THE MAINE ENERGY HANDBOOK

A Resource for Municipalities on Energy Efficiency and Sustainable Energy
Preface

The Maine Energy Handbook is a comprehensive resource for Maine municipal energy efficiency and sustainable energy efforts. The handbook was produced to support the activities of the Energy Working Group, and is organized according to the Six Steps to Success:

- Step 1: Connect with Helpful Resources
- Step 2: Organize Efforts
- Step 3: Assess Energy Use
- Step 4: Identify Technologies and Projects
- Step 5: Identify Financing Options
- Step 6: Evaluate and Prioritize Projects

Individuals who may find this resource useful include representatives from: municipalities, communities, businesses, institutions, nonprofits, and government agencies—essentially, anyone with an interest in understanding how to achieve local energy savings in Maine.

Communities addressing local climate, sustainability, and other similar issues may find this guide useful for its information on how to organize, communicate, finance, and implement community-specific energy saving projects.

Recognizing the rapidly changing field of municipal energy activity and responses, Clean Air-Cool Planet (CA-CP) and the Greater Portland Council of Governments (GPCOG) intend to periodically update this handbook through the Energy Working Group. Errors and omissions are the sole responsibility of the author. The material in this handbook is supplemented by the Energy Working Group’s new online website, to be released in late 2010. Please see the current Energy Working Group webpage hosted by the Greater Portland Council of Governments to download the most up-to-date version of this handbook and for an announcement of the new website launch.
Acknowledgements

This Maine Energy Handbook is a joint initiative of Clean Air-Cool Planet (CA-CP), the Greater Portland Council of Governments (GPCOG), and the Energy Working Group. The mission of the Local Energy Committee Working Group is to reduce regional energy use and greenhouse gas emissions through strategic energy planning, public outreach and the provision of resources and technical support to municipalities and local energy committees. Much of the content in this report is reproduced or modified with expressed written permission from:

- the *New Hampshire* and *Connecticut* versions of the *Handbook on Energy Efficiency and Climate Change* by Clean Air-Cool Planet;
- the *Energy Star Building Upgrade Manual* by the Energy Star Program;
- the *State Climate and Energy Technical Forum Background Report on 5/20/2009* by Julia Miller; and
- the *Clean Energy Financing Guide* by the University of California, Berkley.

Images in the handbook were purchased or reproduced with the permission of the National Renewable Energy Laboratories, shx.hu, and public-domain-photos.com.

The creators of this handbook gratefully acknowledge the crucial initial support of the Roy A. Hunt Foundation in establishing the Climate Fellowship program. The current 2010 year placements are made possible partly through the generosity of David Hills, the Otto Haas Fund, the Cove Charitable Trust, and Climate Ride.

This project was hosted by the GPCOG offices and supervised by the following GPCOG and CA-CP Staff: Christa Kohler, Manager of the State and Local Government Program at Clean Air-Cool Planet Rebecca Lambert, Planner at GPCOG Steve Linnell, Senior Transportation Planner at GPCOG Anne Stephenson, Campus Outreach and Climate Fellows Coordinator at Clean Air-Cool Planet

Current Members of the Energy Working Group, many of whom contributed to the handbook, include: Peter Arnold, Chewonki Foundation Ann Archino-Howe, City of South Portland Giny Callan, New England Grassroots Environmental Foundation Merritt Carey, Maine Businesses for Sustainability Erik Carson, South Portland Brian Cataldo, Woodard and Curran Julie M. Churchill, Maine Department of Environmental Protection Peter Cooke, Maine Department of Environmental Protection Barbara DiBiase, NextCentury Energy Consultants and Maine Partners for Cool Communities Jeff Edelstein, Edelstein Associates Rob Ellis, Hour Exchange Portland Step One Weatherization Carl Eppich, Portland Area Comprehensive Transportation System Dana Fischer, Efficiency Maine Angela Griffiths, Warm Homes Cool Communities Chris Hall, Portland Regional Chamber of Commerce Anne Hewes, EcoMaine Ian Houseal, City of Portland Eileen Johnson, Maine Sustainability Training Institute
Christa Koehler, Clean Air-Cool Planet
Rebecca Lambert, Greater Portland Council of Governments
Steve Linnell, Greater Portland Council of Governments
Diane Milliken, Horizon Residential Energy Services
Paul Niehoff, Portland Area Comprehensive Transportation System
Robert Sanford, University of Southern Maine
Emmie Theberge, Natural Resources Council of Maine
Elizabeth Trice, Cumberland County
Beth Valentine, Maine Interfaith Power and Light
Cynthia Veit, Environmental Protection Agency Region 1
Angela Vincent, ICLEI – Local Governments for Sustainability
Jane West, Conservation Law Foundation

For more information on the Local Energy Committee Working Group, please contact Rebecca Lambert at rlambert@gpcog.org.
Getting the most from this Handbook

Recognizing that Mainers from all walks of life can have a meaningful impact in their community, this handbook was created to benefit a range of people—from citizens who have no familiarity with energy, organizing, or local governments—to government officials with a track record of success in local energy projects.

This handbook is NOT intended to be read from cover to cover, certainly not in one sitting. However, for readers just starting to understand local energy efforts, consider reading the first two sections, “Introduction” and “Six Steps to Success” to become familiar with the motivations and process for local energy efficiency.

The most practical approach to using this handbook is to view the detailed Table of Contents and click on the hyperlinked sections most relevant to you. Alternatively, you may soon find the handbook posted on the complementary website, where you can link friends and colleagues to specific parts of handbook material and resources.

If you seek help beyond the text included in this handbook, consider following the extensive list of resources and website links at the end of each Six Steps for Success chapter.

Best of luck in the important work that lies ahead.
Table of Contents

PREFACE .............................................................................................................................................. 1

ACKNOWLEDGEMENTS .................................................................................................................... 2

GETTING THE MOST FROM THIS HANDBOOK ............................................................................... 4

TABLE OF CONTENTS ..................................................................................................................... 5

INTRODUCTION ................................................................................................................................... 7

  BENEFITS OF ENERGY EFFICIENCY AND SUSTAINABLE ENERGY ........................................... 7
  IMPORTANCE OF INVOLVING LOCAL GOVERNMENTS IN ENERGY EFFICIENCY AND SUSTAINABLE ENERGY EFFORTS ........................................... 10
  LOCAL GOVERNMENT IN MAINE .................................................................................................... 11

THE SIX STEPS TO SUCCESS ......................................................................................................... 12

  IMPORTANCE OF THE SIX STEPS TO SUCCESS ......................................................................... 14

STEP 1: CONNECT WITH HELPFUL RESOURCES ......................................................................... 15

  1.1. COMMON SUPPORT NEEDS .................................................................................................. 15
  1.2 MAINE STATEWIDE SUPPORT PROGRAMS ............................................................................ 16
  1.3 MAINE LOCAL SUPPORT PROGRAMS ..................................................................................... 21

STEP 2: ORGANIZE EFFORTS ........................................................................................................... 22

  A NOTE FOR CITIZENS ON HOW TO INVOLVE LOCAL GOVERNMENTS IN LOCAL ENERGY EFFORTS ......................................................................................................................... 22

  2.1 COMMITTEE CREATION ........................................................................................................... 23
  2.1.1 Committee Structure Options .............................................................................................. 23
  2.1.2 Recruiting Members ............................................................................................................. 26
  2.1.3 Assigning Roles .................................................................................................................... 27
  2.1.4 Public Involvement .............................................................................................................. 28
  2.1.5 Running Meetings ............................................................................................................... 29

  2.2 STRATEGIC PLANNING ........................................................................................................... 29
  2.2.1 Mission Statement ............................................................................................................... 29
  2.2.2 Goal Setting ........................................................................................................................ 30
  2.2.3 The Energy Reduction Target .............................................................................................. 32
  2.2.4 Monitoring .......................................................................................................................... 33

  2.3 COMMUNICATIONS PLANNING ............................................................................................ 34
  2.3.1 External Communications ................................................................................................... 34
  2.3.2 Internal Communications .................................................................................................... 36

  2.4 ADDITIONAL RESOURCES .................................................................................................... 37

STEP 3: ASSESS ENERGY USE .......................................................................................................... 38

  3.1 DIFFERENT ASSESSMENT LEVELS ......................................................................................... 38
  3.2 ENERGY INVENTORY ................................................................................................................. 39
  3.2.1 Staff ..................................................................................................................................... 39
  3.2.2 Software Tools ...................................................................................................................... 40
  3.2.3 Collect Energy Data ............................................................................................................. 44
Introduction

This introduction briefly reviews, first, the benefits of energy efficiency and sustainable energy, second, the importance of involving municipalities in energy efforts, and third, how local governments in Maine work. Once you understand why and how others can benefit from energy action, you’ll be able to convince individuals and organizations to become part of your growing local movement.

Benefits of Energy Efficiency and Sustainable Energy

The Maine Local Energy Committee (LEC) Working Group agrees that energy efficiency and sustainable energy present a diverse range of opportunities across economic, environmental, social equity, security, and public health issues. Their views, represented below, are supported by a wide range of studies from government agencies, nonprofits, businesses, and academics.

Properly implemented, energy efficiency and sustainable energy efforts can help . . .

. . . the economy by saving money through reducing energy costs, creating and sustaining green jobs, and catalyzing overall regional economic development.

- A 2009 study conducted by McKinsey and Company found that the US could save $1.2 trillion by investing $520 billion in energy efficiency by 2020.¹
- A 2010 study by UC Berkley found that comprehensive energy efficiency and sustainable energy efforts could create four million jobs by 2030.²

---

A 2009 study by the University of Southern Maine shows how investing in energy efficiency in Maine businesses could save $450 million by 2020.\(^3\)

Efficiency Maine, also known as the Efficiency Maine Trust, has invested $66 million in efficiency since 2004. They have found that for every $1 they spend on efficiency they save $3 in energy costs.\(^4\)

A 2009 report by the Maine Office of Energy Independence and Security (OEIS) suggests that 85% of money spent on petroleum products was exported to other countries and states in the year 2008. In comparison, the OEIS reported that total 2008 Maine tax revenues were $3 billion.\(^5\) Exported dollars limit the potential to create quality Maine jobs.

The environment by mitigating the impact of climate changing emissions from fossil fuel combustion, protecting Maine agriculture and natural resource based industry, preserving species, and enhancing the sustainability of communities.

A 2007 study by the Energy Information Administration found that over 80% of America’s climate changing greenhouse gas emissions were from energy use.\(^6\)

A 2007 study convened by the Union of Concerned Scientists found that fossil fuel energy use contributed to the majority of climate changing emissions. The report suggests that climate change could alter the environment in a way that negatively impacts ecosystem resilience and biodiversity in land and aquatic ecosystems.\(^7\)

Social equity by making energy more accessible to all, improving social equity and economic justice, and improving the overall quality of life both regionally and globally.


The 2009 OEIS report found that while the average Maine family household spent just 5% of their income on transportation, heating, and electrical energy in 1998. The OEIS estimates that the average Maine family spent 20% of their income on energy in 2008, and will spend 45% in 2018. Rising energy costs will disproportionately impact low-income residents.

... security by improving regional resilience, promoting energy independence, and encouraging world peace.

- A 2007 report by retired military generals finds that climate change and energy dependence pose “a serious threat to America’s national security.” These threats included, but were not limited to, the impact of climate change and energy dependence on US soil, US military operations, and on global societal and political stability. The generals recommended all national security and national defense strategies be revised to address these concerns.\(^8\)

- The 2009 OEIS report finds that the US will face increased insecurity of fossil fuel energy supply in the face of increasing worldwide demand and the political instability of fossil-fuel rich nations.

... and public health by reducing air pollution.

- A 2009 book reports that “motor vehicles as a class are likely the single largest source of air pollution causing an estimated $93 billion in health and environmental damage annually in the United States. Although the United States has among the strictest air quality standards in the world, approximately 30,000 Americans die annually from respiratory illnesses due to car exhaust.” \(^9\)

- A 2010 report by the National Research Council found multi-million dollar negative public health impacts, in large part from increased incidence of asthma and respiratory ailments, from power plants and transportation vehicles powered by fossil-fuels. \(^10\)

---


Importance of Involving Local Governments in Energy Efficiency and Sustainable Energy Efforts

It is important for you to ensure local government involvement in local efforts to promote energy savings and clean energy. Local governments have jurisdiction over a wide array of sectors, policies and programs that influence energy use. For example:

- Local governments have set targets and implemented programs for increased energy efficiency, green procurement, and sustainable energy use in the government sector.

- Local governments can deploy community-scale renewable and other clean distributed generation in schools and government buildings.

- In conjunction with federal and state governments, local agencies oversee weatherization programs to improve energy efficiency in low-income housing and can incorporate efficiency and sustainable energy projects and standards in new affordable housing construction.

- Local governments have jurisdiction over public transit options and manage other public fleets. For example, they can purchase low-emission buses and alternative fuel vehicles to reduce energy and GHG emissions and take other actions to reduce fuel use such as route optimization and establishing anti-idling policies.

- Through local land use and transportation planning, local governments can reduce vehicle miles traveled (VMT), encourage smart growth, and invest in green infrastructure. Open space preservation, urban and community forestry, green roofs and other measures reduce the air conditioning energy needs by lowering ambient temperatures.

- Local governments can harmonize clean energy and climate actions with other state and local objectives, including:
  - Enhancing economic development and green job growth
  - Improving air quality and public health
  - Developing and applying new technologies that improve energy efficiency and save money
  - Ensuring a reliable and secure energy supply through the development of efficient power generation technologies and renewable energy resources

- Municipalities in charge of water treatment and wastewater management facilities can look for opportunities to achieve significant energy and GHG reductions. These facilities are typically the municipality’s largest energy consumers, accounting for 30 to 40% of the total energy consumed.

- Local government waste collection and landfill management can benefit from landfill gas to energy projects.

- Local governments are critical to enforcing efficient building codes, such as the new Maine energy efficient building code.

---

11 This material includes approved excerpts, modified from background materials prepared by Julia Miller for EPA’s State Climate and Energy Technical Forum meeting on May 28, 2009: State Programs for Building Local Government Climate and Energy Planning Capacity. Accessible at www.epatechforum.org
Local Government in Maine

Understanding the types of municipalities in Maine can help you understand the potential role of your local government in achieving the benefits of energy efficiency and sustainable energy. Studies show that towns with a smaller population have smaller local government budgets and therefore less local government staff. This may be one reason why smaller towns tend to be less active on energy efficiency and sustainable energy issues. This fact is illustrated by the average size of towns that applied for a piece of $6 million in local government energy grant funding in 2009. The average population of towns where local governments applied for a grant was 5,000, compared to an average population of 1,500 for towns where local governments did not apply for a grant.

Maine has a population of 1.3 million people who live in 917 ‘units of local government’. About 10,000 people occupy about half of the state’s landmass in a combined 427 townships categorized as the Unorganized Territory. The Unorganized Territory is not the focus of this handbook.

Instead, this study focuses on the 489 ‘local governments’ that have authority over municipalities, also referred to as ‘towns’ and ‘cities’ in this handbook. The following table shows the number and ratio of municipalities in each category by population size. Where does your town fit in?

<table>
<thead>
<tr>
<th>Population</th>
<th>Number of Municipalities</th>
<th>% of Municipalities</th>
</tr>
</thead>
<tbody>
<tr>
<td>10,000+</td>
<td>20</td>
<td>4%</td>
</tr>
<tr>
<td>5,000-9,999</td>
<td>45</td>
<td>9%</td>
</tr>
<tr>
<td>2,000-4,999</td>
<td>100</td>
<td>20%</td>
</tr>
<tr>
<td>1000-1,999</td>
<td>115</td>
<td>23%</td>
</tr>
<tr>
<td>Under 1,000</td>
<td>209</td>
<td>43%</td>
</tr>
<tr>
<td>Totals</td>
<td>489</td>
<td>100%</td>
</tr>
</tbody>
</table>

The primary purpose of local government is to provide public services, traditionally including responsibilities including: school curriculum, health regulations, road construction standards, election procedures, tax assessments, and the care of the old and needy. Recently, local government’s role has begun to address energy use inside government (to reduce taxpayer expenses on energy used for government operations) and in the community (to make living and conducting business in a municipality more affordable).

Towns may be managed differently depending on the size and character of a local government. About two in six towns in Maine employ ‘managers’ to conduct their business. An additional one in six hire ‘professional administrators’. All towns have some version of a board of elected officials that direct and conduct town business. Anywhere from three to seven members make up these boards in the form of a council or select board.

Managers, professional administrators, councilors, and selectpersons are important to involve in local energy efforts because they can help harness the authority of local government and the individual and institutional resources in a community.
The Six Steps to Success

Obviously, the Six Steps process will be useful to those of you just beginning local energy efforts. But so too are the Six Steps useful to those of you who have already been active: reviewing the steps can help you determine if you might have missed a critical piece of work! If you have accidentally missed a step along the way, simply bring it the attention of members of your local project. Addressing a missed step sooner than later can save you a lot of headaches and extra work.

Perhaps most importantly, following the Six Steps for Success will allow municipal officials, grant makers, volunteers, and other entities to understand why and how they can contribute to your local energy efforts.

Introducing the Six Steps to Success

For your convenience, the Handbook is separated into six sections, each discussing one of the Six Steps to Success. First, however, a number of alternative approaches to the process of local energy efforts are introduced. Hopefully, comparing these approaches to the Six Steps to Success will help you to design an approach tailored to your local energy initiative.

You may notice that the Six Steps to Success is a cyclical process, meaning your local effort may want to revisit each step periodically.
After reviewing the Six Steps, you may notice that there is no specific mention of how to ‘implement’ projects. You might ask why that step is missing—after all, your end goal is to implement projects that save energy and costs, right? The beautiful thing about the Six Steps process is that, when followed properly, implementation will follow in a natural and orderly fashion. Try it out for yourself!

**Alternative Approaches**
The Energy Working Group recommends you follow the Six Steps to Success approach for local energy efficiency and sustainable energy initiatives. The following alternative approaches are provided to help you understand possible variations on the Six Steps for Success model in your community.

All of the programs listed below propose the following steps be taken, in some order: 1) goal setting, 2) assessing energy use, 3) planning, 4) implementation, and 5) reflecting on progress. One or more programs also include the following steps: organizing efforts, public recognition of success, and providing opportunities for public participation in process.

You may notice that the guidelines of the following programs are very similar to the Six Steps to Success. This is because the Six Steps captures all of the important parts of these models to ensure your local Maine energy initiative doesn’t miss a beat!

**Efficiency Maine Template Project Planning Guidelines**
1. Create committee
2. Energy plan (assessment, target reduction, action plan)
3. Public participation opportunities
4. Implement concrete, measureable steps
5. Submit final report
6. Recognize achievements

**ICLEI – Local Governments for Sustainability Guidelines**
1. Inventory
2. Set goals
3. Create action plan
4. Implement action plan
5. Evaluate progress

**Energy Star Guidelines**
1. Make commitment
2. Assess performance
3. Set goals
4. Create action plan
5. Implement action plan
6. Evaluate progress

**Environmental Protection Agency (EPA) Community Energy Challenge Guidelines**
1. Take CEC Pledge
2. Assess energy use
3. Identify efficiency opportunities
4. Recognize success
Importance of the Six Steps to Success

Connect with Helpful Resources
- There are potentially hundreds of organizations that may support local Maine energy efforts. This step anticipates what kinds of assistance you may need and then explains exactly where you can look for help with grants, technical assistance, training, and more.

Organize Efforts
- Organizing helps gain support—including time and money—from individuals, organizations, and programs that may be able to help your project. This step explains how to achieve maximum impact with minimum effort and error.

