such financial incentives for energy efficiency investments, including rebates, low-interest loans, and fee waivers.

The city council in West Chester, Pennsylvania, unanimously voted to adopt a resolution that requires new commercial buildings higher than 45 feet to be designed to achieve the ENERGY STAR and to achieve the ENERGY STAR after one year of operation (West Chester, 2008).

11 *See http://www.energystar.gov/index.cfm?fuseaction=challenge_community.showIntroduction for more information.*

The county council in Montgomery County, Maryland, passed a resolution in 2008 requiring that beginning in 2010, all newly constructed single-family residences and all multi-family residences that are eligible to earn the ENERGY STAR score must achieve this score and be certified by a qualified home energy performance rater. The resolution also directs a Sustainability Working Group to evaluate and report on options for incentives to assist local residents and businesses improve energy efficiency (Montgomery County, 2008).

Asheville, North Carolina, waives permit and plan fees for buildings that meet certain renewable energy and energy efficiency criteria, including a $100 waiver for residential new homes that are ENERGY STAR labeled (DSIRE, 2007).

MASSACHUSETTS COMMUNITIES COMPETE TO CONSERVE ENERGY

In 2007, four Massachusetts towns competed as part of ENERGY STAR's "Change a Light, Change the World" campaign. The competition pitted the towns of Rowley and Georgetown against Groveland and Merrimac. Each of the towns' municipally-owned electric departments encouraged local businesses and residents to pledge to replace inefficient light bulbs with energy-efficient ones. One town, for example, gained 75 pledges for a total of 402 bulbs replaced, translating to more than $7,000 in annual energy savings.

Source: MMA, 2007.

- **Communicate the benefits of energy efficiency to the public.** Effective communication helps engage and educate local businesses and residents about energy efficiency, which can lead to broader adoption of energy-efficient practices. Local governments have reached out to businesses and residents using a variety of strategies, including information sessions and by challenging the public to meet community-wide goals.

  When the city council of Missoula, Montana, adopted an energy efficiency policy for new municipal construction, it included directions on communicating the benefits of improving energy efficiency to the community by posting the results of a municipal energy audit on its Web site and using a variety of communications media to explain the reasons for the city's investment in energy efficiency (Missoula, 2007).

- **Join regional, national, or international efforts.** A number of local governments have joined regional, national, and international efforts to improve energy efficiency and reduce GHG emissions. For example, the International Council for Local Environmental Initiatives (ICLEI) Cities for Climate Protection campaign encourages local governments to reduce energy consumption to achieve GHG emission reduction goals and provides local governments with information and resources to do so (ICLEI, 2008a).

ARLINGTON COUNTY, VIRGINIA—SHORT PAYBACK PERIODS ON ENERGY EFFICIENCY INVESTMENTS

Through its Arlington Initiative to Reduce Emissions (AIRE) program, Arlington County, Virginia, is generating significant energy cost savings by investing in energy efficiency in its facilities and operations. On average, the county's investments in energy efficiency are paid back in five years. However, many of its investments have had high returns on investment, leading to shorter payback periods. For example, the county implemented a $500 energy efficiency project in one of its warehouses in 2006 that produced annual energy cost savings of $10,000. In addition, a $6,000 lighting system retrofit at a teen detention facility is producing energy cost savings of $4,000 annually (resulting in a payback period of less than two years).

Source: Arlington, 2007b.

More than 200 local governments have adopted the ENERGY STAR Challenge to improve energy efficiency in their buildings by at least 10 percent. The *ENERGY STAR Challenge—Build a Better World 10% at a Time* campaign calls on governments, schools, and businesses across the country to identify energy efficiency measures in their facilities and improve energy efficiency by 10 percent or more. EPA estimates that if each building owner accepts this challenge, by 2015 Americans would save about $10 billion and reduce GHG emissions by more than 20 million metric tons of carbon equivalent—equivalent to the emissions from 15 million vehicles (U.S. EPA, 2008i).

- **Work with neighboring local governments.** Some local governments have increased the visibility of their energy efficiency programs and encouraged broader adoption of energy-efficient practices in the private sector by collaborating with neighboring local governments to leverage public awareness.

Ten local governments in Vermont and the Upper Valley region of New Hampshire formed "town energy committees" that network to share information about local efforts to reduce energy consumption (SERG, 2008).

In the Washington, D.C., area, local governments are collaborating with businesses and residents to improve energy efficiency as part of the Energy Efficiency Partnership of Greater Washington (Washington, 2007).

7. INVESTMENT AND FINANCING OPPORTUNITIES

This section provides information on the size and payback periods associated with upfront investments in energy efficiency improvements in local government facilities and operations. It also identifies several financing opportunities that can help local governments manage the costs of these investments.

Investment

Improving energy efficiency in local government facilities and operations is an investment that earns a return over time. The size and payback period (the length of time required to recoup upfront costs) of this investment varies depending on the extensiveness of the upgrade and the resources required. While some energy efficiency improvements require substantial upfront investment, the costs can often be quickly recovered. Life-cycle cost analysis, which measures the lifetime costs of design and construction, maintenance and replacement, and other environmental impacts, reveals the cost-effectiveness of energy efficiency upgrades. For more information on life-cycle cost analysis, see Section 3, *Planning and Design Approaches to Energy Efficiency in Local Government Operations*.

Life-cycle cost analyses can reveal short payback periods for many energy efficiency investments. Incorporating investments with short payback periods into a comprehensive energy efficiency upgrade can help reduce the overall payback period for the entire project. For example, the third stage of the approach for upgrading facilities described in Section.3 involves reducing supplemental loads by purchasing energy-efficient products. Purchasing these products, which have short payback periods, can generate significant energy cost savings that can shorten the payback period for the building upgrade as a whole. Similarly, behavioral adjustments such as setting thermostats at lower temperatures in the winter can often be implemented at no cost yet produce significant savings and reduce the payback period of a comprehensive upgrade. Other measures, such as caulking or sealing seams in building envelopes, can be implemented at a low cost yet produce substantial savings. Larger retrofits, such as HVAC system replacement or complete lighting system upgrades, have higher initial costs but can be cost-effective over the life of the investment. Table 3, *ENERGY STAR Specification Overviews: Energy Savings and Payback Periods*, illustrates the payback periods for a variety of energy-efficient commercial-capacity products.

In 2001, Kings County, California, was able to reduce its typical peak energy costs by 10 percent by altering its summer operating schedule to 7 a.m. to 4 p.m. for three months (Flex Your Power, 2003).

In addition, using a staged approach to improve energy efficiency (as described in Section 3) can sometimes minimize investment costs. Purchasing low-cost energy-efficient products to reduce energy loads, for example, can mean that energy savings goals can be met using smaller energy-efficient building systems (e.g., HVAC systems), which can reduce the purchase and installation costs of the system (U.S. EPA, 2008g).

TABLE 3. ENERGY STAR SPECIFICATION OVERVIEWS: ENERGY SAVINGS AND PAYBACK PERIODS[a]

Product Category	Energy Savings Compared to Conventional Product	Payback Period
Appliances		
Dehumidifiers	15%	0 years (typically no retail cost premium)
Dishwashers	30%	2 years
Refrigerators and freezers	20% (refrigerators) 10% (freezers)	3 years
Room air cleaners	40%	0 years (typically no retail cost premium)
Room air conditioners	10%	Varies regionally
Commercial Food Service		
Commercial fryers	5% (electric) 30% (gas)	<3 years
Commercial hot food holding cabinets	65%	<5 years
Electronics		
Battery charging systems	30%	0 years (typically no retail cost premium)
Combination units	60%	0 years (typically no retail cost premium)
Cordless phones	55%	0 years (typically no retail cost premium)
DVD products	35%	0 years (typically no retail cost premium)
External power adapters	5%	0 years (typically no retail cost premium)
Televisions	15%	0 years (typically no retail cost premium)
Envelope		
Roof products	NA	0 years (typically no retail cost premium)
Windows, doors, and skylights	7-24%	Varies regionally
Lighting		
Compact fluorescent lamps	75%	<1 year
Heating and Cooling		
Air source heat pumps	10%	Varies regionally
Boilers	5%	< 5 year
Ceiling fans	45% (with light kit) 10% (fan only)	< 4 years
Furnaces	15% (gas) 8% (oil)	< 5 years

TABLE 3 ENERGY STAR SPECIFICATION OVERVIEWS: ENERGY SAVINGS AND PAYBACK PERIODS[a] *(cont.)*

Product Category	Energy Savings Compared to Conventional Product	Payback Period
Geothermal heat pumps	30%	Varies regionally
Light commercial HVAC	5%	Varies regionally
Ventilating fans	70%	0 years (typically no retail cost premium)
Other		
Water coolers	45%	0 years (typically no retail cost premium)
Vending machines	40%	0 years (typically no retail cost premium)

[a] ENERGY STAR develops performance-based specifications to determine the most energy-efficient products in a particular product category. These specifications, which are used as the basis for ENERGY STAR qualification, are developed using a systematic process that relies on market, engineering, and pollution savings research and input from industry stakeholders. Specifications are revised periodically to be more stringent, which has the effect of increasing overall market energy efficiency (U.S. EPA, 2007b). EPA and DOE screen all of the specifications annually to determine if any require reassessment. These assessments may lead to a specification revision, a specification being sunset, or no action being taken depending on market readiness for the next level. To view current ENERGY STAR criteria, please visit *http://www.energystar.gov/index.cfm?c=product_specs.pt_product_specs*. To view specifications that are under review or revision, please visit *http://www.energystar.gov/index.cfm?c=prod_development.prod_development_index*.

Source: U.S. DOE, 2009; U.S. EPA, 2009c.

Financing

Upfront costs can present a barrier to improving energy efficiency in local government facilities and operations. However, delaying cost-effective energy efficiency improvements can also be costly; an activity *not* undertaken can result in increased operating costs. [As described on page 4 in Section 3, *Planning and Design Approaches to Energy Efficiency in Local Government Operations*, local governments can use the ENERGY STAR Cash Flow Opportunity Calculator to help make decisions about the most effective timing of energy-efficient product purchases (U.S. EPA, 2003a)]. This subsection describes a variety of financing vehicles and funding sources that local governments can access to address financial barriers.