Assess Energy Use
- No one can make quality decisions without quality information. This step shows how to locate the biggest areas of impact—and how to ensure measurements have been made to justify the investment of time and money in energy projects.

Identify Technologies and Projects
- There are hundreds of proven technologies and projects you can harness to achieve local energy savings. This step explains a selection of the most common technologies and projects you may seek to implement.

Identify Financing Options
- Finding the money needed to implement an energy project can be the largest barrier to local energy efforts. This step explains where to locate needed grants, incentives, and capital.

Evaluate and Prioritize Projects
- In order to confidently decide which projects will have the highest impact, you will need to analyze projects and agree on a process to prioritize projects. This critical final step brings together all previous steps into a final, compelling argument for investing time and money in energy projects.
Step 1: Connect with Helpful Resources

The first step in any local energy effort is to establish relationships with Maine organizations and programs that can help you overcome common obstacles. By connecting with these programs now, you may increase the impact of your work, avoid costly mistakes, and find other forms of encouragement and support along the way.

If you represent a municipality or local energy effort and do not have time to read through this step, be sure to contact at least one organization: Efficiency Maine. Efficiency Maine is the most well-networked and resourced statewide organization listed below.

1.1. Common Support Needs

At some point in time, everyone can benefit from the support of one or more of the helpful organizations listed below! Because each organization may be busy helping numerous other municipalities, establishing a relationship with these programs now will help you receive quicker help in the future.

The following is a table that summarizes the most common support needs according to the experience of Maine local energy efforts. Detailed explanations of each ‘common support need’ of local energy efforts follow the table.

<table>
<thead>
<tr>
<th>Enabling</th>
<th>Sharing</th>
<th>Assisting</th>
</tr>
</thead>
<tbody>
<tr>
<td>Commitments and rules</td>
<td>Ongoing information sharing</td>
<td>Coordination</td>
</tr>
<tr>
<td>Grants and financing</td>
<td>Local government information</td>
<td>Staffed technical assistance</td>
</tr>
<tr>
<td>Networking</td>
<td>Reports</td>
<td></td>
</tr>
<tr>
<td>Policy support</td>
<td>Trainings, webinars, and workshops</td>
<td></td>
</tr>
<tr>
<td>Recognition</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tools and model solutions</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Organizations and programs may be of help to your local effort in a variety of ways, including:

1. **Enabling** local efforts by creating a supportive framework for action.
   a. **Commitments and rules** such as programs that require municipal officials to sign a document committing them to an energy reduction target of 10% lower energy consumption by 2010. This allows municipalities to set goals much more quickly and credibly.
   b. **Grants and incentives** to reduce the financial barrier to local action.
   c. **Recognition** to acknowledge and reward active participants and encourage others to become active.
   d. **Networking** within and between local efforts, support organizations, and other stakeholders helps build active groups of stakeholders that can encourage, learn from, and collaborate with one another.
   e. **Policy support** to enact laws and regulations that encourage local activities and goals.
   f. **Tools and model solutions** such as a policy to help reduce building energy use that your municipality can sign into law. This allows municipalities to focus attention on creatively applying solutions instead of reinventing the wheel.

2. **Sharing** with local efforts by exchanging information about how to intelligently approach action.
   a. **Ongoing Information Sharing** between local efforts about the economics and lessons learned of projects, updated frequently, helps to quicken the adoption of energy efficiency and sustainable energy measures.
   b. **Local Government Information** to help members of local efforts understand how to best work within and across municipal governments.
   c. **Reports** that share information relevant to local efforts.
   d. **Trainings, webinars, workshops** to share information relevant to local efforts.

3. **Assisting** local efforts by providing interactive support.
   a. **Coordination** of local efforts by joint planning, joint implementation, and joint purchasing. This helps local efforts to work together in order to quickly and effectively allocate resources to local energy action.
   b. **Staffed technical assistance** to help guide local efforts through the sometimes complicated and technical steps of local action. This includes real-time expert guidance through one or more of the Six Steps to Success.

### 1.2 Maine Statewide Support Programs

The following section briefly explains how twenty-eight statewide organizations assist local Maine energy efficiency and sustainable energy efforts. Most of the programs listed in this section are free of charge.

1. **Clean Air – Cool Planet (CA-CP), [www.cleanair-coolplanet.org](http://www.cleanair-coolplanet.org)**
   CA-CP specialties include: networking opportunities through workshops; an easy-to-use energy inventory software tool called the Small Town Carbon
THE MAINE ENERGY HANDBOOK

Calculator (STOCC); a suite of informative trainings, workshops, and webinars; the Maine Energy Handbook to help guide your local effort; and staffed assistance to help your local energy committee.

2. Conservation Law Foundation (CLF), www.clf.org
CLF works on energy efficiency and sustainable energy policy on a local, regional, and state level, recently working to help towns develop and implement wind ordinances.

The DOE administers a range of grant programs, including the Energy Efficiency and Conservation Block Grant program for local governments. Note that some DOE grants are administered by Efficiency Maine. The DOE also has informative reports and webinars on energy efficiency for homes, businesses, and governments.

4. Efficiency Maine (EM), www.efficiencymaine.com
EM is the first stop to help identify grants and incentives for your Maine local government and community. A representative can help identify which EM grants and incentives your local effort is eligible to receive. EM also offers training to help staff run energy efficient buildings.

5. Environmental Funder’s Network (EFN), www.environmentalfundersnetwork.com
EFN periodically offers grants to Maine organizations, including local energy efforts.

6. EPA Community Energy Challenge (CEC), www.epa.gov/ne/eco/energy/energy-challenge
CEC requires a signed commitment to reduce energy use from your municipality. In return, you will receive access to: recognition, the EPA Portfolio Manager software tool, up-to-date information about other municipal energy efforts, trainings and webinars on how to use the EPA Portfolio Manager software tool in your town, and limited technical assistance.

Energy Star offers: a recognition program for highly energy efficient buildings, the EPA Portfolio Manager software tool, useful reports such as the Building Energy Upgrade Guide, and webinars on how to save money through energy efficiency.

8. EPA State and Local Climate and Energy Program (SLCEP), www.epa.gov/slclimat/
SLCEP offers a considerable amount of useful information for local energy efforts, including a highly useful webinar series as well as a website offering: tools and model solutions, reports, and links to previous webinars.

GPCOG offers comprehensive technical assistance and coordination to twenty-five member governments. Annual membership fee and location in GPCOG service area required. GPCOG also creates and disseminates models and resources to be used statewide.

10. ICLEI Local Governments for Sustainability (ICLEI), www.icleiusa.org
A $600± annual membership fee is required to receive the software and most benefits, including: networking and collaboration between municipalities, example ordinances, recognition as an ICLEI member government, the 2009 Clean Air-Climate Protection Software, technical assistance to help use the software, up-to-date information about other municipal energy efforts, information about how local governments work, and a range of reports and webinars helpful to local energy efforts.

Maine.gov is a website to learn about and connect with other local governments in Maine.

12. Maine Association of Nonprofits (MANP), www.nonprofitmaine.org
MANP provides resources and excellent, low cost trainings and written resources for effective nonprofit organization, management, communication, fundraising, and grant writing. A $100 membership fee gives access to online resources and reduces the cost of trainings, which run $25-$150± per session.

13. Maine Clean Communities (MC²), www.gpcog.org
MC² works to encourage clean and efficient municipal fleets. They may be helpful to your local energy committee in a number of ways, including: grants, policy support, recognition, model solutions, reports, webinars, and phone-based technical assistance related to clean and efficient municipal fleets.

MCF offers small to mid-sized grants that may be relevant to your local energy effort, including region- and mission-specific grants.

15. Maine Department of Environmental Protection (DEP) Governor’s Carbon Challenge (GCC), www.maine.gov/dep/innovation/gcc
GCC requires a signed commitment to reduce carbon emissions from your municipality. In return, you will receive access to a network of businesses and municipalities reducing energy use, recognition, a greenhouse gas inventory tool and reporting form, case studies on active municipalities, and limited technical assistance.

DEP Green Schools helps schools start down the energy saving path in a number of ways, including: mini-grants for student projects to reduce energy use; recognition; school energy audit toolkits; informative reports and webinars; and technical assistance for students, teachers, staff, and administrators seeking to reduce energy use in a school.

DEP Idle Reduction supports student intern projects to reduce idling in a number of ways, including: mini-grants for intern projects; recognition; energy idling analysis toolkits; signs, stickers, and advertising videos to change local idling practices; model anti-idling ordinances; informative reports and staff training on social marketing; and support for intern projects to change.

18. Maine Department of Transportation (MDOT), www.maine.gov/mdot
Maine DOT works supports municipal transportation initiatives in a number of ways, including: state and federal grants it periodically offers to towns; informative reports, trainings, and webinars on how to reduce community transportation fuel use, and technical assistance for community transportation efficiency initiatives.

Maine Initiatives offers small to mid-sized grants that may be relevant to your local energy committee.

EWG provides models and resources for local energy committees around the state.

21. Maine Partners for Cool Communities (MPCC), www.coolmaine.org
MPCC accepts a signed Mayors for Climate Protection Agreement to reduce energy and carbon emissions from your municipality. In return, your local energy committee will become part of the MPCC network of municipalities and benefit from reports, model solutions, recognition, and limited technical assistance.

22. Maine Power Options (MPO), www.mainepoweroptions.org
MPO staff will work with you to see if their joint purchasing programs, which can reduce electricity and fuel oil costs by up to 20%+, may be a good fit with your municipality.

23. Maine Municipal Association (MMA), www.memun.org
MMA offers the free 2005 “Local Government in Maine” guidebook, case studies demonstrating lessons learned from municipal energy efficiency efforts, and a suite of members-only resources. Membership fee required.

MOEIS offers important resources and policy documents to help municipalities understand the state’s energy situation.

MSPO offers smart-growth planning technical assistance and resources.

NRCM offers policy advice, a network of statewide activists, and a Business Guide to Energy Efficiency.

27. New England Grassroots Environment Fund (NEGEF), www.grassrootsfund.org
NEGEF offers small grants ($5000 and lower) for local environmental movements. There was a 60% acceptance rate for applications as of 2009.

USGBC accepts a signed commitment to green municipal buildings. In return you will receive access to resources and recognition.
<table>
<thead>
<tr>
<th>Enabling</th>
<th>Sharing</th>
<th>Assisting</th>
</tr>
</thead>
<tbody>
<tr>
<td>Commitments and Rules</td>
<td>Grants and Financing</td>
<td>Networking</td>
</tr>
<tr>
<td>CA-CP</td>
<td>✗</td>
<td>✗</td>
</tr>
<tr>
<td>CLF</td>
<td>✗</td>
<td>✗</td>
</tr>
<tr>
<td>DOE</td>
<td>✗</td>
<td>✓</td>
</tr>
<tr>
<td>EM</td>
<td>✗</td>
<td>✓</td>
</tr>
<tr>
<td>EFN</td>
<td>✗</td>
<td>✓</td>
</tr>
<tr>
<td>EPA CEC</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>EPA Energy Star</td>
<td>✗</td>
<td>✗</td>
</tr>
<tr>
<td>EPA SLECP</td>
<td>✗</td>
<td>✗</td>
</tr>
<tr>
<td>EWG</td>
<td>✗</td>
<td>✗</td>
</tr>
<tr>
<td>GPCOG</td>
<td>✗</td>
<td>✗</td>
</tr>
<tr>
<td>ICLEI</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Maine.gov/local</td>
<td>✗</td>
<td>✗</td>
</tr>
<tr>
<td>MANP</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>MC2</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>MCF</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>MDEP GCC</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>MDEP Green Schools</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>MDEP Idle</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>MDOT</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Maine Initiatives</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>MPCC</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>MPO</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>MMA</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>MOEIS</td>
<td>✗</td>
<td>✓</td>
</tr>
<tr>
<td>MSPO</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>NRCM</td>
<td>✗</td>
<td>✗</td>
</tr>
<tr>
<td>NEGEF</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>USGBC LGP</td>
<td>✓</td>
<td>✓</td>
</tr>
</tbody>
</table>

---

**Table Notes:**
- ✓: Indicates the presence of a resource or service.
- ✗: Indicates the absence of a resource or service.

**Organization Abbreviations:**
- CA-CP
- CLF
- DOE
- EFN
- EPA CEC
- EPA Energy Star
- EPA SLECP
- EWG
- GPCOG
- ICLEI
- Maine.gov/local
- MANP
- MC2
- MCF
- MDEP GCC
- MDEP Green Schools
- MDEP Idle
- MDOT
- Maine Initiatives
- MPCC
- MPO
- MMA
- MOEIS
- MSPO
- NRCM
- NEGEF
- USGBC LGP
1.3 Maine Local Support Programs

In addition to the programs listed above, there are other organizations that can be of assistance to your local energy effort. These groups are generally active locally or regionally. Depending on where you are located within the state, these organizations may be more or less active in supporting your local effort—you will need to contact each organization to determine how you may work together for local energy action. See the links below and appendix for full lists of programs and contact information.

1. County Governments, Regional Planning Commissions (RPCs), Councils of Government (COGs), and Economic Development Districts (EDDs)
   www.maine.gov/local
   http://www.maine.gov/spo/landuse/techassist/regionalcouncillist.htm
County governments, RPCs, COGs, and EDDs generally have the mission to assist with community economic development and planning efforts. You should contact these organizations to determine if they have relevant grant programs, direct assistance, or resources.

2. Local Energy Committee (LECs) in Maine
   LECs have learned many lessons in the course of their work. Use them as resources for questions you encounter during your own work by contacting experienced members. An updated list of LECs is available here.

3. Colleges and Universities, www.mainecompact.com and
   http://www.maine.gov/portal/education/colleges.html
Many colleges and universities, as well as associated efforts like the Sustainability Training Institute, are looking for opportunities to match students, faculty, and staff abilities with local energy efficiency and sustainable energy efforts. Contact your local college or university, the Green Campus Consortium, or the Maine Campus Compact to learn more about how you can collaborate with your local university.

4. Consultants, Engineers, Auditors, Energy Service Companies (ESCos), and other private firms
Each of these types of private firms can provide technical and skilled services for your local energy effort—at a cost. Check your local listings or contact Efficiency Maine.

5. Chambers of Commerce
Your local Chamber of Commerce may provide essential networking, fundraising, and strategic planning support.
Step 2: Organize Efforts

Now armed with the support of a wide range of organizations and individuals, it’s time for you to organize your efforts. The process of organizing may seem like a speed bump impeding your forward momentum. However, future progress will come more quickly and smoothly—and momentum will be more easily maintained—with a well-organized effort.

There are three main components to completely organizing local efforts: committee creation, strategic planning, and communications planning. You may not need to complete all three steps—which is fine, as long as you understand the importance of each step and find that, given competing priorities and timelines, your planned course of action is most appropriate in your specific situation.

Organizing efforts helps to:

1) Clearly define who has authority to make decisions
2) Provide a structure with which individuals, organizations, and municipalities can easily interface
3) Provide a structure upon which further efforts can grow
4) Ensure the sustainability and momentum of work beyond the political term or involvement of a single individual
5) Share the workload across individuals
6) Bring a diversity of perspectives and resources to bear on decisions
7) Reduce tensions that can arise from miscommunication or a lack of transparency

A Note for Citizens on How to Involve Local Governments in Local Energy Efforts

Make no mistake about it, gaining a commitment to address energy efficiency and sustainable energy from local government—or any organization—requires the right approach. Step 2: Organize Efforts, explains a helpful process you can follow in order to make allies instead of enemies out of municipal officials and others involved in local energy efforts.

The introduction to the Maine Energy Handbook clearly illustrated huge benefits to energy efficiency and sustainable energy. “Therefore, we need to start taking action at this very instant!” you say. But this kind of approach—demanding action now without explaining benefits to the municipality—will not only alienate municipal officials, but also ensure a slow, cautionary response from municipal staff going forward. There are many competing priorities for a municipal government officials, energy being just one of many.

By keeping a town government’s interests in mind, you will be able to convince a municipality to engage energy efficiency and sustainable energy issues with some patience and the right approach, or ‘process.’ By following a process that clearly defines the steps needed to achieve a goal, you will be speaking in a municipal official’s language. You will reduce the municipal staff’s uncertainty about what will be specifically required from the municipality and the steps needed to achieve efficiency and sustainable
energy benefits. Most importantly, you won’t be making the mistake of immediately scaring the municipality into a defensive stance with a demanding but unspecific call for action.

So read the following section carefully, and when acting as a project catalyst be sure to frame any request of municipal government involvement in terms of how their support fits into the overall process and how they can benefit from involvement. Followed by equal doses of persistence and patience, your efforts will soon begin to have amazing impacts on energy use in your community.

2.1 Committee Creation

The Introduction to the Maine Energy Handbook focused on the importance of local government involvement in local energy efforts. Conceivably, then, couldn’t a single municipal staff person drive energy efficiency and sustainable energy efforts by themselves? In Maine, experience tells us that is generally not the case. Except for large or progressive governments like Portland or Freeport, respectively, municipal offices are generally too small or unfocused to hire specialized staff that can administer energy programs. In many municipalities, there is already insufficient staff time to address many essential core municipal services like road maintenance, licensing, and tax collection.

Even so, local governments that have initiated energy efforts from within government have still found it useful to involve the public in local energy reduction initiatives. After all, governmental operations typically only account for 1-3% of energy use in a town!

The fact is that local energy efforts are a team affair for local Maine governments. Most Maine municipalities addressing energy issues have organized local energy committees (LECs). An LEC helps provide a process for interested citizens, businesses, nonprofits, and institutions, and government agencies to interface with local efforts. As Maine municipalities have found, the involvement of individuals and organizations in addition to paid municipal staff is critical to the success of a local energy effort.

2.1.1 Committee Structure Options

There are a number of different local energy committee ‘structures’ that you can use to advance a local energy project. The committee structure you choose will depend on such factors as buy-in from the local government, the municipality’s capacity to “staff” the committee, volunteer capacity, funding sources, the complexity of the project, and the most strategic way to advance short- and long-term goals.

If you are not sure if there is an LEC in your community, check the active LEC list in the Additional Resources section and ask around to see if your community has already organized. If there has been no local activity, gain brief familiarity with the remainder of this handbook before taking the initiative to organize the local movement.

The different types of committee structures discussed include:
Administrative Committee
Typically, this type of committee would form under the local governing body or ranking administrative official in the town. Most local energy efforts in Maine are organized as administrative committees to the municipality. Some elements of this committee worth attention during formation are:

- These committees may have more legitimacy in the public's eye, more direct access to the town and the Board of Selectmen, and municipal funding for initiatives.
- These committees would likely include one-three municipal department heads and other officials, and may function more effectively at start-up because of their greater access to information and town records.
- As with any government-related committee structure, such groups must be aware of attempts to influence their outcomes and limit their autonomy. The committee must be ready to deal with such influences by focusing on their goals, objectives, and mission statements.

Conservation Commission Subcommittee
If the governing body has signaled reluctance in supporting these efforts or is not ready or willing to advance a proposed initiative, it might be more beneficial to form a subcommittee of the Conservation Commission.

- Such a committee may have less buy-in from government officials and face an uphill battle for municipal projects.
- These committees may find more support from the Conservation Commission in terms of educational efforts.
- Such committees may benefit from the established reputation and educational channels of the Conservation Commission.
- Committees in this form would likely focus on education and influence rather than actual projects for their accomplishments.

Planning Board Subcommittee
The Planning Board may represent a balanced approach for some communities. Given its experience with fiscal realities (through its own examination of municipal expenses gathered mostly though capital improvement planning and impact fee development) and its foundation in the development process, planning boards are exposed to a wide range of development issues, costs, and should have been exposed to a number of issues relating to environmental impacts, economic development, and utility planning.