COSTS AND SAVINGS OF PERFORMANCE CONTRACTING WITH ESCOs

In 2004, Lawrence Berkeley National Laboratory conducted a study of the growth of ESCOs over the preceding decade.

According to the survey, the average cost of an ESCO-executed energy efficiency upgrade at the state and local government level is approximately $2.93 per square foot, and the average performance contract with an ESCO for state and local governments is approximately 9.5 years. The average project costs $980,000 and produces energy cost savings of approximately 14 kBtu per square foot, which translates into a median payback period of 8.8 years.

Source: LBNL, 2004.

FINANCIAL VEHICLES

Financing refers to accessing new funds through means such as loans, bonds, energy performance contracts, lease-purchase agreements, and grants to pay for energy efficiency upgrades (Zobler and Hatcher, 2008). Financial vehicles can be used to access the sources of funding described in the following subsection to obtain the capital for energy efficiency upgrades. Financial vehicles that local governments use to finance energy efficiency improvements include:

- **Energy performance contracts.** An energy performance contract is an arrangement with an ESCO or energy service provider (ESP) that allows a local government to finance energy-saving capital improvements—usually over a 7–15 year term—with no initial capital investment by using money saved through reduced utility expenditures. Energy performance contracts bundle energy-saving investments (e.g., energy audits, design and specification of new equipment, ongoing maintenance, measurement and verification of product performance, indoor air quality management, and personnel training) and typically offer financing (Zobler and Hatcher, 2008).

AMHERST, NEW YORK: WORKING WITH ESCOS

Amherst, New York, which has an electricity budget of $2.7 million and a total operating budget of $100 million, used an energy performance contract to implement energy efficiency upgrades in a number of its facilities.

The town entered into a guaranteed savings agreement with an ESCO that maximized the amount of new equipment that could be purchased from the energy savings. The result was a $5.2 million project that included the city's ice skating rinks, police station, three community and recreational centers, four libraries, a museum, and the local wastewater treatment facility. The ESCO guaranteed $5 million in savings on these projects. The actual savings exceeded projected savings by 16%.

Source: U.S. EPA, 2004.

An ESCO often provides a guarantee that energy cost savings will meet or exceed annual payments covering all activity costs. Such guaranteed savings agreements are the most common type of performance contract in the public sector.[12] If the savings do not occur, the ESCO pays the difference. Some performance contracts include a reserve fund to cover potential shortfalls, while others provide security enhancements in the form of performance bonds or letters of credit. In some instances, performance insurance may be available (Zobler and Hatcher, 2008).

ESCOs often offer financing as part of the performance contract. However, because ESCOs are private sector firms that typically borrow at taxable, commercial rates, it is often possible for a public sector entity to secure better financing arrangements by taking advantage of lower, tax-exempt interest rates available to government entities (U.S. EPA, 2003d).

BUFFALO, NEW YORK—LEASE-PURCHASE AGREEMENT

Buffalo, New York, used a $3.5 million tax-exempt municipal lease-purchase agreement to help finance energy efficiency upgrades to 55 public buildings, including lighting retrofits, installation of high-efficiency motors, HVAC upgrades, and installation of building energy management systems. The investment is expected to produce $6.1 million in energy cost savings over a 15-year period, with a payback period of less than nine years. After just four years, Buffalo is saving more than $600,000 annually in energy costs.

Sources: U.S. DOE, Undated; NASEO, 2002.

Compton, California, entered a performance contract to install energy-efficient equipment in a number of its facilities, including new lighting systems with occupancy sensors, street lighting fixtures, chillers, and energy efficiency management controls. The performance contract, which will be paid for with guaranteed energy efficiency savings, is expected to produce savings of more than $4.4 million over 15 years (Johnson Controls, 2007).

[12] *.Another type of agreement is an own-operate agreement, in which the ESCO maintains ownership of the facility and sells back its output to the state entity.*

Through the Washington State Department of General Administration, Kent, Washington, secured an energy performance contract to retrofit the heating system of one of its buildings and to perform energy efficiency upgrades in its recreational center with no upfront costs (AWC, 2006b).

The Baltimore Public Works Energy Office used energy performance contracts to install LED lights in traffic signals and retrofitted 23 city buildings. The costs for these improvements, estimated to be a combined $11.5 million, are all to be paid from energy cost savings (Baltimore, 2006).

- **Lease-purchase agreements.** A tax-exempt lease-purchase agreement (also known as a municipal lease) allows public entities to finance purchases and installation over long-term periods using operating budget dollars rather than capital budget dollars.

WESTMINSTER, COLORADO—LEASE-PURCHASE AGREEMENT

The city council in Westminster, Colorado, passed a resolution in 2005 that authorized the city to enter into a lease-purchase agreement to purchase and install approximately $2.5 million in energy-efficient equipment in 21 city facilities. The city issued a request for proposals for financing bids for the project and the city was able to settle on a lease-purchase agreement with a low interest rate of 3.79%. The city council considered cash-funding the purchase, but determined that capital improvement budget constraints would mean that the project would have to be implemented piecemeal over 8–12 years.

Source: Westminster, 2005.

Boulder, Colorado, uses operating budget dollars and capital investment plan funds (which are designed to automatically fund upgrades at the end of a piece of equipment's useful life) to pay for energy-efficient equipment purchased through lease-purchase agreements (Colorado Energy, 2007).

Lease-purchase agreements typically include "non-appropriation" language that limits obligations to the current operating budget period. If a local government decides not to appropriate funds for any year throughout the term, the equipment is returned to the lessor and the agreement is terminated. Because of this non-appropriation language, lease-purchase agreements typically do not constitute debt. Under this type of agreement, a local government makes monthly payments to a lessor (often a financial institution) and assumes ownership of the equipment at the end of the lease term, which commonly extends no further than the expected life of the equipment. These payments, which are often less than or equal to the anticipated savings produced by the energy efficiency improvements, include added interest. The interest rates that a local government pays under these agreements are typically lower than the rates under a common lease agreement because a public entity's payments on interest are exempt from federal income tax, meaning the lessor can offer reduced rates (U.S. EPA, 2004).

Unlike bonds, initiating a tax-exempt lease-purchase agreement does not require voter referendum to approve debt, a process that can delay energy efficiency improvements. Tax-exempt lease-purchase agreements typically require only internal approval and an attorney's letter, a process that can often take one week (as opposed to months or years for bonds). Local governments can expedite the process by adding energy efficiency projects to existing tax-exempt lease-purchase agreements. Many local governments have master lease-purchase agreements in place to finance a range of capital investment projects. Energy-efficient product procurement can often be added to these agreements without difficulty (U.S. EPA, 2004). For examples of energy-efficient product procurement by local governments, see EPA's Energy-Efficient Product Procurement guide in the Local Government Climate and Energy Strategy Series.

Shenendehowa Central School District in Clinton Park, New York, faced high energy and maintenance costs in seven aging buildings, due mainly to inefficient equipment. With constrained budgets and a reluctance to approach taxpayers for additional bond financing, the school district chose to obtain funds for energy efficiency upgrades from a commercial lender using a tax-exempt lease-purchase agreement for a period of 10 years. Repayments were limited to operating budget savings, rather than capital budget spending. The agreement allowed the school district to make the necessary upgrades without raising taxes (U.S. EPA, 2004).

In addition, many local governments have found that the interest rates available through tax-exempt lease-purchase agreements are typically lower than the rates offered by an ESCO. Tax-exempt lease-purchase agreements can be especially effective when used to underwrite energy performance contracts that include guaranteed savings agreements, under which an ESCO agrees to reimburse any shortfalls in expected energy cost savings.

TAX-EXEMPT LEASE PURCHASE AGREEMENTS AND ENERGY PERFORMANCE CONTRACTING

The Miami-Dade County Public School District financed energy-efficient equipment installations in its facilities at a reduced cost by adding guaranteed savings energy performance contracts with three ESCOs to an existing tax-exempt master lease-purchase agreement, rather than financing the projects directly through the ESCOs. Through the master lease-purchase agreement, the school district has invested $9.5 million in energy efficiency. The investments produced savings of $3.5 million after just three years.

Sources: U.S. EPA, 2003c; U.S. EPA, 2004.

- **Public bonds.** Bonds are well-suited for energy efficiency projects. Since bonds allow amortization of capital costs over a multi-year repayment term, they recover their costs through energy savings over the life of the project.

Alexandria, Virginia, for example, uses public bonds to supplement its capital budget allocation for its Energy Conservation Fund (U.S. Mayors, 2007). This fund is being used to achieve a goal of reducing energy consumption in local government facilities by three percent per year by 2015, for an overall reduction of 20 percent from 2007 levels (Alexandria, 2008).

- **State government loans, rebates, and other assistance.** Some states, such as Oregon and Maryland, have loan programs to help local governments finance energy efficiency activities (Oregon, 2006; Maryland Energy Administration, 2006). These programs often provide financial assistance to local governments via low-interest loans that can be paid off using energy cost savings. Other states, such as Kansas, help local governments with energy performance contracting and provide financing guidance to local agencies (Kansas Corporation Commission, 2003).

MICHIGAN INCENTIVE FOR ENERGY STAR LABELING

The Michigan Department of Labor & Economic Growth offers an incentive to any public school, college, university, local government, or state or federal agency that has applied for the ENERGY STAR building label. The incentive covers 50 percent of the professional engineer's verification fee for the statement of energy performance, with a maximum incentive of $1,000 for a building's first year of labeling, and a maximum of $500 for a building that renews its label.

Source: Michigan DLEG, undated.

The town of Johnsburg, New York, received technical assistance and a $94,000 incentive from the New York State Energy Research and Development Authority to help pay for energy efficiency improvements in its new community center. The investment has saved the town $24,000 in annual energy costs (NYSERDA, 2007).

For more information on state financial assistance, see Table 4, *Examples of States Providing Technical and Financial Assistance to Local Governments*, on page 43.

- **Utility rebates and other incentives.** A number of local governments have used rebates or other financial assistance from utilities to offset the cost of improving energy efficiency in their facilities. The Database of State Incentives for Renewables and Efficiency provides information on utility incentives available in each state (*http://www.dsireusa.org/*).

The New Jersey Clean Energy Program, funded by the state's seven electric and natural gas investor-owned utilities, offers local governments the chance to have a comprehensive energy audit at low or no cost. Once the audit is complete, a list of cost-effective energy efficiency recommendations will be generated. Local governments are eligible for any of the incentives offered to commercial property owners through the Smart Start Buildings® program, including product rebates and custom incentives. A multiple measure bonus is available, as well as design and technical assistance, depending on the size of the project (NJ CEP, 2009).

FUNDING SOURCES

Numerous funding sources can support local government energy efficiency investments, including capital and operating budgets, revolving loan funds, public benefits funds (PBF), private foundations, and federal tax incentives. These sources can be accessed through the financial vehicles described above to provide the capital for energy efficiency upgrades. For example, a revolving loan fund or a state-run PBF can provide funding to a state agency via a financial vehicle such as a loan or a grant. This subsection describes how local governments have used different funding sources.

IOWA ENERGY BANK

The Iowa Energy Bank combines private and public funds to finance energy efficiency improvements in public schools and local governments. The bank conducts energy audits and engineering analyses, negotiates financing terms with private lenders, and uses energy cost savings from previous projects to provide upfront funding.

Source: Iowa, 2006.

- **Capital budgets and operating budgets.** Using capital or operating budgets funds has many advantages: funding is already on hand, there is no need to negotiate financing arrangements, and there are no interest payments. Using life-cycle cost accounting to quantify the lower net capital and future operating costs can help local governments improve the chances of incorporating energy efficiency into their limited capital budgets (Zobler and Hatcher, 2008).

Many local governments have used a "paid from savings" approach to fund purchases of energy-efficient products that have cost premiums by reserving energy cost savings generated from their energy efficiency activities to pay for energy-efficient products.

In 1984, Phoenix, Arizona, established an energy conservation savings reinvestment plan. A reinvestment fund was created using money collected from a state oil overcharge. Under the reinvestment plan, half the city's annual energy cost savings from energy efficiency improvements funded through the plan are reinvested in the fund to provide for future improvements. The fund has been used to offset the costs of new energy-efficient equipment in city buildings (ICLEI, 2007).

ANN ARBOR, MICHIGAN—MUNICIPAL ENERGY FUND

The Ann Arbor, Michigan, Municipal Energy Fund is an excellent example of how energy efficiency can pay for itself in the long term. The fund started with an initial payment of $100,000 per year over five years, capturing 80 percent of the resulting savings for reinvestment back into new energy-saving projects. As these new saving projects grow, their energy and cost savings increase. By year five, future investment is based solely on payment of past projects to finance new ones. Annual cost savings enabled by the fund total $142,000 across 60 facilities.

Sources: Ann Arbor, 2007; C40 Cities, 2008.

- **Revolving loan funds.** Revolving loan funds are capital funds that make loans, collect payments, and re-lend these payments to fund new projects. The original capitalization can come from many sources, including legal settlements, billing corrections, or extended bond payments after the end of the bond term. Revolving loan funds typically offer below-market rates and long-term loans for energy efficiency or renewable energy projects.

The St. Paul, Minnesota, Energy Conservation Investment Fund was created in 2007 using existing sewer fund balances and energy cost savings from past energy efficiency improvements. The revolving loan fund will be used to invest $1 million in energy efficiency upgrades with a payback of less than 10 years for city-owned buildings (St. Paul, 2009).

- **Public benefits funds (PBFs).** Public benefits funds are state-mandated funds that can be used to support energy efficiency activities. These funds are collected through a small required per-kWh surcharge on customer electricity bills. States sometimes allow local governments to use these funds for local energy efficiency activities.

In Wisconsin, for example, Focus on Energy, a PBF-funded program sustained by a state system benefits charge, provides technical and financial assistance to local governments for implementing qualifying energy efficiency measures (Focus on Energy, 2008). Oshkosh, Wisconsin, used Focus on Energy-issued rebates to install 2,900 LED traffic signals that collectively save the city $40,000 in energy costs annually (Focus on Energy, 2003).

- **Private foundations (grants).** Foundations are nonprofit corporations or charitable trusts that can help fund local government energy efficiency activities. The most common types of funding include grants and program-related investments (which are usually set up with a repayment schedule).

The Illinois Clean Energy Community Foundation, for example, administers seven indoor lighting programs that provide grants to local government entities, including schools, county courthouses, and public safety facilities, to assist in purchasing and installing energy-efficient lighting systems (ICECF, 2007).

- **Federal tax incentives.** The Internal Revenue Service Code includes a number of tax incentives for energy efficiency investments. For example, the Energy Policy Act (EPAct) of 2005 authorizes several financial incentives to support local government energy efficiency activities, including tax deductions for energy efficiency upgrades in commercial (including public) facilities at the local level. For buildings that achieve annual energy cost reductions of 50 percent or greater, EPAct provides for tax deductions of up to $1.80 per square foot off the cost of installing energy-efficient HVAC systems, building envelope components, and lighting systems. EPAct allows for the tax savings to be passed on to private designers and developers in lieu of the public entity. EPAct also created the Low Income Community Energy Efficiency Pilot Program, which authorized $20 million in DOE grants to fund energy efficiency activities in low-income areas.[13]

8. FEDERAL, STATE, AND OTHER PROGRAM RESOURCES

Many local governments work with federal, state, and regional agencies and organizations when planning and developing programs for improving energy efficiency in their facilities and operations. These entities can also provide information resources and financial and technical assistance, as described below.

Federal Programs

- U.S. EPA State and Local Climate and Energy Program. This program assists state, local, and tribal governments in meeting their climate change and clean energy efforts by providing technical assistance, analytical tools, and outreach support. It includes two programs:

[13] *See http://www.energystar.gov/index.cfm?c=products.pr_tax_credits#s8 for more information on federal tax incentives for energy efficiency investments.*

- ***The Local Climate and Energy*** Program helps local and tribal governments meet multiple sustainability goals with cost–effective climate change mitigation and clean energy strategies. EPA provides local and tribal governments with peer exchange training opportunities and financial assistance along with planning, policy, technical, and analytical information that support reduction of greenhouse gas emissions.

- ***The State Climate and Energy Program*** helps states develop policies and programs that can reduce greenhouse gas emissions, lower energy costs, improve air quality and public health, and help achieve economic development goals. EPA provides states with and advises them on proven, cost–effective best practices, peer exchange opportunities, and analytical tools.

Web site: *http://www.epa.gov/statelocalclimate/*

- **ENERGY STAR.** The ENERGY STAR program helps building owners and occupants achieve superior energy management and realize the cost savings and environmental benefits that can result. The ENERGY STAR staff and Web site provide targeted information resources, technical assistance, tools, and communications and outreach support to help state and local governments improve energy efficiency in facilities throughout the community. (More information on ENERGY STAR tools and resources for local governments can be found in Table 1, *ENERGY STAR Program Resources*, on page 6.)

Web site: *http://www.energystar.gov/*

- **DOE Building Technologies Program.** The Building Technologies Program partners with private and public sector organizations to improve building energy efficiency. This program supports research and development and provides assistance to those interested in building efficiency through its Web site, which contains tools, guidelines, training information, and information about accessing financial resources.

Web site: *http://www.eere.energy.gov/buildings/*

- **Whole-Building Design Guide (WBDG).** This National Institute of Building Sciences project provides information on building design, project management, and O&M to designers and administrators. The WBDG Web site provides information on a broad range of building types and offers numerous case studies, tools, and guidance documents. A number of federal agencies, including EPA and DOE, are represented on the WBDG Advisory Committee.

Web site: *http://www.wbdg.org/*

State Programs

Many states have programs that provide technical and financial assistance for energy efficiency activities to local governments. This assistance enables state and local agencies to share information about energy efficiency improvements and help develop consistent clean energy activities across the state.

Table 4, *Examples of States Providing Technical and Financial Assistance to Local Governments*, provides examples of state programs that support local government energy efficiency activities.

TABLE 4. EXAMPLES OF STATES PROVIDING TECHNICAL AND FINANCIAL ASSISTANCE TO LOCAL GOVERNMENTS

State	Description	URL
Technical Assistance		
California	The California Energy Commission's (CEC) **Energy Partnership Program** offers technical assistance to cities, counties, hospitals, and colleges and universities. The program helps these local groups identify energy efficiency improvements in existing buildings and energy-efficient options in new construction. The CEC also helps these groups identify state loans and other financing sources for project installation.	*http://www.energy.ca.gov/efficiency/partnership/index.html*
Massachusetts	In the Executive Office of Environmental Affairs, the Commonwealth of Massachusetts has created a Green Communities Division that focuses on providing technical and financial assistance to local governments and school districts. Areas of particular focus include energy audits, energy information reporting, energy management systems, and energy management committee formation. Funding for the program comes from a variety of sources, including emissions allowance trading programs, utility efficiency charges, alternative compliance payments generated by the state's renewable portfolio standard, and the state Renewable Energy Trust Fund.	*http://www.mass.gov/?pageID=eoeeasubtopic&L=3&L0=Home&L1=Energy%2C+Utilities+%26+Clean+Technologies&L2=Green+Communities&sid=Eoeea*
Oregon	Oregon's Department of Energy provides assistance to public entities through multiple programs, including the **Building Commissioning Program**, which helps building managers perform evaluations and implement energy cost-saving strategies.	*http://www.oregon.gov/ENERGY/CONS/GOV/govhme.shtml*
Pennsylvania	The Pennsylvania Department of Environmental Protection maintains a Web page, **Local Government and Municipal Energy Assistance**, to assist local governments in improving energy efficiency through developing energy management plans.	*http://www.portal.state.pa.us/portal/server.pt?open=514&objID=552379&mode=2*
Texas	The **Schools/Local Government Energy Program** provides services to assist in setting up and maintaining effective energy efficiency programs.	*http://www.seco.cpa.state.tx.us/sch-gov.htm*
West Virginia	The **Building Professionals Energy Training Program** offers building code seminars to educate local government officials about the latest codes and building technologies.	*http://www.wvcommerce.org/info/aboutcommerce/energy/programs.aspx*
Financial Assistance		
California	The CEC's **Energy Efficiency Financing Program** provides low-interest loans for public schools, public hospitals, and local governments to fund energy audits and install energy efficiency measures.	*http://www.energy.ca.gov/efficiency/financing/index.html*
Iowa	Iowa's **Building Energy Management Program** is an energy management program for public and nonprofit entities that provides technical and financial assistance for building energy efficiency upgrades.	*http://www.energy.iowa.gov/Energy%20Efficiency/BEST.html*
Kansas	The **Kansas Facility Conservation Improvement Program** provides low-interest, tax-exempt energy performance contracting agreements to state and local public agencies.	*http://www.kcc.state.ks.us/energy/fcip/financing.htm*
Maryland	The **Jane E. Lawton Conservation Loan Program** provides Maryland local governments with financial assistance to reduce energy costs. The program allows energy savings generated by efficiency upgrades to be the major source of loan repayment.	*http://energy.maryland.gov/govt/janeelawton.html*
Missouri	Through its **Energy Revolving Fund**, the Missouri Energy Center offers low-interest loans for energy efficiency improvements in public schools, local government, public hospitals, and public water treatment facilities. The loans are paid back using the energy savings generated from the project.	*http://www.dnr.mo.gov/energy/financial/loan.htm*