- Such a committee would benefit from the information already available to the planning board in the master plan and, if present, a capital improvements program.
With support and input from the board, these committees would have greater ability to assess and influence the regulatory process for the town if such a project is desired. These committees may not be as closely connected to the day-to-day fiscal decisions as an administrative committee but may benefit from long-range planning abilities. The planning board support could include funding, expertise, and consistency as these committees form.

Ad-hoc Energy Committee
The most “grassroots” form for an energy committee is the ad-hoc version. Potentially existing completely outside the municipal process, such a committee still has its own benefits and concerns and may be the only effective format in certain cases.

- Such committees could rise where there is simply a lack of will or support to establish a town-authorized committee.
- These committees would be challenged to prove their worth and must make important initial decisions about their goals and objectives.
- Committees may initially decide to try to influence the town administration to recognize the ad-hoc committee, or they may choose to forgo this challenge and dive right into some real grassroots projects.
- Committees may find themselves leaning toward this form if they are inclined to be free of any influence or control from the government structure.
- One great opportunity in such committees is the ability to look beyond the town’s boundaries for members, projects, and influence.

Nonprofit Organization
The nonprofit approach may be the appropriate option for serious local energy efforts, especially those that involve a large number of both municipal and/or community members. Note that a nonprofit may or may not be incorporated, such as nonprofits incorporated as 501(c)3 organizations.

- Nonprofits may be best suited to engage and manage a large number of volunteers, to work with stakeholders across sectors and municipal boundaries, and to work across a wide range of issues (such as energy and community gardens).
- Nonprofits take a considerable amount of time, effort, and money to create and maintain. The benefits of creating a nonprofit might be obtained more quickly and at less cost by collaborating with an existing nonprofit, for example, by becoming a program of a local environmental nonprofit organization.
- Like all efforts, the commitment of municipal officials and employees to the nonprofit can lend credibility to efforts.
- Nonprofits may be best positioned to generate sustainable public and private funding sources to supplement municipal contributions.

Government Office “Green Team”
The office green team is one tool that can be used on its own or in concert with other structures to green government office buildings and operations. Generally, only employees of a municipality can serve on office green teams. A municipality can create a single office green team for all government operations, or multiple office green teams based on departments (such as administration, police, and public works) or areas of government operations (such as buildings and fleets).
The office green team typically focuses on reducing the impact of running government, such as through building use policies, government building retrofits, employee training, green purchasing, and other in-house decisions. The office green team can provide an outlet for interested employees to help make their workplace more energy efficient and desirable. This office green team will generally not provide opportunities for public input or extensive public outreach. They may serve as the basis for recommending the creation a committee (such as those listed above) to help implement these and other changes.

Subcommittees and Project Teams
Subcommittees and project teams can help expand the number of people and organizations engaged in a project and to expand the impact of a local energy effort. They typically require that a new or existing local energy committee (LEC) approve, direct, and otherwise support subcommittee efforts. An LEC may, for example, create a project team to plan and implement building energy audits for all municipal buildings. The project team would periodically report results back to the LEC, and eventually be dissolved once the audit process was completed.

2.1.2 Recruiting Members
How many to include?
Once the committee structure has been agreed upon, it’s time to decide the ideal number and types of people to be involved in the local energy committee (LEC). Ideally, each LEC should have five to eight individuals representing various constituencies who are interested in working on energy issues. Aim to secure support and establish a coalition of partners who will lend capacity, diversity, and expertise to efforts. Note that it is possible to involve more than eight people in efforts by using subcommittees and project teams.

Who to include?
The Maine EECBG Template Project Grant application recommends creating a “Community Energy Planning Committee,” an administrative committee with the following five to eight members including:

- citizen(s),
- member(s) of the town government,
- member(s) of the business community,
- a representative of the school community,
- a student, and
- members of the transportation/waste management sectors (optional).

Depending on your LEC goals, consider seeking out individuals with the following alternative characteristics or associations, including:

- website builders;
- energy auditors and engineers;
- contractors of efficient construction;
- academics;
- someone with fundraising and financial decision-making experience;
- someone with a significant amount of time to dependably coordinate the process, such as a retired individual or a paid consultant;
someone with volunteer management experience;
someone with project management experience;
someone with nonprofit administration experience; and
someone with marketing and communication experience.

How to recruit members?
There are two methods that can be employed to recruit members. The first method is a closed process where an individual in an authority position, such as a municipal official, consults with different stakeholders and then personally invites participation into the LEC. Members that accept the invitation then serve on the LEC. The second method is an open process that invites applications for positions. A board of municipal officials, experts, and others can then judge community interest and evaluate applications. This approach can help engage a diverse set of participants. See the Additional Resources section for an example of what a sample application may look like.

A town energy committee is an excellent way to encourage community volunteerism from individuals who may not have been involved in town activities or citizen action in the past. Look to fresh faces for some of the committee members – existing town committee members are often tapped out!

Suggestions for finding these new faces include: advertising in the local paper (perhaps getting the paper to cover one of your meetings), tabling at community events, or having involved members contact interested friends and colleagues.

Make sure to offer people opportunities for involvement besides coming to meetings, such as tabling, making phone calls, or helping with office work. Use people’s strengths in innovative ways, such as asking a local graphic artist to design a flyer, or someone who is good with numbers to conduct the inventory of buildings. Since most people are very busy, offer one-time involvement opportunities such as an opportunity to put up flyers or to organize a specific project. It is important to be creative to involve a wide variety of people.

2.1.3 Assigning Roles
To ensure continued project momentum, your LEC should consider assigning the following types of project responsibilities to your members. Note that roles may be shared among individuals but that only one person should ultimately be held accountable for progress in each area. For example, three people can assist in a project, but one person should be the “point person” who makes sure timelines are met and members stay well connected.

Every committee contains members with different skills and experiences. Your LEC can best use these strengths by sharing roles with those most interested and capable to complete the tasks at hand. The following represents a selection of roles that may be core to your position; feel free to establish new roles as necessary.

- Committee Chair – The committee chair is likely the ‘leader’ of your local energy effort. This person has a significant amount of time to stay aware of committee affairs and works to ensure goals are set and are continuously met on time. When selecting this person, choose someone inclined to motivate and manage existing members, as well as to recruit additional support for your LEC.
Committee Liaison – This member will be the first point of contact for the media, general community, and other municipal officials during a specified project. Typically, the committee chair serves in this role.

- Communication Coordinator/Webmaster – This member should be responsible for maintaining a website for your LEC and actively generating interest among community members and the greater public about the committee and the projects.
- Secretary – This member should be responsible for keeping committee’s meeting minutes.
- Assessment Coordinator – Select someone to manage the process of assessment. Someone experience with energy auditing or energy inventorying is ideal for this position.
- Project Lead – For every project, your committee should select a project leader who will be responsible for organizing tasks associated with that project.
- Financing Coordinator – Helps to evaluate projects and identify grant and other financing options to implement projects.

2.1.4 Public Involvement

Your local energy committee is concerned with the public, including organized and unorganized groups of citizens or citizen representatives who are inclined or able to help address local energy concerns. There are a number of benefits of involving the public. By involving individuals that are locally-aware yet with different perspectives, public involvement leads to better, more informed decisions regarding energy issues. In addition, citizens or citizen representatives provide a larger network and more buy-in to create a sustainable and powerful local energy effort. Public involvement also helps to increase the legitimacy of local energy efforts among the community, as well as to protect a LEC from outside criticism.

A number concerns may arise when involving the public. It may require more time from LEC committee members or municipal staff to coordinate the public opinions and initiatives brainstormed during public involvement. (Consider, however, that the public may actually reduce the total amount of work needed by sharing workload with town staff or other LEC members.) Public involvement will decrease the level of control over goals, objectives, and message. Public involvement also requires attention be paid to including a balanced and representative group of individuals.

Sustain Mid-Maine Coalition

Sustain Mid-Maine Coalition (SMMC) is an example of a nonprofit 501c3 local energy effort that was created and remains fueled by public participation. SMMC evolved out of efforts of the municipally-staffed Waterville Sustainability Committee. The Waterville Sustainability Committee decided to hold a three-day strategic planning process for the Mid-Maine area. Sixty individuals participated in the event representing business, government, nonprofits, academia, and the community.

The strategic planning process, facilitated by the Running Start Institute, led to the creation of teams in Energy, Transportation, Recycling, Education, and Local Food. Teams are comprised of local government representatives and community members. The organization is staffed by a sustainability coordinator who seeks public and private funding for initiatives and coordinates the committees. According to survey results from over 100 community members in the mid-Maine area, the plans that guide each teams work are highly agreed upon. See the Additional Resources section for a copy of the survey results.
In the first year and a half of activity, SMMC members have started community gardens, reached over a thousand citizens through public education events, and collected over $200,000 of grant funding. For more information see www.sustainmidmaine.org

2.1.5 Running Meetings
Meetings should be held anywhere from once per week to four times a year, depending on the role of the local energy committee (LEC). A single facilitator should be chosen to run a meeting from start to finish. Meeting agendas with timelines help to keep discussions on track and ensure that a meeting does not get caught pursuing “endless discussions.”

Do not switch topics or end a meeting without making a clear determination as to whether or not action needs to be taken. In the case that action needs to be taken, your LEC should determine what the needed action(s) are or will be, and then determine who has the responsibility to complete these actions. Asking “what is the next action?” at all meetings will help provide clarity, focus, energy, and momentum to your committee.

There are dozens of books printed just on the very topic of running effective meetings. Meetings are very important because complex personalities will come into play. See the Additional Resources section for information on how to run efficient and effective meetings.

2.2 Strategic Planning
Strategic Planning clearly determines what LEC goals are, how goals will be achieved, and how an LEC will know if it has achieved its goals. Just as with the wide range of approaches to creating a committee, there are a number of ways that organizations use strategic planning. This section gives a quick overview of strategic planning and provides resources if you wish to go through a more comprehensive strategic planning process.

2.2.1 Mission Statement
A mission statement describes the purpose for which your LEC exists. A mission statement will serve to guide the committee on a clearly defined course as new members join and the committee evolves. The mission statement is also an important branding tool that can help clearly communicate the importance of your LEC to the general public and other stakeholders. The mission statement will also help to form the goals and objectives discussed below. See http://bit.ly/Ovbn for more advice on how to write a great mission statement.

One of the most challenging decisions you may face at the initial stage of strategic planning is in determining the scope of your committee’s work. One type of decision about scope might be choosing what sectors your LEC will address: municipal, school, and/or community energy use? city hall energy use? low-income homeowner energy use? Another question in need of answer at this stage is which types of technologies and initiatives, if any, your LEC will focus on: sustainable energy technologies?
commercial economic development through development of an eco-park? energy efficient lighting technologies? municipal fleets?

Your LEC may find that briefly scanning Step 3: Assessing Energy Use and Step 4: Identifying Efficiency Technologies and Projects helpful in determining the scope of energy reductions in your community.

2.2.2 Goal Setting
Any useful local energy committee (LEC) effort will quickly seek to set measurable short- and long-term goals. (In this handbook, goals and objectives are considered one in the same). In addition to a mission statement, goals can help narrow the scope and focus of efforts. Concrete goals and timetables can help hold involved organizations and individuals accountable and ensure momentum is maintained in the group. Well-chosen goals can help bring your mission to life!

Keep the list of goals succinct and to the point. This will allow LEC members and others to quickly understand what an LEC wants to accomplish.

As much as possible, align goals with the priorities of the governing bodies involved in the decision-making process. For example, if a local government has a policy to cut the tax rate, try to ensure the majority of goals have net cost benefits to the municipality and its population. As illustrated by the figure at right, energy efficiency measures are more cost effective than sustainable energy measures. In order to fully determine the most cost effective energy efficiency and sustainable energy measures, however, you will have to first assess energy use. So if you are trying to reduce the most amount of energy and save the most amount of money (who isn’t?), your goals might want to focus on this pyramid of energy and cost saving priorities.

You might also consider aligning goals with the benefits of energy efficiency and sustainable energy as identified in the Introduction to the Maine Energy Handbook, including economic, environmental, public health, security, and social equity benefits. Also consider using the different stages of the Six Steps to Success as incremental goals for LEC progress.

Always attach a time value to each goal. If goals are revisited often, this will help your LEC ensure that progress is continuing at pace (rather than goals just being continuously deferred). In general, it makes sense to revisit goals at least on a quarterly basis. An example of a long term goal is to weatherize all town-owned facilities in three years. An example of a short term goal is to complete an energy audit on the town hall building in three months.

When considering new goals, remember that different members may feel particularly motivated toward one goal over another and attempt to push the LEC toward that goal. Despite the
individual feelings, setting goals requires your committee to weigh the pros and cons of each idea and then set your goals accordingly. Your committee will have certain strengths that you should build upon. You should gain a firm understanding of how best the expertise found in your committee can best serve to achieve energy reductions.

The Kittery Energy Advisory Committee

The Kittery Energy Advisory Committee (also KEAK or Kittery Save$) is an advisory committee to municipal staff on energy issues. The following excerpt from the Kittery Save$ website (http://www.kittery.org/pages/kitteryme_bcomm/energy) describes the goals and governance of the Kittery Save$ committee as follows:

Committee’s Mission: Reduce energy consumption and develop more sustainable energy practices in the Town of Kittery.

Goal/Objectives: Develop and recommend alternative energy and conservation guidelines, policies, programs, and projects that will assist the Town of Kittery in developing sustainable practices and reducing energy consumption in accordance with the US. Mayors Climate Protection Agreement, adopted by the Town Council on January 28, 2008, other State and Federal energy programs, and related initiatives.

Committee Governance: KEAC consists of community members committed to the goals of energy conservation and sustainability and an Executive Sub-Committee. Drawn from the larger group, the Executive Sub-Committee includes with 5 to 6 members designated by the town manager and a Town Council liaison. The Executive Sub-Committee reports the larger committee’s findings and recommendations to the Town Manager, who in turn periodically reports on KEAC’s efforts to the Town Council for their deliberation. Further, the Executive Sub-Committee annually prepares a work plan for the Town Council, which includes action steps and associated costs to achieve committee goals.

Development of an Annual Fiscal Year Work Plan and Budget: KEAC will prepare a work plan each year, which will be presented by the Executive Sub-Committee to the Town Manager and then to the Town Council at the Council’s first meeting in February. The work plan or its components and the associated costs will then be evaluated for inclusion in the Town budget for the coming year.

Membership: To seek the broadest input from Kittery citizens, members of Town Committees, and Town employees committed to the committee’s goals, membership in KEAC is open. Terms for community members are one year and may be renewed annually; terms for executive sub-committee members are two years and may be renewed. Prospective members must complete an application, providing contact information and areas of interest and expertise. Members must attend a minimum 3 KEAC meetings during the year to remain active members. Members who do not meet this minimum may not be considered for another term by the Town Manager with counsel from the Executive Sub-Committee. Annual renewal of membership is required through filing a membership renewal application with the Town Manager’s Office. Membership enrollment will be filed and updated with the Town Clerk on a quarterly basis.
2.2.3 The Energy Reduction Target

An energy reduction target is an important part of goal setting. Some say it is the ultimate measure of all progress, and for a reason. Say an LEC sets an energy target to reduce municipal government energy use by 10% in three years. Once this target is set, they will ensure other goals they set will collectively lead to a 10% reduction in energy use. If they meet all of the “little” goals, they should hit their “big” 10% reduction target!

An energy reduction target fosters both political will and creates a framework that guides the planning and implementation of goals. The most important things to consider in establishing a reduction target is that the target should be reasonable, measurable, transparent, and create accountability in the near term.

Performing a few more of the Six Steps to Success will provide the basis for your committee to establish reduction targets. If your LEC wants, they can set an energy reduction target right now. However, whether you are focusing on one building, the entire municipality, or the community-at-large, your LEC’s reduction target should be realistically based on your benchmarking and inventory data. You can revisit your initial target after your committee has completed the next few steps in the Six Steps to Success.

Biting off more than you can chew might present some unanticipated challenges. Therefore, make sure your fellow LEC members feel comfortable about the target and understand their role in achieving it. Also, don’t be afraid to request assistance for setting a target from rule-setting and technical assistance programs identified in Step 1: Connecting with Helpful Resources.

Many governments establish both long- and short-term energy reduction goals. The goals are important because they provide a sense of urgency by creating benchmarks or interim targets along the way. Targets should be defined as a reduction from a base year by a given year; for example, an energy reduction of 20% below the baseline year 2000 levels by target year 2020. Different targets can be set for municipal operations and for community energy use.
2.2.4 Monitoring

The most common mistake for individuals involved in local energy efforts is to accomplish progress (say, installing energy efficient lights), pump their fists in approval, and move onto the next task at hand. In fact, once you get up some steam it will be very difficult to pull back from exciting and likely important progress. But the key to successful progress, and not just momentum in some undefined direction, is to frequently take stock of how your accomplishments and proposed work relates to your original goals, and whether or not you’re on the right track.

Monitoring is the key process you will use to ensure you’re on track and to measure the impact of your efforts. Monitoring is one of the most underappreciated responsibilities of a local energy committee (LEC), but just as important as the others.

Depending on the strength, desires, and goals of your LEC, progress can be monitored either informally, formally, or somewhere in between. On one extreme, informal monitoring would involve LEC members meeting to discuss whether current and planned activities to progress were occurring rapidly enough. Formal monitoring, on the other hand, could involve a review in some or all of the following areas:

- **Mission Statement** – Look back on the full range of activities you’ve undertaken. Do they fit well within your mission statement?

- **Goals** – Have you or have you not met your goals? If not, identify challenges that have impeded progress and creative solutions to meet your goals—or modify goals to be realistic. Have you undertaken new activities not represented by your goals? Question whether or not those activities are necessary and fall within the scope of your committee’s work. If they are, add or modify goals to represent your current activity.

- **Targets/Timelines** – At least some of the goals set by your LEC should have a timeline associated with completion of that goal. If you haven’t already, consider establishing performance metrics, a standard practice among nonprofits and businesses, to encourage the efficiency, effectiveness, and general good practice of any organizational effort. Ask yourself: have goals whose deadlines passed been adequately met? For goals whose deadlines have not yet occurred, do adjustments need to be made in order to meet the deadline with the least amount of effort and maximum impact?

- **Committee Members and Stakeholders Tracking** – For the continuity of the organization and ease of committee expansion, it makes sense to maintain a single spreadsheet tracking individuals and organizations either actively involved in the LEC or with whom communication has been initiated. It may make sense to track names, contact information, and the specific nature and duration of the relationship. A periodically updated flow-chart of committee structure and organizational effectiveness can help clearly and visually track relationships.

- **Energy and Cost Savings** – A little foresight in monitoring energy and cost savings can go a long way. Having one person responsible for collecting all energy information will help mitigate the need to go through the time consuming process of digging up old (and even mysteriously missing) energy bills. First track energy use in an Excel spreadsheet and then analyze energy use data with Excel, EPA Portfolio manager, or other financial analysis software. See Step 3: Assessing Energy Use for more information.
2.3 Communications Planning

Well-run communications—externally, to the general public and internally, to stakeholder groups—will increase the strength of your local energy effort.

The difference between external and internal communication is generally a question of audience. Segments of the general public should be targeted for ‘external’ communication. Those audiences who are directly or may potentially be involved in local efforts should be receive some or all ‘internal’ or ‘stakeholder’ communication. As with all types of information exchange, communication performed by your local energy committee (LEC) may generate a range of reactions, both positive and negative. In fact, miscommunication or a lack of communication can stop your local energy committee efforts in their tracks! In order to deal with this reality, you should place at least some consideration, and ideally a moderate amount of planning, into your approach to communication. External communication demonstrates to the public that an LEC should be taken seriously—that an LEC has the ability to plan for and implement energy improvement changes. Publicity may help gather additional support (in the form of money or time) from interested individuals, organizations, and foundations. External communication is a proactive form of transparency and helps satisfy constituencies concerned that a local government or organization is tackling the energy issues. Finally, publicity about your LEC efforts could encourage individuals or even other communities to undertake energy saving initiatives on their own accord.