TABLE 4. ENERGY STAR SPECIFICATION OVERVIEWS: ENERGY SAVINGS AND PAYBACK PERIODS[a] *(cont.)*

State	Description	URL
New Jersey	The **New Jersey Clean Energy Program** offers financial incentives and low-interest financing to schools and local governments. The program combines the traditional rebate program with incentives and financing, giving schools and local governments the flexibility to implement cost-effective energy efficiency activities immediately.	*http://www.njcleanenergy.com/commercial-industrial/home/home*
North Carolina	The North Carolina Division of Pollution Prevention and Environmental Assistance administers **Local Government Assistance**, providing technical and financial assistance to local governments on implementing energy-related and environmental activities.	*http://www.p2pays.org/localgov/*
Tennessee	Through its **Local Government Energy Loan Program**, the Tennessee Department of Economic and Community Development provides low-interest loans to municipal and county governments for energy efficiency improvements.	*http://www.tennessee.gov/ecd/CD_local_gov_energy_loan.html*

Other Programs

- **ICLEI Local Governments for Sustainability.** ICLEI—Local Governments for Sustainability (ICLEI)—is a membership association of local governments that have committed to adopting sustainable approaches to addressing climate change and other environmental threats through a range of activities, including energy efficiency. ICLEI members receive access to a suite of tools and resources that they can use to plan and implement their energy efficiency programs, including software with training, technical and communications assistance, information sharing, best practices, and opportunities for recognition.

  Web site: *http://www.icleiusa.org/*

LOCAL ASSOCIATIONS: INTEGRATING ENERGY EFFICIENCY AND CLIMATE CHANGE

The U.S. Conference of Mayors (USCM) and the National Association of Counties (NACo) have both passed resolutions supporting EPA's ENERGY STAR Challenge to reduce energy consumption in public and private buildings by 10 percent or more. They promote ENERGY STAR tools and resources to members working to meet their climate protection and energy efficiency goals.

Sources: NACo, 2005b; U.S. Mayors, 2008.

- **U.S. Conference of Mayors.** The USCM Climate Protection Agreement commits mayors to reduce GHG emissions in their cities to at least 7 percent below 1990 levels by 2012. The Climate Protection Center provides guidance to mayors on leading their cities' efforts to reduce GHG emissions linked to climate change and publishes best practices, including examples of cities that are taking the lead in this effort by improving energy efficiency in their buildings and operations.

  Web site: *http://www.usmayors.org/climateprotection/*

- **National Association of Counties (NACo).** The NACo Green Government Initiative provides local governments with resources on energy and other environmental issues related to government facilities and operations. Through the initiative, NACo facilitates information sharing between governments and promotes collaboration with the private sector. In addition to other publications and information resources, NACo administers a Green Government Database that enables local governments to search for case studies on specific topics. Through the ENERGY STAR Courthouse Campaign, NACo provides assistance to county governments in improving energy efficiency in county courthouses and other buildings by assisting them in joining EPA's ENERGY STAR program. In addition to saving energy costs, improving energy efficiency in county courthouses can be a way of increasing public awareness of local clean energy activities (NACo, 2008).

  Web site: *http://www.naco.org/programs/csd/pages/greengovernmentinitiative.aspx*

- **Playbook for Green Buildings and Neighborhoods.** The *Playbook* is an online resource developed by a team of local government, non-profit organizations, and federal government agencies that provides local governments with information, strategies, and tools for building green buildings, neighborhoods, and infrastructure. For each of these three subject areas, the Playbook provides information to assist local governments in the information gathering, planning, and implementation stages of their activities.

  Web site: *http://www.greenplaybook.org/*

- **Regional programs.** Local governments can often obtain information and assistance from numerous other regional programs and initiatives, such as the Rocky Mountain Climate Organization's Colorado Climate Agenda (RMCO, 2006), which provide resources to local governments for implementing energy efficiency activities. In Monterey County, California, several municipalities—as part of the Association of Bay Area Governments—have partnered with an investor-owned utility to create an energy watch program that administers energy efficiency services to local residents and businesses. The program also offers technical consultation for local government buildings (ABAG, 2007).

  Web sites: *http://www.coloradoclimate.org/*
  http://www.ambag.org/programs/EnergyWatch/municipal.html

ASSOCIATION OF WASHINGTON CITIES LOCAL GOVERNMENT ENERGY PROJECT

The Association of Washington Cities' Local Government Energy Project provides assistance to local governments on energy efficiency and energy policy matters. The association monitors regional and state energy policy issues and represents its constituent cities in state and federal energy policy development.

Source: AWC, 2006a.

9. CASE STUDIES

The following case studies describe two local governments' comprehensive programs for improving energy efficiency in their facilities and operations.

Arlington County, Virginia—County Energy Manager and the Fresh AIRE Program

Arlington County, Virginia, has a long-standing commitment to sustainability and has been investing in energy efficiency since the mid-1990s. The county's efforts to improve efficiency in municipal facilities and operations were institutionalized under the Fresh AIRE (Arlington Initiative to Reduce Emissions) program, which seeks to reduce county GHG emissions through a comprehensive suite of actions that also includes investing in renewable energy, using alternative fuels and high-efficiency vehicles, and planting trees to capture and sequester carbon. The Fresh AIRE program strives to not only to change government practices directly, but to also work to modify practices of residents and businesses by providing incentives and leading by example (Arlington 2007b; Arlington, 2008; Arlington, 2010a.)

PROGRAM INITIATION

The Fresh AIRE program was launched in January 2007 under the guidance of the county's energy manager. The initiative aims to reduce GHG emissions in county buildings and operations by 10 percent from 2000 to 2012 through several efforts, but focusing primarily on energy efficiency improvements. The county has since expanded the program by endorsing the Cool Counties Climate Stabilization Declaration and committing to halt growth in community-wide greenhouse gas emissions by 2010 and pursue aggressive reductions thereafter (Arlington, 2008; Arlington, 2010).

PROGRAM FEATURES

To help achieve the goal of reducing GHG emissions from county facilities and operations, a major component of the Fresh AIRE program has focused on improving municipal energy efficiency. Projects have ranged from low-cost/no-cost measures, such as turning off lights and lowering thermostat settings, to longer-term durable investments in more efficient technology. Table 5, *Municipal Energy Efficiency Investments and Savings for Arlington County, VA*, illustrates the range of projects the county has undertaken and many of the energy reductions that have been achieved or that are expected in the near future once projects are completed. All of the county's

improvements to date have payback periods of no more than five years, providing a 20 percent return on investment each year, with expected savings every year after (Arlington 2007b).

Arlington County has also partnered with ENERGY STAR and is using Portfolio Manager to benchmark and assess the energy performance of its buildings. To demonstrate the progress the county is making under the Fresh AIRE program and to increase the transparency of the energy usage and cost of county facilities and operations, the county is publicly disclosing this information in Building Energy Report Cards for all 67 of its buildings. The first report cards were released in March 2009 and made available on the Fresh AIRE Web site (*http://www.arlingtonva.us/Departments/Communications/PressReleases/page69193.aspx*).

Since the county government's facilities and operations account for less than 4 percent of the carbon emissions in Arlington, the county has recognized the need to engage the community in order to make a larger impact and to achieve broader emissions reduction goals. Through the Fresh AIRE program, the county has assisted local business and residents in improving energy efficiency by offering free energy audits, providing information on ENERGY STAR tools and resources, helping to identify alternative and fuel-efficient transportation options, and encouraging recycling and water conservation practices (Arlington, 2010a).

TABLE 5. MUNICIPAL ENERGY EFFICIENCY INVESTMENTS AND SAVINGS FOR ARLINGTON COUNTY, VIRGINIA

Activity	Cost	Savings
Activity	**Assistance**	**Assistance**
Central Library: Improvements to operations and maintenance procedures and building controls; investments in more efficient lighting and equipment.	Not available.	Reduced electricity use by 25%, saving more than $30,000 per year. a
Madison Community Center: Reinsulated hot water pipes, improved temperature controls	Not available.	Reduced natural gas use over 20%, enough to heat six homes for the winter. a
Department of Public Works: Upgraded thermostats in former garage bays.	Not available.	Reduced natural gas use by about 50%, saving over $10,000 per year. b
Teen Detention Center: Lighting retrofit.	$6,000	Reduced electricity use by 30%, saving $4,000 per year. a
Justice Center (Courthouse & Detention Center): Efficiency improvements to electrical, heating, cooling, and plumbing systems. Project expected to be completed summer 2009.	No upfront cost—county's first energy saving performance contract for $5.3 million.	Expected to save $480,000 per year by reducing electricity use by 14%, natural gas use by 35%, and water consumption by 32%.b
Traffic Lights: Retrofitting all signalized intersections with light-emitting diode (LED) lights. Project expected to be completed by 2010.	Not available.	Expected to reduce electricity use by 25%, enough to power 250 homes. Longer life expectancy of LED bulbs than incandescent bulbs also expected to reduce maintenance costs. a

[a] Arlington, 2007b.

[b] Arlington, 2010a.

Profile: Arlington County, Virginia

Area: 26 square miles

Population: 206,800 (2008)

Structure: Residents elect a county board, which consists of five members, each serving four-year terms. The county also has five constitutional officers: a sheriff, court clerk, attorney, treasurer, and commissioner of revenue. The Fresh AIRE (Arlington Initiative to Reduce Emissions) Program is administered by the county's energy manager under the Department of Environmental Services.

Program Scope: The program is a collaborative between county government, businesses, organizations, and individuals to improve energy efficiency and reduce GHG emissions throughout the community. Program activities include energy-saving retrofits to county buildings, installation of LED traffic lights, providing free energy audits to residents and businesses, distributing energy-efficient light bulbs, and providing tips and resources for promoting energy efficiency.

Program Creation: Fresh AIRE was launched in 2007 with the initial goal of reducing the county government's greenhouse gas emissions by 10 percent from 2000 levels by 2012. The program later expanded to include businesses and residents.

Program Results: From 2000 to 2005, Arlington County reduced its GHG emissions 2.6 percent, in part by reducing its energy use per square foot in county buildings and facilities by 6 percent over the same period. The County Energy Manager received an EPA Climate Protection Award in 2008 for his success in working toward efficiency.

PROGRAM RESULTS

From 2000 to 2005, Arlington County reduced its GHG emissions 2.6 percent, in part by reducing its energy intensity (energy use per square foot) in county buildings and facilities by 6 percent over the same period (Arlington, 2007a). The first series of Building Energy Report Cards compares energy consumption in buildings in 2007 with energy consumption in the same buildings in 2009 and indicates that energy intensity fell a further 4 percent during that time. The report cards also reveal that Arlington's efficiency efforts under the Fresh AIRE program reduced energy consumption by more than 3,000,000 kWh of electricity and more than 20,000 therms of natural gas, saving the county approximately $300,000 even though the winter months were colder in 2009 than in 2007. As a result, total energy use in all county buildings declined by 4 percent, even though the county added several new buildings and performed renovations to others (Arlington, 2010b).

Web site: *http://www.arlingtonva.us/portals/Topics/Climate.aspx*

Phoenix, Arizona—Energy Conservation Program

Initiated during the oil shortage of the late 1970s, the Phoenix Energy Conservation Program has been tied into a broader sustainability program that includes activities in environmental leadership, land use, recycling, transportation, water conservation, and historic preservation in addition to energy efficiency. Overall, the Energy Conservation Program has saved the city approximately $75 million from the beginning of the program through 2006.

PROGRAM INITIATION

The Energy Conservation Program was initiated when the city hired an energy manager in 1978 to oversee energy use in municipal buildings and to identify energy waste. Within one year, the energy manager's efforts saved the city $150,000. In 1984, the city established an energy conservation savings reinvestment plan, under which half of all energy savings are reinvested into a fund to finance future energy efficiency upgrades. By 1986, the city was achieving annual energy cost savings in excess of $1 million. In 2002, a general plan was established to guide land use, environmental, and community planning decisions. As a supplement to this plan, the city produced a sustainability program, of which the Energy Conservation Program is a component (Phoenix, 2007a; ICLEI, 2007).

PROGRAM FEATURES

The city Energy Conservation Program has evolved over the past two decades. Today, the program includes the following features:

- **Energy efficiency retrofits for HVAC and lighting systems.** Phoenix has conducted many retrofits in municipal buildings, most often including installation of energy-efficient air conditioning and lighting systems. Other projects have included installing variable speed drives on air and water distribution systems and energy management systems (ICLEI, 2007; Phoenix, 2007a).

- **Building standards for municipal facilities.** In 2006, the city revised its policy requiring that all new city buildings be constructed to meet LEED certification to include that buildings must now be designed to improve energy performance by 30 percent compared to conventional buildings (based on ASHRAE Standard 90.1). The policy also includes criteria for landscape and exterior design, water-efficient landscaping, water use, construction material waste management, and LEED accreditation for design team members (Phoenix, 2007a).

- **Energy Management Task Force.** In 2001, the city formed an Energy Management Task Force comprised of representatives from each municipal department. The task force is responsible for identifying reasonable ways to reduce energy needs in city buildings, especially during peak summer demand. One of the task force's accomplishments was the initiation of an ENERGY STAR purchasing pilot program for city departments that has since developed into a permanent program (Phoenix, 2007a).

- **Energy Conservation Savings Reinvestment Fund.** Phoenix created this fund in 1984 using funds collected from a state oil surcharge. Half of all savings from energy conservation upgrades in local government facilities and operations are returned to this fund to be reinvested in additional upgrades. The fund has often been used to install energy-efficient air conditioning and lighting systems (ICLEI, 2007).

Profile: Phoenix, Arizona

Area: 515 square miles

Population: 1.5 million

Structure: Residents elect a mayor and eight city council representatives to four-year terms. The Phoenix Energy Conservation Program is a component of the Planning Department's broader Sustainability Program.

Program Scope: Energy Conservation Program activities involve lighting and HVAC retrofits to existing facilities, design standards for new facilities, and energy efficiency improvements in local government operations, including traffic signal upgrades and energy-efficient water pump installations in public parks.

Program Creation: The program was created in 1978, when the city hired an energy manager to reduce energy costs in the wake of a national oil shortage.

Program Results: The Energy Conservation Program has saved the city approximately $75 million in energy costs from 1978 to 2006.

Source: Phoenix, 2007b.

PROGRAM RESULTS

The Energy Conservation Program has saved the city approximately $75 million in energy costs from 1978 to 2006. The new building standards, which apply to all city buildings, require buildings to meet LEED requirements. For certain criteria, the standards require city buildings to exceed LEED requirements. For example, city buildings must be designed to achieve a 50 percent reduction in water used for landscaping, a 20 percent reduction in indoor water consumption, and energy cost savings 30 percent greater than the savings achieved by a building that meets the ASHRAE Standard 90.1-2004 (this exceeds the LEED-required minimum of 14 percent) (Phoenix, 2007a).

Web site: ***http://phoenix.gov/sustainability***

10. ADDITIONAL EXAMPLES AND INFORMATION RESOURCES

Title/Description	Web Site
Energy Efficiency in Local Government Operations	
Ada County, Idaho. Ada County, Idaho, began commissioning its new county courthouse/administration building early in the design stage and identified 350 energy efficiency upgrades that could be implemented before the building became operational. The building now uses approximately 40 percent less energy that the average county office building.	*http://www.naco.org/programs/csd/Green%20Government%20Documents/EE_Report_NACo%20ENERGY%20STAR%20Courthouse%20Campaign%20County%20Spotlights.pdf*
Ann Arbor, Michigan. Ann Arbor established a municipal energy fund that has been used to finance energy efficiency improvements in 60 local government facilities since 1998.	*http://www.c40cities.org/bestpractices/energy/annarbor_fund.jsp*
Annapolis, Maryland. The Annapolis city council adopted an energy policy in 2006.	*http://www.ci.annapolis.md.us/Government/Departments/DNEP/documents/Emissions.pdf*
Arlington County, Virginia. The county installed energy-efficient lighting in its courthouse in 2005. The measure has reduced energy consumption by 8 percent and has a payback period of less than five years.	*http://www.arlingtonva.us/portals/topics/documents/9768ReturnInvestment.pdf*
Athens County, Georgia. The county is saving 50,000 kWh annually as a result of replacing 175-watt metal halide lights with 150-watt high-pressure sodium lights in the parking lot at the county courthouse.	*http://www.naco.org/programs/csd/Green%20Government%20Documents/EE_Report_NACo%20ENERGY%20STAR%20Courthouse%20Campaign%20County%20Spotlights.pdf*
Atlanta, Georgia. The city's chief operating officer developed a set of energy conservation policies and procedures.	*http://www.atlantaga.gov/client_resources/forms/energy%20conservation/energy%20conservation%20policies%20and%20procedures.doc*
Baltimore, Maryland. The mayor established a goal for all city departments to reduce energy consumption by 5 to 10 percent.	*http://www.baltimorecity.gov/Government/AgenciesDepartments/Planning/OfficeofSustainability.aspx*
Baltimore, Maryland. Energy conservation efforts in Baltimore have reduced the city's annual energy costs by $500,000. An investment of $7 million for energy efficiency measures (including installations of energy-efficient lighting systems, variable speed drives, and automated energy management systems) in 2.3 million square feet of public building space is expected to increase annual savings to approximately $1 million. Three city buildings have earned the ENERGY STAR label for their performance.	*http://www.baltimorecity.gov/Government/AgenciesDepartments/Planning/OfficeofSustainability.aspx*
Barnstable County, Massachusetts. Barnstable County, Massachusetts, retrofitted the lighting systems in 10 county buildings in 2003. This measure, which cost $119,000, has produced annual energy cost savings of $19,000.	*http://www.naco.org/programs/csd/Green%20Government%20Documents/EE_Report_NACo%20ENERGY%20STAR%20Courthouse%20Campaign%20County%20Spotlights.pdf*
Berkeley, California. Berkeley developed a comprehensive program for implementing clean energy practices in municipal government operations.	*http://www.ci.berkeley.ca.us/ContentDisplay.aspx?id=33182*
Blue Earth County, Minnesota. The county has received the ENERGY STAR label on its 120-year old courthouse and has recently begun building a new LEED-certified justice center.	*http://www.naco.org/programs/csd/Green%20Government%20Documents/EE_Article%20-%20Blue%20Earth%20County%20courthouse%20'goes%20green,'%20earns%20coveted%20ENERGY%20STAR%20rating.pdf*
Broward County, Florida. $8 million in energy efficiency investments in county facilities has produced annual energy savings of $1.5 million and reduced annual GHG emissions by over 19,000 metric tons of CO_2.	*http://www.naco.org/programs/csd/Green%20Government%20Documents/EE_Report_NACo%20ENERGY%20STAR%20Courthouse%20Campaign%20County%20Spotlights.pdf*