Internal communication keeps stakeholders and committee members up-to-date on the progress of the group. By sharing information with a limited group, individuals may feel they are privy to special information and be more inclined to lend their time and resources to help with this ‘exclusive’ club. Internal communication may also generate more support from a stakeholder organization that realizes their priorities align well with those of the group.

The following two sections cover, first, external communications and second, external communications. Even though internal communication generally takes place before external communication (you’ll be talking among LEC members before the general public), external communication is covered first because it requires more structure and is more highly scrutinized than internal communication.

2.3.1 External Communications

External communication can be understood as the building of public awareness around your local energy committee (LEC) and its activities. Depending on the strengths and goals of your LEC, there are a number of appropriate approaches to external communication.

The minimalist approach can be adopted by those truly pressed for time and without ambitious goals to educate or engage the public. In this system, LEC members do not actively communicate outside of the members directly involved in projects. In fact, they may not have even created an official name or other
sort of brand for their committee. At a minimum, they provide a point-of-contact listed on a town website in order to ensure transparency of group operations for interested media and individuals.

The business approach can be adopted by committees that seek to generate significant public education or engagement, or to raise their profile through a ‘brand image’ that helps generate volunteerism and financial support for their group. The business approach mimics most of the popular ways that corporations communicate with potential customers and stakeholders, commonly referred to as ‘marketing’. This approach requires careful consideration of communication objectives, goals, audience, and tools. Ultimately, these deliberations will be brought together in an actionable communications plan.

Remember, depending on the strengths and goals of the LEC, your approach can fall on or in between these two extremes.

**External Communications Plan**
The communications plan can be developed by following the step-by-step guidelines described below. Your LEC or a communications subcommittee may want to draft a communications plan using input from various individuals and organizations. If you can, recruit a community individual with marketing experience to help with this process.

**Goals** — Goals can be similar or linked to goals developed during the organizational stage. For example, a goal that may represent one of many ways to achieve public education objectives includes holding five public video screenings and conversations within the first year of committee creation.

Consider what you would like to accomplish using communications: do you want to educate the public? Gain volunteer support for initiatives? Generate stakeholder interest in partnering with projects? Generate financial support for initiatives?

**Potential Audience** — Identify the groups and specific audiences with whom you will need to connect in order to accomplish your goals. Examples include:

- Citizens
- Businesses
- Energy efficiency and sustainable energy firms
- Industry
- Educational institutions
- Students and teachers
- Nonprofits
- Environmental organizations
- Other targeted demographics (e.g. age, location, gender, etc)

**Tools** — With so many technologies and options, one of the biggest challenges in creating a communications plan will be to select a few of the most appropriate tools that best match your goals and audience.

Print publications like newspapers and magazines are the standard tool for disseminating information, and are generally one of the most credible forms of media. They reach older and more traditional audiences. Independent newspapers often run stories written by anyone, including LECs, so you can receive widespread viewership for news stories written by your committee.
Press releases are abbreviated communications highlighting timely and important news. They can be reproduced by news organizations or used to generate media interest in a story.

Flyers placed in high walking traffic areas can be effective tools to publicize events. Email is a free and efficient way to communicate with stakeholders. Websites allow anyone with computer and internet to access all types of files and information. Other tools consider include conferences, local access television, direct mail, videos, surveys, and local radio.

**LEC Name** – It is important to establish a clear and concise name for your committee that will ideally remain standard over a long term period. Your committee or organizational name, such as the Yarmouth Energy Savers (YES!), will serve as the cornerstone for your “brand,” helping individuals and organizations quickly realize the group and its associated activity.

**Logo and Stationery** – The logo is a slightly more advanced step that advances your brand recognition past the text-only into the visual realm. If someone on your committee has design experience they can create a committee logo using Adobe Photoshop or similar software. The cheapest although somewhat unreliable way to create a logo and stationery (letterhead, envelope, and/or business card) is through outsourcing. Sites like [www.odesk.com](http://www.odesk.com) and [www.elance.com](http://www.elance.com) connect you with domestic or international graphic designers who charge rates as low as $5 per hour. The Logo Company [www.thelogoco.net](http://www.thelogoco.net) is the cheapest and best value professional logo design choice, offering five initial concepts and unlimited revisions ($99 logo-only, $199 logo and stationery design).

**Tag Line** – A tag line, or slogan, is not completely necessary for your organization, but serves as a memorable way to express an idea relating to your committee. Check online for advice on how to create a memorable slogan.

### 2.3.2 Internal Communications

Without actively and effectively communicating to those involved with some aspect in your local energy efforts, your effort may lose momentum or miss opportunities to gain financial, personnel, or other types of organizational and individual support.

Consider identifying goals, audiences, and tools for internal communication purposes just as you did for external communication. The process to develop an internal communications plan can be similar to the external plan, although chances are that the internal plan will be much simpler.

Some of the most common tools targeted toward internal communication include:

**Meeting Minutes** – Whenever there is a meeting of individuals it makes sense to capture the essence of the meeting in some way for future reference using meeting minutes. Generally, annotated minutes that capture major meeting points are the most effective way to capture and communicate meeting happenings. Minutes help bring new members up to speed on committee discussions and can keep members who may have missed a meeting up to speed. Minutes can serve as an important way to track membership activity, project status, barriers to progress, and new project activity.

**Newsletters** – Monthly, quarterly, or biannual newsletters are a great way to keep internal stakeholders informed on the activity of your local energy committee (LEC). Newsletters capture progress, communicate information about committee members, and share other news relative to a committee
and its goals. A newsletter is particularly important for committees that have over a dozen volunteers or a growing number of interested stakeholders. Programs such as Microsoft Publisher are useful to create newsletters, which can be distributed electronically (for free) or in print (at cost).

Listserves – A listserv is an opt-in opt-out email list that allows users to share information, including attachments, by email. Multiple listserv levels can be set up to serve multiple committees and subcommittees. Email addresses on the listserv are hidden to everyone except for the administrator. Free listserv software is available online.

2.4 Additional Resources
This section contains additional resources relevant to Organizing Efforts in your community.

If you are viewing this document on a computer, simply click on the blue hyperlinks below to access each resource.

If you are viewing this document on paper, you will notice that while some additional resources have links that you can type into your web browser, some have no links at all. Each additional resource without a web link can be found in the Step 2: Organizing Efforts webpage on the new Energy Working Group Website, to be released in late 2010. See the current Energy Working Group webpage for an announcement of the new website launch.

Section 2.1 Committee Creation
Why People Volunteer
Example Town Committee Application (Scarborough, Maine)
Volunteer Recruitment Plan
Sustain Mid-Maine Community Survey Results
Ordinance—Establish an Energy and Recycling Committee 2008 South Portland

Section 2.2 Strategic Planning
Overview of the Strategic Planning Process: http://www.quickmba.com/strategy/strategic-planning/
Sustain Mid-Maine Strategic Plan
Overview to Performance Measurement
How to Set an Energy Reduction Target

Section 2.3 Communications Planning
Conducting Effective Meetings: http://managementhelp.org/misc/mtgmgmnt.htm
Sample Communications Brief from the Wilton Energy Commission
Media Release Template

Logo, Stationery, and Website Design
www.odesk.com
www.elance.com
www.thelogoco.net
Step 3: Assess Energy Use

Now that you’ve organized into a Local Energy Committee (LEC) and have begun connecting with helpful resources, it’s time to take a look at energy use and energy costs in your municipality. Assessing energy use establishes a baseline of current energy use. This will allow you to compare future energy use to past energy use, which will help you determine the success of an energy initiative. Perhaps more importantly, assessing energy use will help you to determine the ‘problem areas’ and general trends to identify smart, successful energy projects for your local energy effort.

Some LECs may not have specific energy reduction targets and may, for example, be focused on educating community members on the benefits of weatherization. Even in this case, assessing energy use can be a useful step. This process can help identify how much energy homeowners use compared to the rest of the town. It may also uncover the number of homes in a town, and otherwise find information useful for a successful local energy effort.

This section focuses primarily on assessing energy use in municipal operations. Municipal and community energy assessments are very similar. There are resources at the end of this report which go into more detail on how to perform community energy assessments in Maine.

3.1 Different Assessment Levels

Energy assessments fall into two general categories: energy inventories and energy audits.

The energy inventory is a good first step to identify broad trends in energy use, energy costs, and areas of inefficiency. Going through an energy inventory process is much like going to a general practitioner. You review big-picture information and symptoms to better understand the nature of the problem at hand. The energy inventory or general practitioner check-up may help identify areas of inefficiency or problems with enough accuracy to justify some treatment.

Often times, however, there will be a need for a follow up assessment to justify the time or money spent on a treatment regimen. The addition of more information collected and analyzed under the lens of a specialist can help provide more certain recommendations for treatment. Just like when a general practitioner refers a patient to a specialist, an energy audit is often the next step after an energy inventory. An energy audit requires more specialized knowledge and often advanced technology applied to determine the nature of a problem.

The pyramid at right shows how an energy inventory is the basis or ‘building block’ for an energy audit. Each step of the energy assessment process, described more fully in the sections that follow, helps identify energy trends and energy improvement opportunities with increasing accuracy.
3.2 Energy Inventory

An energy inventory captures a ‘snapshot’ of a period of time in your municipality’s overall energy use. The energy inventory may provide enough insight to implement some basic efficiency measures (see Step 4: Identify Technologies and Projects). The inventory also helps identify broad-based areas of inefficiency that a local energy committee (LEC) can focus on, and creates a baseline of energy use against which the impacts of energy projects can be measured.

Inventories often have immediate and unintended positive consequences. For example, an energy inventory for the City of Waterville, Maine found that a fuse had shorted at the municipal airport. The shorted wire was fixed, and over a thousand dollars per year in potential energy use costs were saved.

In many ways, the process of conducting an energy inventory is an educational process. A municipality can learn how to track energy use, and begin the habit of collecting and tracking energy bills in one location. The inventory can illustrate to what organization money is paid, what type of energy is being used, and otherwise identify the cost effective next step.

3.2.1 Staff

The energy inventory can be a relatively simple process. The primary challenges in the energy inventory process are gathering information, inputting information, analyzing information, and sharing results. Generally, the only unique tool required for this process is energy inventory software, with which almost anyone can conduct an assessment. The following individuals and organizations may be well-suited for conducting an inventory, depending on the status of your local energy effort.

- **In-house (municipal) staff** have good access to town government data and an understanding of municipal operations. However, staff generally do not have the time to conduct such an assessment. The inventory may take months to complete as staff attempt to fit the project into existing responsibilities. The quality of analysis and reporting may be limited by staff’s lack of knowledge about the inventory process—and a lack of time available to become educated about the process. For all energy inventories, at least some municipal staff time will be spent on helping volunteers, interns, consultants, or others locate and interpret energy bill data.

- **Community volunteers** are a no-cost option to inventorying. The inventory may take months or years to complete as volunteers seek to gather municipal data and fit projects into their busy lives. The data, analysis, and reporting may not be as quality as those of an in-house staff due to a lack of understanding of municipal operations and the inventory process. There will be considerable time demands placed on municipal employees to help collect and interpret data.

- **Hired interns** are a low-cost option to inventorying. The inventory generally takes place over a specified period of weeks or months. The quality of data and analysis will likely be higher than that produced by a community volunteer or municipal official due to the ability of an intern to spend more time on the data collection and analysis process. Reporting and analysis may be
lower quality than reports produced by consultants. There will be considerable time demands placed on municipal employees to help collect and interpret data.

- **Consultants** are a higher-cost option to inventorying. The quality of data, analysis, and reporting will likely be high due to the consultants’ level of experience. The inventory report will be produced relatively quickly. There will be some time demands placed on municipal employees to help collect and interpret data.

- **Other organizations and programs** may periodically receive funding to assist with energy audits and inventorying. In the past, colleges and universities have helped towns perform energy inventories, and the EPA Community Energy Challenge has helped seven Maine towns benchmark their building energy use.

### 3.2.2 Software Tools

There a range of free and for-cost tools available to help with local energy inventorying. Note that many useful tools for energy inventorying are titled ‘greenhouse gas inventory’ tools, and that these tools are generally of equal usefulness for energy inventories.

Several forms of inventory software are available to your committee. Determining the tools you will use will help you understand the type of information you need to collect. These software tools complement one another. The following descriptions will help you understand the role of each software option and how they might work together.

Note that you will want to calculate total energy use in Btu, British thermal units, or MMBtu, million British thermal units. The Btu is a common measure of energy. For example, it allows you to compare energy used by electricity (measured in kilowatt hours) to energy used by burning gasoline (measured in gallons).
<table>
<thead>
<tr>
<th>Software Tool</th>
<th>ICLEI Clean Air and Climate Protection (CACP) 2009</th>
<th>Small Town Carbon Calculator (STOCC)</th>
<th>EPA Building Portfolio Manager</th>
<th>GCC Annual Reporting Tool</th>
<th>DEP Governor's Carbon Challenge</th>
<th>Computer Spreadsheet</th>
</tr>
</thead>
<tbody>
<tr>
<td>Organization</td>
<td>ICLEI - Local Governments for Sustainability</td>
<td>Clean Air-Cool Planet</td>
<td>EPA Community Energy Challenge</td>
<td></td>
<td></td>
<td>Microsoft, Open Office, etc.</td>
</tr>
<tr>
<td>Cost</td>
<td>Included with ICLEI membership ($600)</td>
<td>Free</td>
<td>Free</td>
<td>Free</td>
<td>Free</td>
<td>Free</td>
</tr>
<tr>
<td>Technical Assistance</td>
<td>Limited</td>
<td>Very limited</td>
<td>Very limited</td>
<td>Very limited</td>
<td>Very limited</td>
<td>None</td>
</tr>
<tr>
<td>Energy Analysis</td>
<td>Limited</td>
<td>Limited</td>
<td>Yes</td>
<td>No</td>
<td>Yes</td>
<td></td>
</tr>
<tr>
<td>GHG Analysis</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
<td>Yes</td>
<td></td>
</tr>
<tr>
<td>Energy Cost Analysis</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Building Performance</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Comparisons</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Municipal Inventory</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Community Inventory</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Annual Tracking</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Monthly Tracking</td>
<td>No</td>
<td>No</td>
<td>Yes</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Technical assistance* is help from the organization that distributes software. Most organizations will provide limited help setting up the software on your computer and answering one or two questions about how to collect or input data, for example. ICLEI will do this and also provide a limited amount of technical support to member towns for energy and greenhouse gas inventories, walking them through each stage of the process from data collection to analysis to reporting.

*Energy analysis* allows you to input information on how much energy you are using (e.g., kilowatt hours of electricity for lighting, gallons of gasoline for transportation) in order to calculate the total amount of energy used in Btu. Some energy analysis tools also break down information based on how much energy is used in a department or building (e.g., the fire department) or by fuel type (e.g., total amount of gasoline used).

*Greenhouse gas analysis* is similar in that it provides different ways to understand a town’s climate changing emissions.

*Energy cost analysis* allows you to include the cost of energy use. Like energy analysis, this option allows you to break up costs by department, building, and fuel type.

*Benchmarking* allows you to compare the energy efficiency of a building to similarly sized and used buildings.

*Municipal Inventory versus Community Inventory:* Recognize that you can focus on energy use assessments for municipal operations and the community. Generally, municipal assessments will lead to
cost savings that can be captured by a local government and potentially redirected to further local energy efforts. Community assessments tend to lead to the distribution of energy efficiency benefits to residents and citizens, meaning that a funding source beyond energy efficiency paybacks may be needed to sustain local efforts.

Annual versus Monthly Tracking: Monthly tracking allows a town to understand changes in its energy use patterns in near-real-time. Consistently collecting and analysis of energy use is a good habit to get into—by constantly measuring and paying attention to energy use, it will likely be managed. For example, if January’s electricity use in a building rises by 40% over energy use in the same month one year ago, a municipality will be inclined to look for open windows or permanently-switched on in a building and help reduce costs immediately. Annual tracking software does not help towns identify these changes as frequently.

ICLEI- Clean Air and Climate Protection (CACP) Software 2009 (Included with annual membership, $600)
www.icleiusa.org/action-center/tools/cacp-software
If your energy committee represents a larger (>5,000) municipality consider using ICLEI’s Clean Air Climate Protection (CACP) Software 2009, which is designed for local governments with more diverse energy usage and emissions sources. This tool is specifically useful for towns that wish to calculate municipal and community energy use, greenhouse gas emissions, and criteria air pollutants (NOx, SOx, carbon monoxide, volatile organic compounds, PM10, PM 2.5) associated with electricity, fuel use, and waste disposal.

The CACP 2009 Software is included as a part of ICLEI membership upon payment of annual dues. Annual membership dues are based on the local government’s population size; with the exception of Portland, all municipalities in Maine would pay $600 annually for membership. Data collection tools, greenhouse gas accounting protocols, technical support, and recorded webinar trainings on CACP 2009 are also included with membership.

Through ICLEI USA’s Affiliate Program, regional planning agencies, councils of government, and metropolitan planning organizations can also gain access to the CACP 2009 Software and two hours of associated technical assistance per month.

One idea: small towns may wish to begin the inventory process using STOCC (discussed below) and then utilize ICLEI’s more comprehensive greenhouse gas inventory tools. Municipal governments can get a free version of the outdated CACP 2003 software by contacting Denise Mullholland at the EPA, mulholland.denise@epa.gov. It is worth noting that CACP 2003 is not up to date nor consistent with national standards for greenhouse gas reporting.

Small Town Carbon Calculator (STOCC) (Free)
www.cleanair-coolplanet.org/for_communities/stoc.php
Developed by Clean Air - Cool Planet (CA-CP) and the University of New Hampshire to serve the needs of small towns addressing the growing costs of municipal energy use and emissions of heat trapping gases, STOCC simplifies the process of creating a greenhouse gas and energy inventory. STOCC enables you to better understand and assess the sources of your energy expenses, as well as the majority of your greenhouse gas emissions. STOCC is intended for small towns with relatively few municipal buildings/facilities, streetlights, and vehicles. This Excel spreadsheet based tool automatically generates a number of useful graphs which will be useful for visualizing energy use.
STOCC is the first step towards reducing energy use at your most inefficient sources. Note that STOCC does not provide suggestions for addressing energy efficiency. It simply identifies the source of your costs and emissions.

Maine Department of Environmental Protection (DEP) Governor’s Carbon Challenge (GCC) Reporting Form [www.maine.gov/dep/innovation/gcc](http://www.maine.gov/dep/innovation/gcc)

The Governor’s Carbon Challenge (GCC) reporting form is a way to calculate greenhouse gas emissions from energy use in municipal operations. It is the least developed tool for inventorying energy use and greenhouse gas emissions. Users must use other software or develop their own spreadsheets to track energy use and enter into the greenhouse gas reporting form. Submitting this Excel-based reporting form annually is the only way for municipalities to qualify as participants in the GCC program. The benefits of GCC membership are discussed in Step 1: Helpful Resources.


The Environmental Protection Agency’s (EPA) Portfolio Manager helps to understand your municipal buildings’ energy use through benchmarking. Benchmarking creates a profile of energy use for one or more of your municipal buildings and compares them to other similar buildings in the EPA Portfolio Manager’s database. For example, if you submit energy use and building characteristics for a fire station, you can compare how that building uses energy to other similar fire buildings in the U.S.