10 ADDITIONAL EXAMPLES AND INFORMATION RESOURCES *(cont.)*

Title/Description	Web Site
Bullhead City, Arizona. The city has installed energy-efficient chillers, lighting systems, and traffic signals, which are saving approximately $100,000 annually in energy costs.	*http://apps1.eere.energy.gov/state_energy_program/project_brief_detail.cfm/pb_id=437*
Burlington, Vermont. The Burlington Municipal Development Plan includes descriptions and goals for reducing energy consumption in municipal buildings and operations.	*http://www.ci.burlington.vt.us/planning/mdp/2006/mdp_2006_energy.pdf*
Chicago, Illinois. As part of its "Conserve Chicago Together" initiative, the city of Chicago has made energy efficiency improvements to more than 15 million square feet of public facilities, saving 3,360,995 kWh annually. These investments have resulted in estimated cost savings of $6 million annually.	*http://www.chicagoclimateaction.org/pages/where_we_have_been/60.php#Energy*
Chicago, Illinois. Chicago, Illinois has performed tune-ups to 50 boilers in city facilities, improving the energy efficiency of some boilers by as much as 12%. These tune-ups, which cost approximately $12,500 each, have collectively reduced the city's natural gas consumption by 5 percent, which is expected to save nearly $1.65 million in annual energy costs.	*http://c40cities.org/bestpractices/energy/chicago_boiler.jsp*
Cincinnati, Ohio. The mayor of Cincinnati established a goal for the city to reduce electricity consumption by 1 percent within one year and 10 percent within four years.	*http://www.cincinnati-oh.gov/mayor/downloads/mayor_pdf17104.pdf*
Dakota County, Minnesota. In 2002 Dakota County, Minnesota, used the county *Sustainable Design and Construction Standards* for the new Northern Service Center, which has achieved annual energy cost savings in excess of $50,000.	*http://www.naco.org/programs/csd/Green%20Government%20Documents/EE_Report_NACo%20ENERGY%20STAR%20Courthouse%20Campaign%20County%20Spotlights.pdf*
Dallas, Texas. Dallas has initiated an energy efficiency program as part of its environmental management plan.	*http://www.dallascityhall.com/html/energy_efficency.html*
Denver, Colorado. Denver, Colorado, has retrofitted windows in several municipal fire stations, resulting in a 10-fold increase in energy efficiency.	*http://usmayors.org/uscm/best_practices/EnergySummitBP06.pdf*
Durham County, North Carolina. Durham County, North Carolina, is saving nearly $25,000 in annual energy costs from installing variable speed motors on HVAC equipment in its buildings	*http://www.naco.org/programs/csd/Green%20Government%20Documents/EE_Report_NACo%20ENERGY%20STAR%20Courthouse%20Campaign%20County%20Spotlights.pdf*
Erie County, New York. Erie County is constructing a new courthouse in the city of Buffalo that will incorporate approximately $100,000 in energy efficiency upgrades. The building is expected to achieve energy cost savings of nearly $39,000 annually, resulting in a payback period of less than four years.	*http://www.nyserda.org/programs/New_Construction/Case_Studies/ErieCountyCourt.pdf*
Grand Rapids, Michigan. In 2006, the city council of Grand Rapids adopted a resolution requiring that new construction and major renovations of buildings over 10,000 square feet and costing more than $1 million or more meet LEED standards.	*http://www.dsireusa.org/documents/Incentives/MI12R.pdf*
Green Bay, Wisconsin. The Sustainable Greater Green Bay initiative has established three principal goals for community energy consumption: make energy more affordable through increasing energy efficiency; make energy cleaner; and increase the local benefits.	*http://sustainablegreenbay.wordpress.com/*
Hillsborough County, Florida. The Hillsborough County Court Facilities Improvement Project, which involved constructing a new energy-efficient court building and central chilled water plant and utilizing the services of an ESCO, is expected to save nearly $700,000 annually.	*http://www.naco.org/programs/csd/Green%20Government%20Documents/EE_Report_NACo%20ENERGY%20STAR%20Courthouse%20Campaign%20County%20Spotlights.pdf*

10 ADDITIONAL EXAMPLES AND INFORMATION RESOURCES *(cont.)*

Title/Description	Web Site
Hopkinton, New Hampshire. Hopkinton is participating in EPA's New England Community Energy Challenge, a regional extension of the ENERGY STAR Challenge. Hopkinton is evaluating energy consumption in its town hall, library, clerk's office, and fire station, and using Portfolio Manager to track energy consumption reductions.	*http://cs.newhampshire.com/blogs/hopkinton_news/archive/2008/01/23/Town_2C00_-schools-take-energy_2D00_efficiency-pledge.aspx*
Jackson County, Missouri. The county entered into a performance contract with an ESCO to improve energy efficiency in four public facilities. The project, which involved lighting retrofits, plumbing upgrades, and installation of an energy management system, was implemented with no upfront costs and is being paid for using energy cost savings, which total approximately $430,000.	*http://www.johnsoncontrols.com/publish/etc/medialib/jci/be/case_studies.Par.0510.File.tmp/JacksonCounty.pdf*
Lansing, Michigan. The mayor required that energy efficiency upgrades be implemented at the city hall.	*http://apps.cityoflansingmi.com:8000/newsevents/releases/EO_2_press12565.pdf*
Las Vegas, Nevada. In 2008, the city council of Las Vegas adopted a resolution committing the city to a sustainable energy strategy. Among other things, the strategy lays out several goals for improving energy efficiency in local government facilities and operations.	*http://www.lasvegasnevada.gov/sustaininglasvegas/energy.htm#sustainable*
Lawton, Oklahoma. Lawton passed a local administrative law that requires specific energy conservation upgrades in government buildings, including setting thermostats at a maximum of 65o during cold weather and a minimum of 78o in warm weather.	*http://www.cityof.lawton.ok.us/CityCode/Administrative_Policies/Section_9/1.html*
Lewiston, Maine. Lewiston is replacing the ceiling at its city hall to reduce energy costs. The initial investment cost the city approximately $190,000.	*http://www.nrcm.org/news_detail.asp?news=2602*
Los Angeles County, California. Energy efficiency improvements in the Long Beach courthouse, which have included lighting system and HVAC system retrofits, have produced annual energy savings of 34 percent (24 percent due to energy-efficient lighting and 10 percent due to energy-efficient HVAC operations).	*http://www.naco.org/programs/csd/Green%20Government%20Documents/EE_Report_NACo%20ENERGY%20STAR%20Courthouse%20Campaign%20County%20Spotlights.pdf*
Lowell, Massachusetts. Lowell has passed a resolution committing to participate in the U.S. Conference of Mayors' Climate Protection Agreement and to become an EPA ENERGY STAR partner. In addition, the city has committed to reducing energy consumption in government buildings by 10 percent.	*https://secure.lowellma.gov/depts/dpd/GBC-minutes-agendas/minutes.2008-06-02.3905772756/?searchterm=Climate%20Protection%20Agreement*
Madison, Wisconsin. Madison adopted sustainability guidelines that include a mandate for training facility managers in commissioning and re-commissioning.	*http://www.cityofmadison.com/sustainable_design/ and http://www.cityofmadison.com/Sustainability/City/energyProjects/lighting.cfm*
McHenry County, Illinois. The county has used Portfolio Manager to benchmark its administration building. The building, which incorporates a number of energy efficiency improvements, has achieved a score of 81.	*http://www.naco.org/programs/csd/Green%20Government%20Documents/EE_Report_NACo%20ENERGY%20STAR%20Courthouse%20Campaign%20County%20Spotlights.pdf*
Medford, Massachusetts. This presentation provides an overview of how Medford developed its energy efficiency program and the activities it is implementing.	*http://www.cleanairinfo.com/airinnovations/2004/Presentations/Reducing%20Energy%20Consumption/KimLundgrenLEDs.ppt*
Milwaukee, Wisconsin. Milwaukee entered into a five-year performance contract with an ESCO to improve energy efficiency in its city hall. The ESCO worked with the city to install a Metsys building energy control system.	*http://www.johnsoncontrols.com/publish/etc/medialib/jci/be/case_studies.Par.15414.File.tmp/milwaukeecityhall.pdf*
Minneapolis, Minnesota. In his 2007 budget, the mayor established a plan for increasing the city's investment in energy efficiency and renewable energy.	*http://www.ci.minneapolis.mn.us/mayor/news/20060928newsmayorbudgetenergyenivron.asp*