This free online resource provides you with the opportunity to enter monthly energy, as well as water consumption data, into the software program and view your buildings current performance. The ability to track data on a monthly basis helps to identify wasted energy from behavior change (such as always-on lights or open windows during winter) much more rapidly than previously mentioned software tools.

The EPA regional office for the northeast created the Community Energy Challenge (CEC) for towns and cities in the northeast. By becoming part of the CEC program, municipalities across the northeast can benefit from additional assistance for towns to fully realize the benefits of the Portfolio Manager tool.

Energy Data in Excel

Regardless of which, if any, tool you choose to analyze data, be sure to first capture all energy use information in Excel. Try to use as few spreadsheets as possible, i.e., use one spreadsheet for electricity, one spreadsheet for heating, etc. Whenever you collect data, enter it into this spreadsheet. If you enter data directly into some of the software tools below, you may not be able to retrieve it again! By using the spreadsheet-first method, you will be able to share your information easily and have a backup for all of your energy use information. It’s important to have an Excel spreadsheet of energy data for when you hire a professional energy auditor or for when you want to perform financial analyses, topics covered later in this handbook.

Those with a basic familiarity with Excel may find that the software provides the most flexibility for the energy inventorying process. Use the BTU Conversion Factors available in the “Additional Resources” section of this step for more information.
3.2.3 Collect Energy Data

Arguably the most difficult part of the inventory process is finding the information in the first place. This section gives several pointers on where to find energy use information. You can find most data for energy inventories by requesting copies of energy bills.

Information on electricity and fuel consumption for buildings, fleets, street lighting, and other applications should be gathered for all municipal inventories. Community inventories should gather a different set of information around residential, commercial, industrial, and transportation use of electricity, heating fuel, and transportation fuel.

A small amount of planning before data collection and analysis can help avoid spending hours of time from reorganizing and recollecting data in continuing energy improvement initiatives. It helps to first designate a single person, likely an administrative assistant or financial officer, who will continue to collect energy cost and use data in a central spreadsheet. This spreadsheet can be used to copy and paste into different energy inventory and energy audit programs.

It also helps to collect information in all of the following areas so that energy data collection does not need to be revisited: total cost, cost per unit, usage amount, date, and application. Each type of data should be broken down as much as is possible and feasible given information availability and the time constraints of the person collecting data. For example, transportation fuel should be broken down by application as much as possible: by department, by vehicle class, by individual vehicle. The more detailed and complete information collected, the more possible it is to identify opportunities to save energy and money.

Energy Bills

Energy bills provide a significant amount of insight into overall energy use. At least one year’s worth of bills allows you to view the total amount of energy required to heat and power the facility(s) or departments required—although going back two to three years helps give a more accurate picture. Note that some software tools, such as ICLIE, recommend that calendar year instead of fiscal year data be entered into the software.

Municipal buildings, just as with our homes and businesses, receive a monthly set of energy bills from their utility(s). These bills typically include a monthly electric bill. Some heating and cooking fuel bills (such as natural gas) are billed on a monthly basis. Other heating and cooking fuel bills (such as propane, oil, or other form of delivered fuel) are billed on a sporadic basis at the time of delivery.

Since these bills are paid through the municipal budget process and therefore paid with taxpayer money, these bills are viewable by the public and available to your committee. Energy bills are typically kept by facility staff and may be available in spreadsheet format.

Typical locations and individuals that may be helpful in locating energy bills include:

- Town managers, administrators, or administrative assistants;
- Facilities manager or public works directors;
- Accounting or finance directors; and
- Utility and fuel oil companies.

It may be worth it to ask representatives in each of the above locations for electronic copies—preferably Excel spreadsheets—of billing information. This will save a significant amount of your time.
Additionally, if old bills are disorganized or misplaced, you will want to check with representatives in other locations to see if they have a better organized and more complete set of billing information.

**Electric Bills**

When evaluating your electric bills there are several important points of information to look for. Electric bills can be somewhat confusing at first glance, but are simple to understand with a little practice. Your electric bills typically contain two over-arching areas of information – actual energy usage and the cost for that usage. First, let us focus on obtaining information on how much energy was used in a month. To determine this simply look for the column that states “Actual Usage,” “Total Usage,” or some version thereof. By accounting for each month’s electric use for one to three years you can gain an understanding of how much total energy is being consumed and when the highest rate of use is. Understanding this allows you to manage your facility more efficiently and possibly reduce electric use during peak demand periods. This leads to the next area you want to evaluate – cost.

In the event the information has not already been compiled into a spreadsheet, you will need to obtain copies of the actual bills to evaluate. Compiling information will also provide you the opportunity to assist facility managers in organizing energy data that can then be used to monitor your results at a later date.

The cost of electricity depends on more than just your usage charge. Your bill includes additional costs such as transmission and distribution costs, demand charges, and applicable taxes. To guarantee you are always factoring in full costs, be sure to use the total cost of electricity,

**Streetlight Assessments**

Maine municipalities rarely track the number or cost of streetlights operated by their town. In fact, a recent streetlight assessment in one Maine town found that their utility was billing the town for over a dozen streetlights that didn’t even exist! Streetlights are a good area to expend a little extra effort assessing energy use because they are costly and often can lead to no-cost energy efficiency improvements. A streetlight assessment should first use the electric bill to quantify the type, number, and energy demand of streetlights. Then, the streetlights should be mapped. A GPS tracking unit can be used to aid in the process by using GPS coordinates to precisely track the location of streetlights and automatically plot them on a map. Your local university or Council of Government may be able to help with the GPS mapping process. Otherwise, the streetlights can be mapped manually and then evaluated to see whether or not they are necessary. Generally, necessary streetlights are those needed at pedestrian crossings and for safety reasons. See the Additional Resources section in Step 4 for additional information on assessing and eliminating streetlights.

**Heating Fuel Bills**

The type of fuel the building consumes will determine how the building is invoiced for heating. Although uncommon in Maine, a building that receives a continuous supply of heating fuel, such as natural gas, will receive a monthly bill for fuel used (usually in therms). A building that consumes fuel that needs to be delivered by truck, such as fuel oil, will receive
an invoice each time the fuel is delivered (in gallons). In both scenarios, the bill will include information on the fuel purchased (therms or gallons) and the cost of that fuel ($/therm or $/gal.)

**Transportation Fuel Bills**
Transportation bills will generally measure gasoline and diesel used to power municipal fleets. Fuel bills may all be linked to one account, or they may be separated by departments. Even better, bills may be separated by vehicle over time. Try to get monthly billing data including the volume, type, and cost of fuel used.

### 3.2.4 Walk Through Assessment

Once you have gathered all of the energy related records you can, the next step in your investigation is the “walk through assessment,” also known as a “walk through audit.” A walk through assessment is a simple process to collect a significant amount of information about a building, fleet, and other operations. In addition to collecting useful information for the inventory, the walk through can help identify potential energy saving opportunities (see Step 4).

Walk through assessments can likely be performed by you—or by a team of local energy committee (LEC) members—using tools no more sophisticated than a pen, paper, Excel spreadsheet, and word processor to complete.

It is important that your walk through assessment should not be viewed as a thorough audit upon which to base investment decisions—although it may provide enough information to justify investment for the most simple projects, such as upgrading lighting fixtures. In most cases, the walk through assessment serves solely as an information gathering tool that will allow you to better determine the types of projects that will significantly increase building efficiency and performance.

After you have collected and organized all energy data, it is time to determine a good day to tour the building or equipment—and to interview relevant municipal staff. Your town manager or administrator is a great contact to help provide access. One of the most important parts of doing a walk through audit is communicating with the staff to understand how buildings or equipment functions. The most important person to include in this process is the person in charge of building, fleet, or streetlight maintenance. The information and access you will gain from their involvement will be extremely valuable.

Your team should plan on spending as much time as needed to effectively and thoroughly document the buildings’ or equipment’s current condition. The team should inspect the entire facility. Locked areas can occasionally contain significant findings. The whole process can take several hours. You will definitely want to take ample pictures and may want to use a tape recorder to guarantee you capture all of the information provided in staff interviews.
Many town buildings have a basic floor plan of the buildings that includes room layouts. Fleets have spreadsheets of equipment. Public works managers and administrators have lists of streetlight bills. You may want to bring a couple copies of these documents to write notes on. For example, you may take a photo of a window with an enormous gap, allowing for a large amount of air infiltration. Later, when you’re going through your photos and using them in your “walk-through audit report,” you may not recognize the photo, and can’t remember the room from which it came. As you take pictures, write a small corresponding number on the floor plan. Don’t be shy about taking photos!

A good rule to remember while conducting the walk through audit is that the more information, the better. It is better to over analyze the building and document anything that you feel is or might be important, than to under analyze.

Some walk through audits will use Kill-a-Watt meters (shown below) to measure how much electricity equipment and appliances are using. These are available for loan from most public libraries in Maine.

Things you should have done before you arrive for the walk-through:

- Gather energy bills for at least 12 months, preferably 24 months.
- Enter all data into a spreadsheet and create some useful graphs.
- Check town schedules for a preferred walk-through date.
- Call the town administrator and ask them to contact the appropriate maintenance person for their availability on the day of the walk-through.
- (If a building) Obtain a floor plan of the building.
- (If a fleet) Obtain make/model/year lists for vehicles in the fleet.

See the Additional Resources section for additional information on how to conduct a walk-through audit.

3.2.5 Data Analysis and Reporting

Each software package comes with written instructions on how to complete an energy assessment. ICLEI’s Clean Air and Climate Protection (CACP) Software 2009 comes with technical support via phone and email to help with reporting. The Clean Air-Cool Planet (CA-CP) Small Town Carbon Calculator (STOCC) automatically graphs simple analyses of collected data. The software provided by ICLEI, Clean Air-Cool Planet, and EPA Portfolio Manager each include online training.

The key is to simplify energy use information as much as possible. Break down energy use and costs into components—use by buildings, transportation, and streetlights; use by department; and use by fuel type are good examples. If you produce a 25 page report on energy use, prepare a one or two page executive summary of key points to distribute to town officials—and to email to the numerous people who will likely inquire with interest about your report.

Step 2 told of the importance of monitoring energy use after implementing projects. The inventory is not meant to be a onetime activity. Rather, an inventory can be an annual exercise to incorporate annual data, involve and train new committee members, and collect new data to discern changes in energy consumption are projects are completed. This measurement and verification process is an important follow up step and should not be overlooked in the course of defining a projects full scope. Also consider working with current municipal staff responsible for energy bills/data to automatically enter energy data into your chosen inventory tool for future billing cycles.
Sample energy inventory plans are available at the end of this chapter to help illustrate useful energy analysis and reporting practices. The following are example charts that demonstrate the results of an energy inventory for the City of Bath, Maine.

### 3.3 Energy Audits

Most of the time, an inventory will show the need for one or more technical analyses in order to justify investment decisions. Energy audits often involve the use of sophisticated monitoring equipment to accurately understand the energy efficiency of buildings, equipment, and operations. Energy audits should be performed by certified professionals. Energy audits can be used to make investment decisions. This section focuses on energy audits of government buildings only, and does not significantly discuss audits of community buildings, the municipal fleet, or municipal streetlights.

#### 3.3.1 Audit Types

There are a number of energy auditing options for Maine municipalities to consider. The first option includes free building walk through assessments, as previously described. The second option includes lower-cost energy audits called Decision Grade Audits (DGA). The third option includes higher-cost audits called Investment Grade Audits (IGA). The fourth option is a Detailed Energy Assessment (DEA) which can be received for free if energy efficiency investments are made using DEA recommendations.

**Option 1: Free Building Walk Through Assessments**

Your town may be eligible to receive one or more free building walk through assessments, also known as building walk through audits. The walk through will generally not include the use of technical equipment. These types of audits are discussed in the previous section.

In addition to a walk through audit conducted by volunteers, another option is to request a free audit from a State of Maine certified energy auditor through the Efficiency Maine small business program. The auditor will provide a walk through assessment of facilities, providing some specific and general
recommendations. Generally, an Efficiency Maine audit provides more useful information than an in-house walk through assessment—but less than a professional audit.

Another free option is to have a lighting assessment performed by an interior lighting retrofit company. Employees from these types of companies will often, free of charge, assess the number and types of lights and lighting fixtures in a facility and propose energy cost reduction measures.

Option 2: Decision Grade Audits (DGA)
The decision grade audit starts off with a walk through assessment. It may involve minimal interviews with site operating personnel depending on the site. The walk through helps identify, on site, the glaring areas of energy waste or inefficiency.

Once the walk through has been performed, the DGA moves onto the evaluation stage. This is when more information is collected about facility operation and more detailed evaluations are performed. Utility bills are collected for a 12 to 36 month period to allow the auditor to evaluate the facility's energy demand rate structures, and energy use profiles. In-depth interviews with facility operating personnel can be conducted to provide a better understanding of major energy consuming systems as well as to generate insight into variations in daily and annual energy consumption and demand. Often, a blower door test and thermal imaging are included in this phase of evaluation. Blower door tests and thermal images help understand building air-tightness and the source of air links, respectively.

Blower door tests help to determine how airtight a building is by forcing air out of a doorway and measuring the pressure difference between inside and outside of the building.

Thermal images help to identify how significant specific temperature leaks are in buildings. The following thermal image was taken in Chebegue Island, Maine and demonstrates how cold winter air is infiltrating into a building through a window and air conditioner unit in the winter.

The DGA is intended to identify most, if not all, energy conservation measures appropriate for the facility given its operating parameters and site owner’s objectives. A fairly detailed financial analysis is performed for each potential energy reduction measure based on estimated implementation costs, site-specific operating cost savings, and the customer's investment criteria. Sufficient detail is often provided to justify project implementation, especially if the problem and solution are straight-forward.

Option 3: Investment Grade Audit (IGA)
The IGA expands on the DGA described above by providing a dynamic model of energy use characteristics of both the existing facility as well as potential energy conservation measures. The building model is calibrated against actual utility data to provide a realistic baseline against which to compute operating savings for proposed measures. Extensive attention is given to understanding not only the operating characteristics of all energy consuming systems, but also to situations that cause load profile variations on both an annual and daily basis. Existing utility data is supplemented with metering
of major energy consuming systems and monitoring of system operating characteristics. The IGA can cost five to ten times more than a DGA.

Option 4: Detailed Energy Analysis (DEA)
The DEA can be performed by entering into an agreement with an Energy Services Company, or ESCo. The DEA generally looks at ways to measurably reduce electricity use in a single large building or a suite of buildings. Cities with a large number of municipal buildings or school districts may be best suited to receive free Detailed Energy Analysis reports. See Step 5 for more information on the benefits of an Energy Services Company (ESCo).

3.3.2 Hire an Energy Auditor
The energy auditor industry is a rapidly growing industry, and as such, there will be several types of certification that an auditor may possess. The state of Maine does not require energy auditors to be certified to conduct audits. The Association of Energy Engineers (AEE) offers a commercial energy auditor certification, currently the only certification for commercial energy auditors. An energy professional with the CEM (Certified Energy Manager) designation is also a good choice for a commercial auditor. There are also certifications for residential energy auditor certifications, including the Home Energy Rater System (HERS) certification and the Building Performance Institute (BPI) certification. You can find a list of certified residential energy auditors from Efficiency Maine.

In addition to asking a potential auditor for a certification, it is important to ask for information about an auditor’s previous work. Ask your auditor to provide an example audit that they have provided to another customer. Also ask for references for similar customers that you can talk to in order to ensure you’re getting your money’s worth.

Also consider contacting a nearby municipality from the list of Maine towns and cities that have used federal grant funds to hire an energy auditor as listed in the 2010 report Understanding the Energy Efficiency and Conservation Block Grant: A Resource for Maine.

3.4 Additional Resources
This section contains additional resources relevant to Assessing Energy Use in your community.

If you are viewing this document on a computer, simply click on the blue hyperlinks below to access each resource.

If you are viewing this document on paper, you will notice that while some additional resources have links that you can type into your web browser, some have no links at all. Each additional resource without a web link can be found in the Step 3: Assess Energy Use webpage on webpage on the new Energy Working Group Website, to be released in late 2010. See the current Energy Working Group webpage for an announcement of the new website launch.
Section 3.2 Energy Inventory

**Energy Inventory Software**
- Small Town Carbon Calculator (STOCC) – Clean Air-Cool Planet
- Clean Air Climate Protection (CACP) – ICLEI - Local Governments for Sustainability
- Governor’s Carbon Challenge (GCC) Reporting Form – Maine Department of Environmental Protection
- Community Energy Challenge (CEC) Building Portfolio Manager – Environmental Protection Agency

**Energy Inventory Information**
- Steps for a Community Emissions Inventory Using ICLEI Software
- STOCC and Building Portfolio Manager Data Collection Checklist
- Energy and BTU Conversion Factors Toolkit—Hire a ten week intern to do your inventory using ICLEI CACP software (ICLEI) This set of information is intended to guide the inventory process for the ICLEI software but is applicable with any of the software tools.

**Energy Inventory Reports** (look in the appendices of these reports for a good place to find answers to methodology questions for municipal and community inventories):
- Topsham (2010)
- Falmouth (2009)
- Bath (2008)
- Waterville (2007)

**Walk Through Assessment Tools**
- What to Look for during a Walk Through Energy Assessment
- Maine Department of Environmental Protection Walk through Audit Checklist

Section 3.3 Energy Adults

**Transportation Tools:**
- GREET Fleet Footprint Calculator
- General fuel efficiency information for vehicles [www.fueleconomy.gov](http://www.fueleconomy.gov)

**Energy Audit Documents**
- Efficiency Maine Free Audit Report Waterville 2008
- Performance Contracting Request for Qualifications, or RFQ (Biddeford 2007)
- Performance Contracting Detailed Energy Analysis, or DEA (Biddeford 2007)
Step 4: Identify Technologies and Projects

After connecting with helpful resources, organizing efforts, and assessing energy use, you can now identify potential projects to help meet goals and save money and energy. Many ideas are likely dancing through your head now, and in fact, many options may be available to you.

This section identifies potential projects for your town, split into three sections: municipal energy efficiency, municipal sustainable energy, and community energy projects. This section does not illustrate the average cost, economic return, or complexity of each project. This is because each project varies widely depending on project scale, location, and financing. Remember that, as a general rule of thumb, energy efficiency projects are more cost effective than sustainable energy projects.

The final two steps—Step 5: Identify Financing Options, and Step 6: Evaluate and Prioritize Projects—will help guide potential projects to implementation.

As you scan this chapter for projects you may be interested in, remember that some of the best advice can come from communities that have already implemented projects similar to yours. Towns have likely learned from their mistakes and may be able and willing to provide useful guidance on how to approach and implement an energy project. One report on almost one hundred Maine local governments that are currently implementing energy efficiency and sustainable energy projects may be particularly helpful. The report, Understanding the Energy Efficiency and Conservation Block Grant: A Resource for Maine, lists towns by the types of projects completed (such as towns installing wind turbines and conducting energy audits) and provides contact information for each town.

A separate tool, ICLEI’s Climate and Air Pollution Planning Assistant (CAPP), identifies over one hundred energy-related projects implemented by ICLEI member cities http://www.icleiusa.org/action-center/tools/cappa-decision-support-tool/. CAPP is an excel-based decision support tool designed to help local governments choose emissions reductions measures, set an informed emissions reduction goal, and develop climate action plans. The CAPP tool may provide additional example projects and initiatives to help reduce energy use your municipality and community.