10 ADDITIONAL EXAMPLES AND INFORMATION RESOURCES *(cont.)*

Title/Description	Web Site
New Haven, Connecticut. New Haven's Energy Conservation Program, initiated in 1994, has saved the city over $29 million through 2006.	*http://www.cityofnewhaven.com/Finance/pdfs/EnergyConserReport8-30-2005.pdf*
New York City, New York. New York City established the ENCORE program to assist government agencies in improving energy efficiency and reducing energy consumption. Several of the city's agencies participate in the New York Power Authority Peak Load Management Program.	*http://www.nyc.gov/html/om/pdf/energy_task_force.pdf*
New York City, New York. In October 2007, the mayor issued an executive order directing city government agencies to reduce energy consumption by 30 percent by 2017. The order also calls for the creation of an energy savings steering committee and short-term and long-term energy savings plans.	*http://www.nyc.gov/html/om/pdf/2007/pr383-07_eo_109.pdf*
Northampton, Massachusetts. The Northampton Energy Resources Commission adopted policies and procedures for reducing the city's energy consumption.	*http://www.northamptonma.gov/energyresources/*
Oakland, California. Oakland's City Facilities Energy Improvement Program is focused on continuously improving energy efficiency in municipal buildings, traffic signals, and street lights. The City has retrofitted 102 of its 115 largest facilities (representing more than 60 percent of total building area), creating energy cost savings of over $1 million per year to the City's budget.	*http://www2.oaklandnet.com/Government/o/PWA/o/FE/s/EECE/index.htm#Business*
Ocean City, New Jersey. Ocean City has established a goal to reduce energy consumption in government buildings by between 5 and 10 percent through its energy conservation program.	*http://services.ocnj.us/Environment/tabid/114/mid/556/dnnprintmode/true/Default.aspx?SkinSrc=%5bG%5dSkins%2f_default%2fNo+Skin&ContainerSrc=%5bG%5dContainers%2f_default%2fNo+Container*
Philadelphia, Pennsylvania. Philadelphia established an energy conservation initiative that combines the efforts of the Municipal Energy Office and the Capital Program Office. The city produced its own *High Performance Building Renovation Guidelines*.	*http://www.phila.gov/pdfs/PhiladelphiaGreenGuidelines.pdf*
Phoenix, Arizona. Phoenix developed an environmental sustainability program to complement the city General Plan. The city's Energy Conservation Program is part of this initiative.	*http://phoenix.gov/sustainability/sustaincity.pdf*
Pitt County, North Carolina. The county has entered into an energy performance contract with a goal of reducing energy costs by $3.7 million from 2006 to 2017.	*http://www.naco.org/programs/csd/Green%20Government%20Documents/EE_Report_NACo%20ENERGY%20STAR%20Courthouse%20Campaign%20County%20Spotlights.pdf*
Redondo Beach, California. Between 2000 and 2001, Redondo Beach, California, installed an energy management system to improve the energy efficiency of air conditioner compressors on rooftop air-handling units in several buildings. This measure, which costs approximately $500 per installed unit, resulted in energy savings of about 18 percent for each unit.	*http://www.fypower.org/pdf/RES171161_BPG_LGov1_Conserv.pdf*
Saco, Maine. The Saco Energy Committee initiated energy conservation efforts that include installing compact fluorescent light bulbs (CFL) and high efficiency refrigerators and computers in city department buildings.	*http://www.sacomaine.org/news/energy.shtml*
San Diego, California. San Diego committed to reducing 5 MW of energy demand through energy efficiency improvements.	*http://www.sandiego.gov/environmental-services/geninfo/news/pdf/060512_energy.pdf*
Southlake, Texas. The city council adopted a comprehensive energy policy in 2002 that directs city departments to reduce energy consumption in their facilities by 5 percent annually over five years.	*http://www.seco.cpa.state.tx.us/zzz_sb5-tep/sb5southlake.pdf*

10 ADDITIONAL EXAMPLES AND INFORMATION RESOURCES *(cont.)*

Title/Description	Web Site
Stamford, Connecticut. Stamford has been administering an energy management program since 1998. In 2005, the city committed to reducing energy consumption from fossil fuels by 20 percent by 2010. Through 2009, the city has reduced its energy consumption by 19 percent.	*http://www.cityofstamford.org/content/25/50/105109/109156.aspx*
Syracuse, New York. To help reduce CO_2 emissions by 20 percent by 2010, Syracuse has upgraded 10,000 traffic signals with LEDs and is performing comprehensive energy audits on government facilities. These efforts helped reduce the city's energy consumption by 20 percent between 2000 and 2006.	*http://www.syracuse.ny.us/mayorDocs/1/Nyserda.1.28.04.pdf*
Toledo, Ohio. The Municipal Energy Management Program was established to improve energy efficiency in local government facilities. The program began with a $930,000 lighting system retrofit in seven buildings, paid for through the city's capital improvement program and public bonds.	*http://www.usmayors.org/uscm/best_practices/bp_volume_2/toledo.htm*
Wilson County, North Carolina. Wilson County, North Carolina, has reduced annual energy costs by $107,000 by improving energy efficiency in 10 county buildings. The majority of the savings are the result of an integrated building energy management system, which was installed under a performance contract to control all county buildings. Along with additional energy efficiency improvements, the energy management system is helping the county to reduce overall energy use by 15 percent.	*http://yestoamendment4.com/downloads/TAC_Wilson_County.pdf*
Local Government Green Buildings Programs	
Arlington, Massachusetts. Arlington passed a resolution in 2003 requiring LEED Silver certification for all new and renovated town-owned buildings.	*http://www.cleanair-coolplanet.org/for_communities/LEED_links/ArlingtonLEEDbylaw.doc*
Arlington County, Virginia. Arlington County passed a city green building ordinance that requires new buildings to be designed to comply with LEED standards.	*http://www.arlingtonva.us/Departments/CPHD/planning/zoning/pdfs/zoa_leeds.pdf#search*
Atlanta, Georgia. Atlanta passed a city ordinance requiring that city buildings be designed to meet LEED criteria.	*http://www.atlantaga.gov/mayor/energyconservation_sustainabledesign.aspx*
Boston, Massachusetts. Boston passed a city ordinance requiring all new local government buildings to be designed to meet LEED-Silver standards.	*http://www.cityofboston.gov/environmentalandenergy/buildings/*
Chicago, Illinois. The Chicago Standard for municipal buildings was developed based on LEED criteria, and is applicable to private sector development.	*http://www.buildings.com/ArticleDetails/tabid/3321/ArticleID/2475/Default.aspx*
Costa Mesa, California. Costa Mesa has adopted a sustainable municipal green policy that includes a requirement that all new municipal facilities be constructed to meet LEED-Gold standards.	*http://www.ci.costa-mesa.ca.us/departments/green-building/green-bldg.htm*
Denver, Colorado. In 2007, the mayor issued an executive order requiring new city building construction and major renovations to meet LEED-Silver energy and environmental criteria and achieve ENERGY STAR qualification.	*http://www.greenprintdenver.org/green-building-industry/greenprint-goals/*
Frisco, Texas. Frisco has developed a green building program that includes a public facilities initiative that requires all new public facilities to meet LEED-Silver certification.	*http://en.openei.org/wiki/Frisco_-_Municipal_Green_Building_Program_(Texas)*
Los Angeles. Los Angeles has developed a green building program that promotes green building practices in the private sector. The city has proposed adopting a policy to require public facilities to meet energy and environmental criteria.	*http://cityplanning.lacity.org/Code_Studies/GreenLA/Brochure.pdf*

10 ADDITIONAL EXAMPLES AND INFORMATION RESOURCES *(cont.)*

Title/Description	Web Site
Miami-Dade County, Florida. The county adopted an ordinance in 2005 to expedite permitting for commercial, industrial, and residential buildings that meet green building standards.	*http://www.co.miami-dade.fl.us/govaction/matter.asp?matter=052225&file=false&yearFolder=Y2005*
New York City Long-Term Plan to Reduce Energy Consumption and Greenhouse Gas Emissions from Municipal Buildings and Operations. In response to the mayor's directive to reduce local government GHG emissions by 30 percent by 2017 through energy efficiency, a city steering committee developed this long-term plan that outlines recommendations, expected costs, and implementation strategies.	*http://www.nyc.gov/html/planyc2030/html/plan/energy_reduce-consumption.shtml*
Orinda, California. Orinda is attempting to become the first municipality in California to design and construct a LEED-Gold-certified city hall.	*http://www.sfgate.com/cgi-bin/article.cgi?f=/c/a/2007/09/05/BAF7RT883.DTL*
Plano, Texas. Plano has adopted a policy to make new facilities and major renovations meet LEED-Platinum energy and environmental criteria.	*http://www.plano.gov/SiteCollectionDocuments/Volunteer Program/SES_Overview.doc*
Portland, Oregon. The city of Portland has adopted a green building policy for municipal buildings.	*http://www.portlandonline.com/shared/cfm/image.cfm?id=112689*
San Antonio, Texas. San Antonio requires new municipal facilities to meet the LEED-Silver rating.	*http://www.sanantonio.gov/oep/SustainabilityPlan/Appendices/Initiative%2010/COSA%20Sustainability%20Inventory.pdf*
San Diego, California. San Diego has established a number of incentive programs to encourage green building and energy efficiency in the private sector.	*http://www.sdcounty.ca.gov/dplu/greenbuildings.html*
San Francisco, California. San Francisco has adopted LEED-Silver criteria for new construction and major renovation of public facilities. In addition, effective in November 2008 the city adopted green building requirements for private sector facilities.	*http://www.sfenvironment.org/our_programs/topics.html?ssi=8&ti=19*
Scottsdale, Arizona. In 2005, Scottsdale became the first city in the nation to require local government buildings to be designed to meet LEED-Gold standards.	*http://www.scottsdaleaz.gov/greenbuilding/LEED*
Somerset County, New Jersey. Somerset County is encouraging new public facilities to meet LEED energy and environmental criteria. The county has developed a technical toolkit for municipal engineers.	*http://www.scbp.org/member/documents/thetoolkit.pdf*
Washington, D.C. In 2006, Washington, D.C., passed legislation requiring new non-residential buildings greater than 10,000 square feet to be designed to achieve 75 points on the Target Finder energy performance scale and to be verified as achieving LEED-Silver standards within two years of occupancy.	*http://www.dccouncil.washington.dc.us/images/00001/20061218152322.pdf*
Incentives for Energy Efficiency in Residential and Commercial Facilities	
Riverhead, New York. Riverhead has decided to reduce the permitting fees associated with installing certain energy conservation devices on residential and commercial buildings.	*http://www.dsireusa.org/incentives/incentive.cfm?Incentive_Code=NY42F&re=1&ee=1*
Springfield, Missouri. The Springfield municipal utility offers numerous rebates for energy efficiency investments in residential and commercial buildings. The utility also offers low-cost energy audits for residential customers.	*http://www.cityutilities.net/conserve/res_pgms.htm (residential) and http://www.cityutilities.net/conserve/com_pgms.htm (commercial)*