### 4.1 Municipal Energy Efficiency

Energy efficiency is defined as using less energy to provide the same level of energy service. One common energy efficiency measure is to replace incandescent light bulbs with compact fluorescent lamps, or CFLs. A CFL uses about five times less energy to produce the same amount of light as an incandescent light bulb.
Remember, energy efficiency is more cost effective than sustainable energy to reduce energy use. Towns concerned with reducing their exposure to energy price volatility and aiming to save tax dollars should first consider the options presented in this section, municipal energy efficiency.

4.1.1 Buildings
Building energy use always represent a significant amount of municipal energy use and costs. Buildings tend to be the area in which towns focus their initial efforts.

Green buildings
Green buildings include designing new buildings or retrofitting old buildings to include energy efficient and other sustainable practices. A 2003 report commissioned by California’s Sustainable Building Taskforce reviewed a large body of literature examining the costs and benefits of green buildings. They concluded that, nationwide:

“Integrating ‘sustainable’ or ‘green’ building practices [such as efficient lighting fixtures and sufficient insulation] into the construction of state buildings is a solid financial investment. In the most comprehensive analysis of the financial costs and benefits of green building conducted to date, this report finds that a minimal upfront investment of about two percent of construction costs typically yields life cycle savings of over ten times the initial investment. For example, an initial upfront investment of up to $100,000 to incorporate green building features into a $5 million project would result in a savings of at least $1 million over the life of the building, assumed conservatively to be 20 years.”

Building Occupancy Policy
The Town of Freeport developed a written policy to help guide the efficient use of energy in their buildings. The document covers eight building themes: occupant practices, heating systems (and ventilation and air conditioning), hot water systems, lighting systems, electrical equipment, heating demand, energy audits and efficiency improvements, and new technology. Click here or visit for a copy of Freeport’s Building Occupancy Policy.

Weatherization
The most common result of an energy audit is weatherization of the building under consideration. Many buildings are similar to a leaky bucket – there are holes that need to be plugged before you try

---

and fill it with water. A building is the same way. You want to fix the leaks (inefficiencies) in your building before at the same time you incorporate new energy sources.

Weatherization typically includes:
- Sealing/repairing/replacing windows and exterior doors
- Improving insulation
- Insulating heating pipes and/or air ducts
- Cleaning air ducts and radiator units to allow for better heat transfer

EPA’s Weatherizing Buildings Guide provides insight into the types of weatherization projects your committee can carry out (http://www.energystar.gov/index.cfm?c=diy.diy_index).

**Interior Lighting Efficiency**
Generally, the shortest payback and most cost effective upgrade for municipal buildings is interior lighting efficiency upgrades. The older and greater the number of lights, the more likely that a significant amount of money can be saved. Many lighting specialists can assist your committee with identifying the greatest opportunities for savings. Often, lighting companies will perform assessments free of charge.

One option is to change the technology with which you use to generate light. Changing incandescent bulbs to compact fluorescent lights (CFLs) saves up to 80% of electricity. Changing the larger diameter T-12 fluorescent tubes to the smaller diameter, higher efficiency T-8 or T-5 tubes can improve lighting profile and reduce energy consumption. So too can changing from magnetic ballasts to electronic ballasts.

**Occupancy Sensors**
In some cases it makes sense to install automatic on/off lighting sensors. These switches may be especially well suited to rooms that receive occasional use, such as bathrooms and file rooms. The ‘occupancy sensors’ can be installed in the same electrical box used to house your existing light switch, or it can be ceiling-mounted for larger rooms. Most occupancy sensors allow users to calibrate how long the lights stay on after a person has left a room. Likewise, most allow for users to turn lights off immediately as they leave the room in order to save the most amount of energy. Generally, installed occupancy sensors range from $25-$250 per room.

**4.1.2 Heating, ventilation, and air conditioning (HVAC)**
In many buildings, improving the efficiency of heating, ventilation, and air conditioning (HVAC) systems can not only save energy and money, but also increase the quality of the office environment. Safe and comfortable work environments improve employee productivity and health.

The primary technologies available in Maine to heat buildings include:
- Furnaces and boilers fueled by oil or natural gas;
- Electrical resistance heating;
- Small space heaters.
Additionally, the following sustainable energy sources are increasingly being used by Maine municipalities to heat buildings. Each is discussed more in section 4.2 Sustainable Energy for Municipalities:

- Furnaces and boilers fueled by biofuels
- Wood and pellet-fuel heating;
- Geothermal heat pumps;
- Air-based heat pumps;
- Active solar heating; and
- Passive solar heating

There are also a number of different ways to deliver heat from the combustion source to the internal building space, each of which has its own strengths and drawbacks depending on the application:

- Forced air heating;
- Radiant air heating; and
- Radiant floor heating

The following section details some of the ways in which your municipality can adjust or replace HVAC equipment for energy, cost, and workplace quality benefits.

**Efficient furnaces and boilers**

Furnaces and boilers that burn oil are the most common type of heat source for municipal buildings in Maine. According to the Department of Energy, old heating systems can have a 56%-70% efficiency in combustion. New, high efficiency systems achieve a 90%-97% efficiency.

Furnaces and boilers combust fossil fuels or biofuels to heat a building. Furnaces use the flame from combustion to heat air, which is distributed throughout a building through air ducts. Boilers use the flame from combustion to heat water, which is distributed through pipes and radiators, which transmit heat to air in the building.

**Efficient air conditioning units**

According to the Department of Energy, switching to high efficiency air conditioners and taking other actions can help to reduce associated energy use by 20-50%. Generally, experienced professionals should be hired to conduct evaluations of air conditioning systems.

**Efficient ventilation systems**

In tightly sealed municipal buildings, wastewater treatment plants, and buildings in which vehicle combustion may occur (e.g. public works garages) ventilation is essential to providing air with the appropriate temperature and humidity—as well as a sufficient amount of fresh air—to a workplace. In both warm and cold weather, efficient ventilation systems can help save electricity use. High efficiency ventilation systems can monitor for carbon dioxide and pollutant levels and cycle the air systems to exchange air only when necessary. Some advanced ventilation systems include variable-frequency drive (VFD) units which can alter the speed of the ventilation system instead of cycling it on and off, saving the electricity demand by the motor which moves air. In cold weather, efficient ventilation systems save energy by eliminating unnecessary introduction of cold outside air that needs to be conditioned to reach internal temperatures.

**Air-to-Air Heat Exchanger**
An air-to-air heat exchanger is a form of heat recovery ventilation (HRV). Air-to-air heat exchangers are a technology that transfers energy from air that has been conditioned inside a building to air that is being drawn into a building. For example, if it is 70° inside and 20° outside, an air-to-air heat exchanger will increase the temperature of the fresh incoming air by running exhaust air in a closed system exposed to the air flow of the intake pipe. This will reduce the temperature of the outgoing stale air and increase the temperature of fresh intake air. See the diagram below for a visual representation of this process. Most of these units operate passively, some at an efficiency of heat transfer up to 99%, depending on the application.

Wastewater-to-Air Heat Exchanger
An innovative efficiency practice, and one being used in Maine, is the use of energy in wastewater to heat wastewater treatment plants. This process uses the heated effluent entering wastewater treatment plants to be transferred to the air inside a building as shown in the diagram below. For more information click on the following links: Summary of HVAC Measures at Kennebec Sanitary Treatment District and Heating with Wastewater Effluent at Kennebec Sanitary Treatment District.
Programmable Thermostats
A common question among LEC’s is whether you should turn down a building’s thermostats at night. In fact, turning down the thermostats when the building does not have a large heat demand will save energy during those times. Programmable thermostats allow you to set certain times when the temperature can be automatically lowered or raised before occupants arrive. The best of both worlds!

Small Space Heaters
If you see small space heaters in an office, this is a sign that the HVAC system is improperly operated or that the building is poorly insulated. Small space heaters cost an average of $50 per month to run for just a few hours a day.

4.1.3 Equipment and Appliances
Kitchen equipment
Older coffee makers and refrigerators can be upgraded to drastically increase energy efficiency in your buildings. Refrigerators especially have a low payback period—often less than a year.

Equipment Idling
When plugged in but not in use, kitchen equipment, computers, printers, fax machines, power chargers, and other office equipment may draw a considerable amount of power. There are a wide range of technologies and strategies that can be pursued in order to address idling equipment energy use in a building.

Smart power strips and power misers are two new technologies that can be purchased to reduce energy consumption by equipment idling.

Smart power strips operate like normal power strips, except they monitor equipment idling either by motion sensors or electrical sensors. They can cut off power to equipment in idle mode using user-specified timeframes. The smart power strips help stop the current drawn from equipment when not in use.

Power misers are motion sensors placed on vending machines. Power misers cycle the refrigeration unit to keep drinks cool all the time by using more efficient on/off cycles. They also can keep the interior lights on units turned off until people walk by the units.

Another strategy to reduce energy wasted by equipment idling is to change the idle settings on equipment. For example, computers, printers, fax machines, copiers, and monitors can be set to shutdown or standby after a few minutes instead of a few hours.

Stickers or other reminders near light and equipment power switches can politely encourage building users to reduce wasted power.

Hot water heaters
There are two general forms of fossil-fuel powered water heaters, tank-based and tankless (on-demand) water heaters. Generally speaking, tankless water heaters are more efficient than tank-based water
heaters, which require that water in the tank be continuously circulated and heated to a high temperature.

**High efficiency motors**
Wastewater treatment and water delivery facilities typically use a large amount of energy to power motors for water aeration, purification, and/or delivery. Upgrading to a high efficiency motor, particularly a variable frequency drive (VFD) motor, can improve energy use profiles significantly.

**4.1.4 Fleets**

Municipal fleets can include passenger, light duty, and heavy duty vehicles and machinery. Municipal departments such as fire, police, public works, parks and recreation, public transportation, and administration may own or lease vehicles and machinery. Schools, although not the focus of this report, tend to spend a large amount of money on fleets due to high transportation needs.

Just as with buildings, energy efficiency should be pursued before sustainable energy in fleets. Changes to behavior and technology are lower cost than replacing equipment or fuel switching to sustainable fuels. See the Additional Resources section for a comprehensive green fleet policy model ordinance that can be adopted by your town.

**Efficient Driving (eco-driving)**
There are a number of tips that can be employed in order to improve fleet fuel efficiency by 10% or more at little or no cost. For example, maintain proper tire pressure and steady speed. If desired, training courses are available for maintenance crews and fleet operators to maximize efficiency savings from maintenance and driving behavior change. For tips to begin improving fleet efficiency, see [www.ecodrivingusa.org](http://www.ecodrivingusa.org).

**Anti-Idling**
One of the easiest switches a fleet can make to save a significant amount of fuel is to encourage anti-idling practices. This reduces the amount of fuel used when a vehicle is stationary and does not need the engine running to perform work or safety functions.

In many cases, vehicles do not need to be idled and employee education will be the largest obstacle to achieving savings. The Maine DEP offers free educational tools and signs that may assist in communicating the need for idle-reduction measures at [http://www.maine.gov/dep/air/education/caz_no_idling_video.htm](http://www.maine.gov/dep/air/education/caz_no_idling_video.htm).

Some vehicles like police cruisers and public works vehicles, however, need to run safety lights and other equipment when the vehicle is stationary. Havis IdleRight and other similar technologies are being used by Maine fleets to drastically reduce fuel use in police and public works vehicles. This piece of equipment costs about $500 installed and cycles the engine on/off in order to maintain a properly charged battery while maintaining adequate power to all electronic safety lighting and other equipment.

According to the IdleRight website, “a typical vehicle that idles for 6 hours at an emergency or construction scene uses as much as 4 gallons of gas. That same vehicle, equipped with the Havis-Shields IdleRight system uses less than one-quarter of a gallon of gas — and never jeopardizes the charge in your battery needed for start-up.”
Efficient, Hybrid, or Electric Vehicles
Maine municipal fleets are starting to purchase newer, more efficient vehicles. Encourage your vehicle procurement process to consider putting a priority on the purchase of efficient, hybrid, or full electric vehicles (where applicable). A list of electric heavy duty vehicle manufacturers that may be available in Maine can be found at [http://evmaine.org/html/electric_trucks.html](http://evmaine.org/html/electric_trucks.html).

Right-Sizing and Replacement
Fleets typically include a wide variety of vehicles and machines that can significantly vary in fuel efficiency. When purchasing a new vehicle or machine, be sure to make sure that it is appropriately sized for the task at hand. Smaller vehicles and machines typically cost less to purchase and operate.

Compressed Natural Gas and Propane
Compressed natural gas (CNG) and propane, often referred to as liquid petroleum gas (LPG), are cleaner burning and sometimes more efficient and less costly than gas and diesel. Consider investigating a switch to CNG and LPG as a potential cost, energy, and pollution reduction measure.

4.1.5 Energy Purchasing
Saving money on energy doesn’t need to involve behavior change, equipment upgrades, or renovations. There are a number of measures your town can take to reduce the amount of money you spend on each gallon of gasoline and each kilowatt hour of electricity—with minimal changes to the way you use energy! This section illustrates how your town can save up to 20% on energy bills mainly by changing the way energy is purchased.

Peak Energy Reduction/Forward Capacity Market
Did you know that you can save a large amount of electricity on your monthly electricity bill by reducing the amount of electricity used during times of high demand on the power grid? This is because electric utilities measure energy use during times of “peak load,” which usually occurs during the hottest days when air conditioners are running. Based on the energy used at time of peak load, the utility assesses an ongoing monthly surcharge. Towns can reduce the amount of the surcharge by hiring companies to use real-time monitoring services to lower energy use or by otherwise reducing the amount of energy used during times of peak load.

In case you are interested why electric utilities find it necessary to assess a monthly fee based on peak energy use, here is the reason: when the total quantity of electricity demanded reaches a high level for all users across the grid, it is more costly for utilities to produce energy. This is demonstrated by the figure on the following page. The “P” axis represents the price of energy and the “Q” axis represents the quantity of energy. As you move right on the “S” curve, which represents the supply of energy, the price per unit of electricity supply increases. This is because supplying more energy requires turning on older, inefficient plants and eventually requires the construction of an entirely new plant. By reducing the amount of electricity used, or demanded, during times of high energy use from the “D1” to the “D2” curve, the grid lowers their monthly electricity surcharges by ΔP, or the change in price between “P1” and “P2.” In sum, electric utilities assess the monthly fee on peak energy use in an effort to ensure an adequate, year-round supply of electricity while simultaneously reducing the need to construct new power plants.
For towns with larger demand, companies will install technology that will automatically turn off non-essential electric equipment during periods of high demand, sometimes at low or no cost. In addition to the normal electricity savings of 10-20 cents per kilowatt hour, larger towns may be able to aggregate the electricity saved to be sold on the Forward Capacity Market.

The supply of energy in Maine is managed by an entity known as the Independent System Operator New England (ISO-NE). ISO-NE is responsible for insuring that the grid functions properly and supplies the energy we demand. The Forward Capacity Market (FCM) was created as a means to facilitate our increased demand without relying solely on centralized power plants. Under this program, ISO-NE is responsible for performing forecasts of needed capacity three years in advance and for conducting an annual auction to purchase sufficient power to meet those needs. The program requires that generators be paid for any capacity purchased from them, but generators would not receive payment if the capacity is unavailable when called upon. “Generation” under this program can be met through reduced demand (also known as ‘load shedding’) and through aggregation of reduced demand at multiple sources. The smallest blocks of demand is 100kw, so the size is fairly large for most towns, but could be attained by aggregating across facilities. Payments for reduced demand during periods of peak load are made monthly based on the capacity on the reliability of performance. Failure to lower demand or generate when called upon will result in substantial penalties.

Joint purchasing of electricity, gasoline, diesel, and heating fuel
In theory, any sort of product or service bought in quantity across a number of municipalities can be purchased jointly, or in collaboration with other communities to increase the bargaining power of towns against suppliers. In practice, jointly purchased municipal materials typically include raw materials and products. Maine Power Options (see Step 1 Connecting with Helpful Resources) is the largest joint purchasing provider of electricity and fuel oil for municipalities and nonprofits in the state. Maine Power Options (MPO) can help save up to 20%± on electricity and fuel oil costs for towns and cities.

Leadership Benefits from Municipal Projects:
Even if your municipality focuses mainly on energy efficiency and sustainable energy for its own operations, consider that you are providing leadership to town citizens and businesses. Because town operations are so visible, by completing an energy project, you will show others not only that they can implement technologies and projects, but also that they can benefit from making energy changes.
4.1.6 Other Projects

Streetlights
Streetlights are very energy intensive and expensive to operate. The good news is that streetlight costs can be reduced quickly and easily.

By performing a streetlight assessment, a town can get a better understanding of the energy use and costs associated with streetlights in their community (see Step 3 Assessing Energy Use). Towns can also begin the process of evaluating whether or not all streetlights are needed. The first option is to reduce energy use in streetlights by flipping the switch on unnecessary lights—a no-cost option. For example, Lewiston and Freeport identified up to $127,000 and $20,000 annually that could be saved by each town from shutting off unnecessary streetlights, respectively.

Another option is to switch existing mercury vapor, metal halide, high/low pressure sodium, or high intensity discharge streetlamps to potentially more efficient LED or induction light bulbs. Towns and cities in Maine are harnessing federal Energy Efficiency and Conservation Block Grant (EECBG) funds to initiate a wide range of diverse and innovative projects. If you’re considering upgrading your streetlights to more efficient light bulbs, you should track the progress of six communities that are installing LED or induction streetlight fixtures in their communities. The experiences of these towns could indicate whether or not installing the streetlight bulbs are a cost effective measure.

Furthermore, to support keeping our sky dark at night (and therefore reducing energy), you committee might consider evaluating your communities outdoor lighting codes. The International Dark-Sky Association has developed a handbook called “Outdoor Lighting Code Handbook” that provides useful information concerning outdoor lighting.

Traffic Lights and Pedestrian Crossing Signals
Most municipalities in Maine have changed traffic lights over from halogen or incandescent bulbs to more efficient LED lighting systems to save money on energy and maintenance costs. Few municipalities, however, have made the change for pedestrian crossing signals, where applicable. Upgrading traffic light or pedestrian crossing signals from incandescent or halogen to LED can save up to 85% on electricity costs—and reduce the number of maintenance trips to replace bulbs by five times.

Staff Training
Municipal staff can benefit from both formal and informal training to reduce energy use and improve workplace quality. An example of a formal training program is the Building Operator Certification (BOC) course offered by Efficiency Maine at discounted rates for Maine municipal officials and residents. According to Efficiency Maine, the program trains managers to improve energy efficiency, reduce electric and other fuel bills, reduce maintenance costs, and enhance building occupant comfort. Certified building operators demonstrate competence in: evaluating building energy consumption, HVAC energy inspections, lighting surveys, indoor air pollutant sources and pathway locations, and facility electrical distribution. Informal staff training might involve a green tip distributed in a monthly town government newsletter or email.

Green Team
A group of staff can be formed to help promote energy efficient upgrades and energy efficient behavior in government buildings and their operation. See “Step 2 Organizing.”
4.2 Municipal Sustainable Energy

Sustainable energy is defined as the provision of energy such that it meets the needs of the present without compromising the ability of future generations to meet their own needs. Wind power, solar power, and geothermal power are examples of sustainable energy because the energy generated is provided by renewable sources. Oil, natural gas, and coal are not considered sustainable energy because they are drawn from depletable reserves. Often, sustainable energy sources reduce dependence on fossil fuels, providing a continuous supply of energy from an initial capital investment. Producing or procuring can help insulate a municipality against the impacts of volatile and rising fossil fuel prices. The sustainable energy technologies discussed below include:

- Biofuels for Heating
- Biofuels for Transportation
- Biomass for Heating
- Clean Energy Power Purchasing
- Combined Heat and Power
- Distributed Energy
- Geothermal
- Landfill Methane
- Solar Power (photovoltaics and solar hot water)
- Wind Power

For additional information on sustainable energy changes in your municipality, see ICLEI’s excellent Municipal Clean Energy Toolkit, http://www.icleiusa.org/action-center/tools/municipal-clean-energy-toolkit.

Biofuels for Heating (Bioheat)

According to Efficiency Maine, “biofuels are liquid fuels produced from biomass (renewable organic matter), which are often blended with or used to replace petroleum.” Biofuels include energy derived from the combustion of recently living biological material in liquid form, such as oil derived from plants like soybean and waste oil from restaurants and food processing. Like petroleum products, biofuels price changes based on supply and demand, feedstock, and blend. Generally, biofuels costs roughly the same as conventional oil and can be combusted in conventional oil burners. Biofuels for heating, also known as bioheat or biodiesel, are now available across Maine. Check with your existing local heating fuel vendors.

Biofuels for Transportation

Biofuels for transportation include biodiesel, ethanol, and second-generation biofuels. Biofuels include some percentage (generally 5% or more) of agriculture based or food-waste based product. The most common transportation biofuel in the US is ethanol, a common additive in gasoline. Municipalities are more frequently combusting soybean and food-waste based biofuels in conventional diesel engines. A number of municipalities, such as Falmouth, Maine, purchase biofuels for municipal fleets. Some biofuels are produced in Maine using Maine-based ingredients. Most engine manufacturers will uphold warranties for biofuels in a concentration of 5-20%, and you should check with your manufacturer before making the switch.

For vendor locations and more complete explanations of transportation biofuels types visit http://www.afdc.energy.gov/afdc/ or contact the Maine Clean Communities program.
**Biomass for Heat**

Biomass is energy derived from combustion of recently living biological material in solid form, such as wood and solid waste, as opposed to biofuels for bioheat in liquid form. Maine, over 90% forested, has one of the richest stocks of wood biomass in the nation. Biomass energy can be used for producing heat and electricity in stationary applications. Installing biomass heating systems can help insulate owners from the price volatility of heating oil, and reduce the overall cost of heating buildings.

Municipal, small commercial, and residential applications of biomass typically involve the use of wood pellets, a biomass product often made from compressed wood waste from paper mills, saw mills, and wood product manufacturers. Wood pellets are scraps of wood bound into pellet shapes using high pressure and heat. Wood pellets are burned in furnaces and boilers that can replace conventional oil-burning units.

Industrial applications of biomass typically involve the use of wood chips or other forms of biomass. Fuel efficiencies in wood are typically determined by the moisture content found in that wood and can vary depending on the base material. Industrial scale biomass energy units combust wood chips because they are cheaper, although more difficult, to burn than wood pellets.

Typical municipal applications for wood pellets include wood pellet furnaces and boilers. These heating units store fuel in hoppers that automatically feed into the combustion unit, much like fuel oil is stored in tanks and burned when needed. Wood pellets are becoming more widely available within the Northeast due to the continuing development of regional pellet fuel providers.

**Clean Power Purchasing**

Clean power, or “green energy,” is the only sustainable energy option that does not involve a significant change in municipal operations. Instead, clean power purchasing involves buying some or all electricity from accredited sustainable energy sources. There are two types of clean energy that your municipality can purchase.

The first is energy produced locally and directly fed into the grid and to your location. You are charged a fixed rate per kilowatt hour (kWh) of electricity that your municipality purchases.

The second, and much more common option, is to purchase renewable energy credits (RECs). A REC is usually one megawatt hour of clean energy in the form of a tradable, non-tangible commodity which can be produced in any location. RECs provide clean energy, although unlike supply, the energy doesn’t necessarily come through your grid.

For simplicity sake, think about RECs this way: first, assume that your standard electricity supplier continues to provide you electricity at market rates. If it costs ten cents per kWh to generate electricity from wind and eight cents per kWh to generate the coal based electricity you receive, a REC pays the wind generator two cents per kWh. This provides income so that the wind generator can compete with the coal generators that now supply your electricity.

Electrons are more or less the same no matter where you are—it doesn’t really matter if clean electrons are generated in Maine or Oregon. So, if you are displacing a coal plant in Oregon with wind power, it has about the same positive impact as displacing a coal plant in Maine with wind power. There are strong positive job creation, human health, and environmental benefits of purchasing RECs no matter
which location you purchase them from. However, locally purchased RECs can help ensure that these benefits accrue closer to your municipality.

Your town may also be eligible to sell RECs from eligible sustainable energy projects installed on municipal property. The town can certify and sell these RECs to brokers and other buyers. In this case, a municipality needs to be careful about how they advertise their clean energy system. If the town sells RECs for power produced by its facility, it cannot claim the beneficial attributes of being *powered by* clean energy—although it can rightfully claim that is the *host* of the clean energy system. If the town does not sell the REC, a town can rightfully advertise that it is powered in full or part by sustainable energy.

See [http://www.maine.gov/mpuc/electricity/choosing_supplier/green_power.shtml](http://www.maine.gov/mpuc/electricity/choosing_supplier/green_power.shtml) for an updated list clean power purchasing of options.

**Combined Heat and Power (CHP)**
Combined heat and power, also known as CHP or co-generation, is “an efficient, clean, and reliable approach to generating power and thermal energy from a single fuel source.” About 30% of energy used to generate electricity is lost as heat. Furthermore, about an additional 30% of electricity generated at central power plants is lost in transmission to customers. CHP takes advantage of this fact by using the waste heat produced created by electricity production for heating purposes. On-site CHP reduces or eliminates transmission losses. In other words, CHP is simply a way to generate and use energy more efficiently than the conventional generation method that wastes energy through transmission and waste heat. See the diagram below for a comparison between conventional generation and CHP.

In addition to large scale CHP found at industrial sites and university campuses, technological advances in the field of micro-CHP now allow for individual municipal building-sized applications. Micro-CHP units may run off of traditional fuels like oil or sustainable energy like biomass. Micro-CHP can be a form of distributed generation (meaning more, smaller, dispersed generating systems as compared to fewer, larger, centralized power plants) that is now gaining increasing traction in the United States. Distributed generation is discussed below.

Some countries produce a significant amount of electricity using CHP technology. Denmark and Russia produce 50% and 30% of electricity using CHP, respectively, compared to the USA which produces less than 10% of energy using CHP.
Distributed Energy (or Distributed Generation)

Distributed energy involves the generation of energy very near to where it is actually used. On average, about one third of electricity that leaves a transmission facility is lost to resistance in electrical wires before arriving at the end use. Some believe that centralized energy systems also create national security vulnerabilities. Models for distributed energy depend highly on small-scale electricity systems produced by combined heat and power, solar electricity, and wind electricity systems.

The fundamental impediment to the installation of sustainable energy systems is the perception of increased cost. The challenge is to change this perception and effectively communicate a new choice for facilities and utilities. The goal of many communities is to install and maintain energy systems that will meet the community’s environmental and economic objectives and provide an important educational and leadership opportunity for the community.

If implemented effectively, the growth potential for distributed generation mirrors our projections for increased demand for energy. That said, the first order of business is the perceived impediment.

Myths associated with this impediment include:

- the belief that future systems will increase in efficiency or decrease in costs making a present investment untimely,
- that energy prices fluctuate wildly making current investments risky,
- the complexity of these systems, their installation and their opposition from regulators and utilities will make their deployment too complicated,
- incentives are too infrequent, unstable, or difficult to benefit from and only can only be utilized by private entities and home owners.

The reality is that renewable and efficient energy systems:

- are reliable and affordable,
- are supplemented by stable incentive programs at the state and federal level,
- can be installed at virtually any facility (including schools and governments) in an arrangement that captures tax credits and incentives,
• stabilize energy costs over the long term with the support of the regulatory authorities and the utilities,
• in most cases will yield a return on investment in less than 15 years for electric systems and 5 years for combined electric and thermal systems.

**CENTRAL vs. DISTRIBUTED GENERATION**

**Central Generation**

**Distributed Generation**

*Central vs. distributed generation. “Distributed generation is often contrasted to central generation. In the case of central generation, power is generated in a large plant (gigawatts in size) and electricity is transmitted over transmission and distribution lines (collectively referred to as the power grid) to buildings where the power is consumed. In the case of distributed generation, the potential exists to provide generation at the building where the power is consumed AND feed excess power back into the power grid as well as take power from it.”*

Copyright © URL National Fuel Cell Research Center, University of California, Irvine, CA,

A final comment regarding distributed generation relates to the efforts to develop a “smart-grid”. The objective of smart grid technology is to create a connected information-based monitoring system. The communications and information in a smart-grid are projected to promote efficiency through real-time pricing, distribution, conservation and interaction with distributed resources.

**Geothermal**

Geothermal energy involves the capture and use of the earth’s relatively constant temperature for heating and cooling within a building. A geothermal heat pump (GHP) (also known as ground-source pumps) transfers thermal energy between the building and the ground through a series of pipes that are installed on the property. Pumps are then used to circulate fluid through the ground loop that absorbs the heat during the summer to provide cooling, or provides BTU’s for heating in the winter. The entire process simply moves heat back-and-forth from the ground to your building. This process can work either like a refrigerator (using underground water as air conditioning for a building) or like a reverse refrigerator (using underground water to heat a building). Note that in most cases in Maine, the same geothermal system can be used both in the summer and winter to cool and heat a building, respectively.

According to the US Department of Energy: “The biggest benefit of geothermal heat pumps (GHPs) is that they use 25%–50% less electricity than conventional heating or cooling systems. This translates into a GHP using one unit of electricity to move three units of heat from the earth.” According to the EPA, geothermal heat pumps can reduce energy consumption—and corresponding emissions—up to 44%
compared to air-source heat pumps and up to 72% compared to electric resistance heating with standard air-conditioning equipment.”

For your municipality, typical applications can include coupling a geothermal heat pump with a radiant floor distribution system within the building to provide highly efficient space heating. These and other similar applications provide even, comfortable heat and are able to significantly lower the buildings heat loss.

The illustrations below depict two types of closed loop systems that could be installed at your building.13

---

**Hydropower**

Hydropower creates electricity by forcing dammed river water past turbines, which creates electricity. See the figure at left which shows one way in which hydropower is created.14 Most of Maine’s hydroelectric potential has already been captured by a network of hundreds of large and small dams. There may be opportunities for smaller-scale hydropower, or “micro-hydro” systems, in your municipality. Hydropower sites with the highest potential will have a large amount of ‘flow,’ a measure of the speed and volume of moving water, and a significant amount of ‘head,’ a measure in the elevation change of the river. Note that improperly designed hydropower installations can have negative impacts on the ecology of a river.

**Landfill Methane**

Globally, landfill methane is an increasingly popular source of energy for communities. The technology works by collecting and combusting methane, a high-energy gas produced in the process of

---

decomposition in landfills. A landfill is capped with special liners while specially designed vents collect the methane gas which is then burned in a generator. Note that burning landfill methane has other benefits because methane is a powerful greenhouse gas—about 25 times more powerful than CO₂. When it is burned, it produces energy and changes the methane to CO₂, reducing its climate changing potency. The technology has been demonstrated as successful in Maine by Casella Waste/Pine Tree Systems. The City of Presque Isle, Maine is currently considering installing waste methane-energy technology on their municipal landfill. See the EPA Landfill Methane Outreach Program for technical assistance and more details at www.epa.gov/lmop.

Ocean (Tidal and Wave) Power
Maine has about 3,500 miles of coastline which may be appropriate for a suite of ocean power technologies including tidal power and wave power. Many of these technologies are in their prototype stage. Your towns’ best chance for implementing tidal and wave power is to first connect with the University of Maine system, which is expanding research programs for ocean and offshore energy solutions.

Where ocean tides change by fifteen feet or more, a location may be able to transfer the energy of changing tides into energy using tidal barrages, dams, fences, and turbines. Each harnesses energy using turbines or turnstiles to generate electricity in a manner often similar to the concept of hydroelectric dams.

Where wave action is considerable, the flow of waves can be concentrated to force past a turbine using funnel-shaped concrete structures. There are also additional technologies to harness the up-and-down movement of water at sea using arrays of floating tubes on the ocean surface.

Solar Power
It may come as a surprise to you that Maine has the highest solar energy potential of all states in New England. Thousands of solar energy units installed in Maine prove the effectiveness and popularity of the technology. Coupled with innovative financing options discussed in Step 5, solar power may be a viable option available to your municipality.

Three primary forms of solar energy are widely available – photovoltaic (PV), solar hot water, and solar hot air. A fourth option, passive solar, involves the construction of a building so that it takes natural advantage of the sun’s warmth in Maine’s cold months, but not in the warmer months.

- Photovoltaic solar panels produce electrical power for use in a building.
- Solar hot water transfers solar energy to fluids which can be used to provide space heating or hot water.
- Solar hot air units transfer solar energy directly to air, which can be used for space heating.

Note that solar hot water and solar air systems, each considered ‘solar thermal’ systems, have a lower upfront cost and higher conversion efficiency than solar photovoltaic systems. The figure below uses calculations from projected experiences of five Maine towns that will install solar photovoltaic or solar
thermal systems: Addison, Dayton, Gorham, Greenville, and Thomaston. You may notice that, even though the average photovoltaic installation costs nine times more than the average solar hot water installation, the photovoltaic installation produces less energy (measured in MMBtus, or million British thermal units) than the solar thermal system. Likewise, the solar photovoltaic systems, which cost over 900% more, produced only 30% more annual expected benefits than solar thermal, for a payback that is, on average, 30 years longer than solar thermal.

<table>
<thead>
<tr>
<th>Solar Photovoltaic</th>
<th>Solar Thermal</th>
<th>How Does Solar Photovoltaic Compare?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Average Final Installation Cost</td>
<td>$88,600</td>
<td>$9,763.33</td>
</tr>
<tr>
<td>Average Annual Energy Production</td>
<td>70 MMBtu</td>
<td>107 MMBtu</td>
</tr>
<tr>
<td>Average Annual Economic Return</td>
<td>$2,177</td>
<td>$1,691</td>
</tr>
<tr>
<td>Average Payback Period</td>
<td>40.8</td>
<td>8.5</td>
</tr>
</tbody>
</table>

Aside from solar air heating or solar hot water heating for use in space heating, the other main use for solar thermal systems are for domestic hot water uses. Fire departments and community centers—and other buildings with large shower or kitchen hot water demands—are the most common municipal buildings that can benefit from solar hot water heating.

In addition to electricity production purposes, solar photovoltaic systems can be used as an education tool in your town, especially if installed in highly publicized ways and in visible locations such as schools and libraries.

During the inventory and audit phase of your work, be aware of those locations that provide a large, flat, south-facing, non-shaded area where solar energy could be installed. Typical locations ideal for larger arrays include school buildings, a large municipal complex, and fire and safety buildings. While large open locations are ideal, it should be noted that many buildings are still good candidates for solar power, just on a smaller scale. Also, solar thermal generally does not need as much southern exposure as photovoltaic does.

**Wind Power**

Wind power is another clean form of energy generation that does not produce any emissions during electrical generation. The development of wind turbine technologies has come a long way in terms of design and scale. The most critical component to wind power installations is first understanding what type of wind resource is available at a specific location. Just because it appears to always be windy in certain areas of your town does not necessarily mean those areas are appropriate for a wind turbine installation. Wind resources can be very site specific to a building or property. Not all locations have a steady or predictable amount of wind to harvest, as compared to solar which is relatively predictable from a single assessment. The most effective way to determine whether the installation of a wind turbine is appropriate at a facility is by erecting and operating (for a minimum of 6 months) a wind “anemometer.” An anemometer is a device that attaches to the top of a pole and collects valuable wind speed data over a period of time. This allows you to evaluate whether there is a consistent and adequate amount of wind at that location to warrant the installation of a turbine, as well as what size turbine is appropriate.
To gain a general idea of the wind resources in your area, consult the 50 meter wind power resource map maintained by the Department of Energy at http://www.windpoweringamerica.gov/maps_template.asp?stateab=ME

Wind turbines also vary greatly in size and shape. Turbines now range anywhere from 400 watt systems all the way through multiple megawatt systems (1,000,000 watts equals 1 megawatt). Maine towns typically install 10kW± systems to supplement power to their buildings.

The objective for any wind turbine installation is to have the turbine in operation as much as possible. If the turbine installed requires too high of a ‘cut in’ speed (the speed required for the system to initially begin operating), then the turbine will only operate during those times of high gusts and not produce the desired energy generation. Therefore, it is important for your committee to first evaluate potential sites your municipality could erect a turbine(s) and then work with a professional installer to determine whether that site has enough of a wind resource to warrant a project.

4.3 Community Energy Projects

There are a number of compelling reasons to involve community energy projects in your local energy efforts. Typically, local government operations use only 1%-3% of energy within municipal boundaries. Residents, business, industry, and transportation typically accounts for the remaining 97%-99% of energy use. Furthermore, a number of factors are leading to a potentially dire situation for the average Maine family. According to the Maine Office of Energy Independence and Security, the average Maine family spent 5% of their budget on energy (electricity, heating, and transportation) in 1998. In 2008, that number rose to 20%. By 2018, an estimated 45% of the average Maine family budget will be spent on energy.

State and federal government are increasingly realizing the importance of community energy efficiency initiatives and providing grants to support these efforts. Typically, only municipalities are eligible to apply for these funds that benefit their communities. For all these reasons and more, it is difficult for Maine local energy committees (LECs) to ignore energy use in their community.

Involving citizens and organizations outside of your committee and municipal structure will be an ongoing process. Many community members, from home owners to local businesses, are interested in saving energy and money by making improvements to their building or installing some form of sustainable energy generation. Your committee will likely receive requests for assistance from the community. Your committee’s level of participation will vary depending on whether you would like to, or can support particular efforts.

Some things to consider when expanding your committee’s work to other areas of the community:

- Does this fit within our formation structure and mission statement?
- Will your committee be able to harness state or federal funding in order to hire someone to administer community-oriented aspects of our efforts?
- How much time will this require?
- Can our committee effectively move forward with other committee work while being involved in the effort (e.g., to continue with municipal energy improvements)?
4.3.1 Community Weatherizations
Perhaps the most interesting community energy initiative now taking place in Maine are community weatherization projects, which focus on increasing the energy efficiency of community buildings.

Community weatherizations are much the same as “weatherizing” any municipal building: the process involves making homes or businesses more energy efficient in their use of heating fuel. Often, weatherization efforts are tied with overall energy efficiency efforts by also working to increase the electrical efficiency of lighting and appliances in a household.

Community weatherization projects are often started by community-based nonprofit organizations, many of whom partner with municipalities for support. Maine currently has a stated goal to weatherize all homes and 50% of businesses by 2030.

Non-Financial Tools for Community Weatherizations
For more information about the grants and incentives for community weatherization’s, including Property Assessed Clean Energy (PACE), see Step 5: Identifying Financing Options.

Volunteers
Community volunteers can be important to market and implement community energy efficiency initiatives. Hour Exchange Portland (www.hourexchangeportland.org) is an example of a time bank system that is being used to promote weatherization initiatives. According to timebank.org, for every hour you spend doing something for someone in your community, you earn one Time Dollar to put in your. Then you have a Time Dollar to spend on having someone do something for you. Hour Exchange Portland performs air sealing and other basic weatherization steps in exchange for time dollars.

The Unity Barnraisers (www.unitybarnraisers.com) and the United Way of Mid Coast Maine (www.uwmcm.org) both run volunteer efforts to help increase the energy efficiency of homes through air sealing and other basic winterization steps. A number of the following initiatives can be implemented by volunteers to help increase energy efficiency retrofits for buildings in your community.