10 ADDITIONAL EXAMPLES AND INFORMATION RESOURCES *(cont.)*

Title/Description	Web Site
Information Resources for Energy Efficiency in Local Government Operations	
Building Investment Decision Support. This document provides an overview of the qualitative and quantitative benefits of high-performance buildings.	*http://www.aia.org/aiaucmp/groups/ek_public/documents/pdf/aiap080050.pdf*
Clean Air, Cool Planet. Clean Air, Cool Planet is a partnership that works with communities in the Northeast to adopt policies that reduce climate change impacts. The Web site offers a community toolkit that includes case studies of several communities that have implemented energy efficiency improvements.	*http://www.cleanair-coolplanet.org/for_communities/index.php*
Community Jobs in the Green Economy. The Apollo Alliance developed this report to outline the community economic benefits of investing in energy efficiency and renewable energy.	*http://apolloalliance.org/downloads/resources_Community_Jobs_in_the_Green_Economy.pdf*
Counties and Residential Green Building Standards. This NACo fact sheet provides information on the benefits of a number of county and residential green building programs.	*http://www.naco.org/programs/csd/Green%20Government%20Documents/GB_Factsheet_Counties%20and%20Residential%20Green%20Buildings%20Standards.pdf*
Energy and Environment Best Practices. The U.S. Conference of Mayors produces this report each year to highlight local government initiatives.	*http://usmayors.org/uscm/best_practices/EandEBP07.pdf*
Energy Conservation Tips for Local Governments. This list of conservation strategies was developed by the Idaho Department of Environmental Quality.	*http://www.deq.state.id.us/multimedia_assistance/p2/gov_energy_conserve_fs.pdf*
Energy Guide: Achieving Energy Efficiency in County Facilities. This NACo guidance document provides information to local government on steps they can take to improve energy efficiency in their facilities.	*http://www.naco.org/programs/csd/Green%20Government%20Documents/EE_Report_Energy%20Guide_Achieving%20Energy%20Efficiency%20in%20County%20Facilities.pdf*
ENERGY STAR Building Upgrade Manual. This document serves as a guide for planning and implementing facility upgrades. The manual provides assistance in developing a comprehensive energy management strategy.	*http://www.energystar.gov/index.cfm?c=business.bus_upgrade_manual*
ENERGY STAR Challenge Training for Local Governments. ENERGY STAR offers free online training sessions for local governments participating in the ENERGY STAR Challenge.	*http://www.energystar.gov/ia/business/government/training_sessions.pdf*
ENERGY STAR Performance Contracting Best Practices. This primer identifies best practices for using ENERGY STAR tools and resources in the field of energy performance contracting.	*http://www.naesco.org/resources/industry/documents/2008-05.pdf*
ENERGY STAR: State and Local Legislation Leveraging ENERGY STAR. This Web site provides descriptions of several state and local governments that have adopted ENERGY STAR policies for public facilities.	*http://www.energystar.gov/ia/business/government/State_and_Local_Legislation.pdf*
Energy-Aware Planning Guide. This guide, developed by the California Energy Commission with the assistance of representatives from 49 local governments, identifies energy-related planning opportunities in land use, transportation, buildings, water use, and waste management.	*http://www.energy.ca.gov/energy_aware_guide/index.html*
Fast Facts on Energy Use. EPA's ENERGY STAR Challenge program has developed a fact sheet on national energy consumption and the benefits of participating in the ENERGY STAR Challenge.	*http://www.energystar.gov/ia/business/challenge/learn_more/FastFacts.pdf*
Financing Energy Efficiency Projects. This ENERGY STAR article describes how energy cost savings can be used to finance energy-efficiency investments.	*http://www.energystar.gov/ia/business/government/Financial_Energy_Efficiency_Projects.pdf*

10 ADDITIONAL EXAMPLES AND INFORMATION RESOURCES *(cont.)*

Title/Description	Web Site
Flex Your Power Municipal Best Practices Guide. This guide provides assistance to local governments on improving energy efficiency and energy conservation. A number of case studies are available through this Web site.	*http://www.fypower.org/bpg/index.html?b = institutional*
Florida Green Local Government Standard. A collection of local governments joined with the Florida Solar Energy Center to develop this standard, which encompasses community-wide criteria as well as "in-house" practices.	*http://www.floridagreenbuilding.org/db/?q=node/5751*
Green Purchasing in County Offices. This brochure, produced by the National Association of Counties, provides a number of strategies for local governments looking to adopt environmentally preferable purchasing policies.	*http://www.naco.org/programs/csd/Green%20Government%20Documents/Green%20Purchasing%20in%20County%20Offices%20(Factsheet).pdf*
A Guide to Greening Your Bottom Line Through a Resource-Efficient Office Environment. This City of Portland Office of Sustainable Development guidebook includes helpful information on behavioral adjustments local governments can make to reduce building and operations energy consumption.	*http://www.oregon.gov/ENERGY/CONS/BUS/docs/Green_Office_Guide.pdf*
Guide to Preparing Feasibility Studies. This California Energy Commission report provides guidance to local governments in assessing the feasibility of potential energy efficiency activities.	*http://www.energy.ca.gov/reports/2000-03-20_400-00-002.PDF*
High Performance Cities. This Apollo Alliance document serves as a guide to energy-saving policies for local governments and provides multiple case studies.	*http://www.cows.org/pdf/econdev/apollo/rp-high_perform_cities.pdf*
Historic Building Energy Efficiency Guide. Boulder, Colorado, has developed this guide for implementing energy efficiency improvements in historic buildings. Energy efficiency improvements can be implemented without compromising historic authenticity and architectural or aesthetic integrity.	*http://www.bouldercolorado.gov/index.php?option=com_content&task=view&id=8217&Itemid=22*
Jobs from Renewable Energy and Energy Efficiency. This fact sheet provides statistics on the economic and jobs impacts of investing in renewable energy and energy efficiency in the U.S.	*http://www.globalurban.org/Environmental%20and%20Energy%20Study%20Institute%20Fact%20Sheet%20on%20Jobs%20from%20Renewable%20Energy%20and%20Energy%20Efficiency.pdf*
Leading by Example: Streamlining EE in the Local Government Sector. This ACEEE Summer Study paper describes the Association of Bay Area Government Energy Watch programs. The paper provides information on energy efficiency barriers that the programs have encountered and addressed.	*http://eceee.torped.se/conference_proceedings/ACEEE_buildings/2008/Panel_8/8_414/Paper*
LEED Initiatives in Governments and Schools. This U.S. Green Building Council Web site provides a list of LEED requirements in governments and schools, including a number of local government initiatives.	*https://www.usgbc.org/ShowFile.aspx?DocumentID=691*
Local Governments: An Overview of Energy Use and Energy Efficiency Opportunities. EPA has developed this fact sheet to provide local governments with an overview of resources available for improving energy efficiency in their facilities and operations.	*http://www.energystar.gov/ia/business/challenge/learn_more/LocalGovernment.pdf*
Municipal Green Building Policies: Strategies for Transforming Building Practices in the Private Sector. This report provides descriptions of local government policies for advancing green building in the private sector by establishing mandatory green building criteria, providing expedited review, and offering financial incentives.	*http://www.elistore.org/reports_detail.asp?ID=11295*
National Association of Counties *ENERGY STAR Courthouse Campaign*. Through this program, NACo provides assistance to county governments in improving energy performance in county courthouses by using the ENERGY STAR framework.	*http://www.naseo.org/taskforces/energystar/news/NACo_ENERGY_STAR_Courthouse_Campaign.pdf*

10 ADDITIONAL EXAMPLES AND INFORMATION RESOURCES *(cont.)*

Title/Description	Web Site
New Energy for Cities. This report by the Apollo Alliance lays out a four-part plan for how cities can develop clean energy technologies. The report includes a number of case studies.	*http://apolloalliance.org/downloads/resources_new_energy_cities.pdf*
New Hampshire Handbook for Energy Efficiency and Climate Change. This handbook was developed to provide local planners with information and resources on improving energy efficiency and addressing climate change at the local level through the planning process.	*http://www.carboncoalition.org/Conference/ConferenceDVD/NH%20Handbook%20on%20Energy%20Efficiency%20and%20Climate%20Change%20Volume%201.pdf*
Office Building Energy Use Profile. The National Action Plan for Energy Efficiency has developed a profile of office buildings in the U.S. that provides information on average energy consumption, cost, and end-use figures.	*http://www.iluvtrees.org/wp-content/uploads/2009/05/iltofficebuildingprofile.pdf*
Philadelphia High Performance Building Renovation Guidelines. This document provides guidance on 12 major project types. Each guideline includes an overview of project materials, implementation strategies, and benefits.	*http://www.phila.gov/pdfs/PhiladelphiaGreenGuidelines.pdf*
Reduce Energy Use in Local Government Facilities Through Conservation Improvements. This Flex Your Power best practices guide uses examples from various California local governments to highlight strategies for improving energy conservation.	*http://www.fypower.org/bpg/index.html?b=offices*
Reduce Energy Use in Local Government Facilities Through Efficiency Improvements. This Flex Your Power best practices guide highlights strategies for improving energy efficiency in municipal buildings. It draws from the experiences of selected California local governments.	*http://www.fypower.org/bpg/index.html?b=institutional*
San Francisco Green Building Task Force Report. The city and county of San Francisco convened a task force to develop recommendations for green building standards in residential and commercial buildings.	*http://www.fypower.org/pdf/SF_GreenBuildingTFReport.pdf*
San Francisco Municipal Green Building Compliance Guide. This document provides guidance for the design and construction of new buildings in San Francisco.	*http://www.sfenvironment.org/downloads/library/gbcomplianceguide.pdf*
Selected Best Practices for Successful City Energy Initiatives. Prepared for the U.S. Conference of Mayors, this report provides case studies of 14 local governments. The report highlights diverse approaches to energy-related initiatives.	*http://usmayors.org/pressreleases/documents/bestenergy2001.pdf*
A Study of Green Building Programs in Our Nation's Communities. The American Institute of Architecture has developed this study on local green building programs. The study includes several case studies of local programs.	*http://www.aia.org/advocacy/local/programs/AIAS075254*
Summary of the Financial Benefits of ENERGY STAR Labeled Office Buildings. This report provides detailed information on the direct and ancillary financial benefits of earning the ENERGY STAR label for office buildings.	*http://www.energystar.gov/ia/partners/publications/pubdocs/Summary_of_the_Financial_Benefits_23June06_FINAL.pdf*
Sustainable Cities: Best Practices for Renewable Energy & Energy Efficiency. This Sierra Club report highlights the achievements of Austin, Chicago, Fort Collins, and Portland as leaders in implementing clean energy initiatives in the public and private local sectors.	*http://rmc.sierraclub.org/energy/library/sustainablecities.pdf*
U.S. General Services Administration Sustainable Design Program. The U.S. GSA administers a sustainable design program that works to incorporate energy efficiency and environmental features into GSA building designs. The program Web site includes a number of resources on sustainable design as well as a set of facilities standards for GSA-designed buildings.	*http://www.gsa.gov/portal/content/104462*

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