Green Sneakers (www.coolmaine.org)
According to the Maine Partners for Cool Communities (MPCC) website, the Green Sneakers Project is a door-to-door neighborhood campaign created to motivate local, personal actions that address the global challenge of climate change and deteriorating air quality. MPCC will recruit and train teams of local volunteers to educate households on how to reduce residential energy use. The Green Sneakers Project will provide training by BPI (Building Performance Institute) trainers to volunteers who will talk to and educate their neighbors about residential energy and money saving strategies they can implement in their homes as they reduce their
contributions to global climate change.

**New England Carbon Challenge (www.necarbonchallenge.org)**
The Carbon Challenge provides “off-the-shelf” resources for individuals and communities to educate and motivate residential energy and greenhouse gas reductions. The Carbon Challenge is a joint initiative of the University of New Hampshire (UNH) and Clean Air - Cool Planet (CA-CP) committed to providing New England residents and communities with the information, tools, and support necessary for households to reduce their residential carbon dioxide emissions by 10,000 pounds per year. A key objective of the Carbon Challenge is to develop a duplicable residential outreach model using research-based voluntary behavioral change tools that target the root causes of climate change inaction and utilize the networks and community organizations that can foster personal behavioral change.

**Maine State Housing Authority and Community Action Programs (CAPs) (www.mainehousing.org)**
The Maine State Housing Authority, or Maine Housing, in partnership with the regional Community Action Programs, offers a wide range of services for low income homeowners. Contact your local CAP to learn how you can help promote the free Maine Housing programs to residents in your community.

**Light Bulb Swap-Out**
Several LECs throughout Maine have conducted “light bulb swap-out” projects that encourage community members to use and safely dispose of more efficient compact fluorescent lamps (CFL). The CFLs are given out for free after donation from hardware store companies and the rebates provided by Efficiency Maine. Sometimes, Efficiency Maine will run initiatives to distribute CFLs to residents, often to low income communities.

**4.3.2 Community Transportation**
Transportation represents about half of energy use in the state of Maine. Your LEC may find it useful to promote or create one or more of the following programs.

**Traffic Light Synchronization**
This technology connects different traffic lights into a smart network that helps facilitate the flow of vehicles through your town or city, reducing congestion and idling time.

**Public Transportation**
Consider establishing public transportation options to increase transportation access and reduce transportation costs for residents and businesses. GoMaine (www.gomaine.org) is Maine’s statewide commuter service providing access to healthy, economical and eco-friendly options for commuting to and from work, besides simply driving alone. GoMaine helps commuters across Maine find practical commuting modes that save money, save energy, and save vehicle wear and tear through carpools, vanpools, public transit and bicycling.

**Integrated planning activities**
See the State Planning Office resources (in section 4.3.4) for information on how to harness integrated planning to enhance community transportation.
Bike and pedestrian lanes and crossings
Consider promoting bicycling and walking in your community by identifying high-priority areas to establish lanes and crossings to improve biker and pedestrian safety. The Bicycle Coalition of Maine (www.bikemaine.org) may be a helpful resource.

Car Sharing Programs
Car sharing programs allow people to rent cars for a short period of time, often by the hour, helping to reduce the need for car ownership. Municipalities and institutions can set up the programs or promote programs with a proven track record of success such as Zipcar.

Safe Routes to School
The goal of the Safe Routes to School program is to encourage a greater number of children to either walk or ride their bikes to school. The program encourages children to walk or ride their bike by providing education and incentives that remind children how much fun it can be. Parents’ safety concerns are also addressed by encouraging greater enforcement of traffic laws; exploring ways to create safer streets; and educating the public about safe walking, biking, and driving habits.

To implement a Safe Routes to Schools Program in your community visit the federal government’s SAFETEA program. Additional information can also be found by visiting the National Center for Safe Routes to Schools.

Idling Reduction Campaigns
The Maine Department of Environmental Protection’s Clean Air program has a long-successful anti-idling program for schools, municipal fleets, and communities. The program offers materials, technical support, community-based marketing techniques, and other resources to run a successful campaign in your community.

4.3.3 Education
Maine Energy Education Program (MEEP) (www.meepnews.org)
MEEP offers a number of hands-on energy education modules to bring to your K-12 school systems. The age-specific class sessions are taught by MEEP staff.

PowerSleuth (www.powersleuth.org)
Efficiency Maine has developed curriculum for grades 4-8 called PowerSleuth, based on resource-informed national standards and aligned with newly revised Maine Learning Results standards.

Public Education Campaigns
Some committees focus on public education in a number of ways including public lectures, expositions, demonstrations, informational kiosks, and film series.

4.3.4 Other Projects
Building Energy Codes
In 2008 Maine adopted higher efficiency building energy codes for new construction and renovation. The Maine Municipal Association has a resource guide and continuously updated website to help

Planning
The Maine State Planning Office (SPO), throughout Land Use Program, co-sponsors the annual Active Communities Conference, which provides information, assistance and encouragement to local officials, groups and citizens working to improve opportunities for walking and bicycling in their communities.

There are a number of resources offered by the SPO which may be helpful to your local energy reduction efforts. For more details on each program, see the Additional Resources section for more information on each of the following programs:

The Waste Management and Recycling Program works with local communities on issues that have significant energy implications.

The handbook ‘Creating Traditional, Walkable Neighborhoods: A Handbook for Maine Communities ‘ will help municipal officials craft land use regulations that foster traditional neighborhood development.

The Density Visualization Tool uses Maine-based examples of different housing densities to help town planners, planning boards, and others understand what different densities look like on the ground.

A brochure on Why Municipalities Create Comprehensive Plans shares some of the key benefits of creating a comprehensive plan that is consistent with Maine’s Growth Management Act.

Finally, coastal communities interested in information related to coastal planning and wind turbines can benefit from finding out more about the Ocean Energy Task Force recommendations.

4.4 Additional Resources
This section contains additional resources relevant to Identifying Technologies and Projects in your community.

If you are viewing this document on a computer, simply click on the blue hyperlinks below to access each resource.

If you are viewing this document on paper, you will notice that while some additional resources have links that you can type into your web browser, some have no links at all. Each additional resource without a web link can be found in the Step 4: Identify Technologies and Projects webpage on the new Energy Working Group Website, to be released in late 2010. See the current Energy Working Group webpage for an announcement of the new website launch.

Section 4.1 Municipal Energy Efficiency

General Resources
Example Municipal Local Government Energy Initiatives 2010 (Understanding the Energy Efficiency and Conservation Block Grant: A Resource for Maine)
Example Municipal Local Government Energy Initiatives 2007 Cool Maine
Rapid Development Energy Efficiency Toolkit
Ten Municipal Energy Changes – Massachusetts Municipal Association

Green Buildings
Ordinance—LEED Green Building Standards 2008 Bangor
Ordinance—Building Occupancy Policy 2006 Freeport

Weatherizing Buildings
Environmental Protection Agency Weatherization Guide
http://www.energystar.gov/index.cfm?c=diy.diy_index

Municipal Energy Efficiency Policy
Ordinance—Energy and Climate Policy 2008 Bangor
Freeport Energy Conservation Strategy

Eliminating Streetlights
Steps for Eliminating Streetlights
Ordinance—Draft Guiding Principles for Eliminating Streetlights

HVAC at Wastewater Treatment Plant (Kennebec Sanitary Treatment District)
Summary of HVAC Measures
Heating with Wastewater Effluent

Transportation and Fleets
Ordinance—No Idling, Yarmouth 2009
Ordinance—Model Ordinance Green Fleet Policy
Idle-Right Technology Falmouth
ICLEI Municipal Green Fleet Handout
Efficient Driving Tips www.ecodrivingusa.org
Maine DEP Anti Idling Program http://www.maine.gov/dep/air/education/caz_no_idling_video.htm

Section 4.2 Municipal Sustainable Energy

Biomass
Municipal Biomass Case Study 2010 Maine Municipal Association

Biofuels
Comprehensive Biofuels Information and Distributors Locations http://www.afdc.energy.gov/afdc/

Green Power Purchasing
Maine Public Utilities Commission Green Power Purchasing Supplier List
Landfill Methane Gas to Energy
EPA Local Methane Outreach Program  www.epa.gov/lmop

Wind
Ordinance—Small Wind Turbines, Windham 2010
Ordinance—Wind Energy, Portland 2010 (Draft)
Ordinance – Model Ordinance State Planning Office
Guidebook – Model Ordinance Guidebook, State Planning Office
Municipal Regulation of Wind Case Study 2010 Maine Municipal Association
Municipal Wind Case Study 2009 Maine Municipal Association

Section 4.3 Community Energy Projects

General Resources
Green Sneaker Program--Homeowner Outreach for Weatherizations

Building Energy Codes
Maine Municipal Association’s Building Energy Code Webpage

Community Weatherization
Example Time Dollar Weatherization Program  www.hourexchangeportland.com
Example Volunteer Weatherization Programs www.unitybarnraisers.com and www.uwmcm.org
Green Sneakers Program www.coolmaine.org
New England Carbon Challenge www.necarbonchallenge.org
 Maine State Housing Authority www.mainehousing.org

Education
Power Sleuth Energy Education Curriculum www.powersleuth.org
Maine Energy Education Program www.meepnews.org

Transportation
GoMaine Commuter Program www.gomaine.org
Promoting Bicycling Initiatives www.bikemaine.org

Planning Resources – Maine State Planning Office (SPO)
SPO Waste Management and Recycling Program contact Sam Morris at 207-287-8054.
SPO Ocean Energy Task Force recommendations contact Kathleen Leyden at 207-287-3144.
Creating Traditional, Walkable Neighborhoods: A Handbook for Maine Communities
Density Visualization Tool
Why Municipalities Create Comprehensive Plans
Step 5: Identify Financing Options

Once you have connected with helpful resources, organized efforts, assessed energy use, and identified efficiency projects, it is time to consider financing options. Analyzing the wide range of options available for financing ensures that projects receive the support they deserve.

Acquiring financial resources to conduct energy audits, educational programs, and energy improvement projects can be challenging. There are many organizations throughout the country and state that are working to ramp up these resources and provide assistance to communities interested in exploring projects. This section reviews material in a systematic way by explaining:

Did you know: your town is paying for energy efficiency projects—right now?

It’s true. Towns are paying for energy efficiency projects whether or not the projects themselves are actually implemented. The Environmental Protection Agency has found that, on average, 30% of utility expenses are attributed to waste or underutilization. If your municipality spends $100,000 on electricity, an average of $30,000 is wasted per year—you may, in a sense, be paying $30,000 for energy efficiency, or a lack thereof.

5.1 Grants, Donations, and Subsidies

Most towns are interested in knowing what sort of direct cash incentives they can receive for local energy efforts. The following section is a primer on how to take advantage of cash resources and subsidies that may help your local energy committee (LEC) efforts. Note that grant and subsidy opportunities for local governments and community energy efficiency efforts are rapidly changing.

5.1.1 Grants

Maine Department of Environmental Protection Micro-Grants
The Maine DEP offers a variety of micro-grants for energy efficiency projects. The Maine Green Schools program offers grants of up to $1,000 to help administrators, teachers, and students perform energy assessments for schools. www.mainedep.com

Department of Energy/Efficiency Maine
The Department of Energy (DOE) and Efficiency Maine are responsible for administering the Energy Efficiency and Conservation Block Grant (EECBG) program. The EECBG program provides grants to municipalities, schools, and nonprofits. The EECBG program was funded for the first time in 2009. Maine towns and cities received grants ranging from $10,000 to $85,000. Some larger cities received grants over $100,000. [http://www1.eere.energy.gov/wip/eecbg.html](http://www1.eere.energy.gov/wip/eecbg.html)

**Retrofit Ramp-Up**

The State of Maine received $30 million through the federal Retrofit Ramp-Up program. The money will soon be available to municipalities who wish to start Property Assessed Clean Energy (PACE) financing districts in their towns. The PACE program will help fund homeowner and business energy efficiency efforts. For up-to-date information go to [www.efficiencymaine.com/pace](http://www.efficiencymaine.com/pace) and see section 5.3 Community Financing Options.

**Efficiency Maine**

Efficiency Maine (EM) administers the EECBG and Retrofit Ramp-Up programs described above. They also operate a suite of cash incentive programs for municipalities. All LECs should contact EM to discuss their projects to see what EM grants and programs may be of assistance to their efforts. [www.efficiencymaine.com](http://www.efficiencymaine.com)

Voluntary Renewable Resources Grants of up to $50,000 are periodically offered by Efficiency Maine. The grants fund small-scale demonstration projects to educate communities on the value of renewable energy. The grants are generally available to, among others, nonprofits, schools, municipalities, community action programs. The program is offered only periodically when voluntary contributions reach a certain level. Track this grant opportunity often to determine when the application periods open.

**5.1.2 Foundations**

The foundations listed below are also discussed in Step 1: Connecting with Helpful Resources.

- **Environmental Funder's Network**
  - EFN periodically offers large grants ($100,000±) to Maine-based environmental initiatives. [www.environmentalfundersnetwork.org](http://www.environmentalfundersnetwork.org)

- **Maine Community Foundation**
  - MCF has about two dozen state-wide and regional grant programs that may be applicable to local energy efforts. [www.mainecf.org](http://www.mainecf.org)

- **New England Grassroots Environmental Fund**
  - Each September, NEgef offers small grants (up to $2,500) to grassroots organizations that strengthen the role of local citizens in solving environmental problems or developing sound environmental policies. [www.grassrootsfund.org](http://www.grassrootsfund.org)

- **Maine Initiatives**
  - Maine Initiatives funds nonprofits working for social, economic, and environmental justice. Each October they offer “Grants for Change” including three-year grants of $75,000 and one-year grants from
$5,000 to $20,000. Year round they offer rapid-response “Lightning” grants of up to $2,000.
www.maineinitiatives.org

5.1.3 Private Donations
LECs often overlook the power of corporate and private donation funding for local initiatives. In 2008, charitable giving in the US totaled $308 billion (www.givingusa.org). Grants from foundations provided only 13% of that funding. Individuals donated over 75% of funds. Corporations donated 5%.

There are a range of resources your LEC can use in order to begin a fundraising campaign. The Maine Association of Nonprofits (www.nonprofitmaine.org) frequently offers free or low-cost trainings on how to begin your own private fundraising campaign.

5.1.4 Incentives
Tax credits (requires third party)
Normally, in the context of municipal investments in Maine, the concept of tax incentives is never raised. Municipalities are traditionally exempt from taxes and therefore from programs that offer tax incentives. However, recent developments in the market and the law have led to creative approaches to project financing that allow governments to indirectly receive these benefits. These benefits can typically be realized by going through a third party, explained further in section 5.2.3. For a full and up-to-date description of tax credits visit www.dsireusa.org.

A summary of the tax credits and rebates includes:
Sales and Use Tax Refund for Qualified Community Wind Generators - Through 2011, municipalities and others are qualified for a full tax refund on the use of electricity or sale of wind energy as long as the wind turbine meets a community renewable energy project certification. The general sales and use tax is 5%. The tax refund does not apply to the production and use of community wind within the government, which is exempt from the sales and use tax. However, the tax credit may apply to the sale of electricity from the government to residential customers.

Business Energy Investment Tax Credit (ITC) – The ITC provides for a tax credit for electricity derived from wind facilities placed in service by December 31, 2012, as well as for geothermal, biomass, hydropower, landfill gas, waste-to-energy, and marine facilities placed in service on or before December 31, 2016. Municipalities can take advantage of the ITC through third party financing. Technologies include:
  o 30% of expenditures with no maximum tax credit for:
    o Fuel cell, maximum at $1,500 credit per 0.5 kW of capacity.
    o Small wind turbines, up to 100kW, placed in service after January 1, 2009.
  o 10% of expenditures with no maximum tax credit for:
    o Geothermal for projects after October 3, 2008.
    o Microturbines capped at $200 per kW up to 2 megawatts (MW) of capacity.
    o Combined Heat and Power (CHP) up to 50MW capacity, at least 60% energy efficiency or at least 90% biomass energy source.

Grant Program in Lieu of Tax Credits – The 2009 American Recovery and Reinvestment Act (ARRA) program provides funding for taxable entities to receive a cash rebate for the above described Business
Investment Tax Credit, with a few additions and modifications. Projects must be installed and operational by December 31, 2010—check for potential extensions of this law. Eligible projects include:

- 30% of expenditures with no maximum grant for:
  - Wind
  - Closed-Loop Biomass (Plants planted for purpose of electricity)
  - Open-Loop Biomass (Livestock waste and waste plants)
  - Geothermal (Electricity)
  - Solar
  - Landfill methane-to-energy
  - Trash Combustion
  - Hydroelectric (land-based)

- Hyrdokinetic (ocean tidal)
- Fuel Cell
- Solar
- Small Wind

- 10% of expenditures with no maximum grant for:
  - Geothermal
  - Microturbines
  - Combined heat and power (CHP)
  - Geothermal heat pumps (GHP)

**Efficiency Maine Business Programs and Rebates**

*Note that municipalities are eligible for all for all of the programs listed under ‘Efficiency Maine Business Programs and Rebates.’*

Efficiency Maine offers a wide range incentives, including prescriptive and custom cash incentives, for purchasing and installing new and upgraded energy efficiency equipment. Efficiency Maine also offers free, independent technical advice for municipalities to help navigate the options available to them. Call them at 866-376-2463. All Maine municipalities are eligible to apply for the following programs:

- **Free Energy Audit Program**
  Efficiency Maine offers free walk through assessments for municipal buildings to help identify initial cost-saving opportunities.

- **Small Business Low-Interest Loan Program**
  Receive 1% interest loans up to $35,000 for qualifying energy efficiency upgrades for businesses and municipalities with less than $5 million in annual sales or less than 50 full-time employees.

- **Business Cash Incentive Program**
  Efficiency Maine offers energy efficiency purchase and retrofit cash incentives of up to $300,000 per calendar year, per business. Cash rebates for efficient equipment are up to 35% of the total project costs for retrofits and 75% of the incremental cost for new construction, major renovations, and replacement of failed equipment. The most common Efficiency Maine cash incentive that municipalities apply for is a lighting retrofit rebate, but Efficiency Maine offers a number of pre-defined incentives for energy efficient equipment:
  - Lighting
  - Ventilation
  - Refrigeration
  - Heating and air conditioning systems
  - Motors and drives
  - Compressed air systems
If your municipality is considering an energy efficient technology not included above, Efficiency Maine can work with you to develop customized incentives for your project.

- **Solar and Wind Energy Rebate Program**
  Like the Voluntary Renewable Resources Grant, the Solar Wind Energy Rebate Program is only offered periodically and on a first-come, first served basis. Funding ranges between $500,000 and $1,000,000 per year. The program is offered to all entities in the state for solar photovoltaics, solar hot water, solar hot air, and wind. The solar incentive is 25% of the project cost or $1,000, whichever is lower. The wind incentive is $500 per 500 watts up to 4,000 watts.

**Unitil/Northern Utilities Cash Incentives and Programs**
In addition to the above described Efficiency Maine program, customers of Unitil/Northern Utilities are also eligible for a number of cash incentive and other programs. Northern Utilities provides free or reduced cost energy audits for municipalities and pays 50% of qualified upgrades up to $50,000. Some of the incentives are listed below, but Northern Utility will work with customers to establish custom incentives if they are considering energy efficient technologies not included on the list below.

- ECM Furnace: $400
- Warm Air Furnace: $100
- Hot Water Boiler: $500-$1000
- Steam Boiler: $200
- Combined High Efficiency Space and Water Heating Unit: $1300
- Indirect Water Heaters: $300
- Tankless water heaters: $300
- Thermostat: $25
- Low-intensity infrared heating: $500

**Net metering**
Net metering is a policy tool that enables utility customers with qualifying forms of onsite generation to interconnect with the grid and feed excess power, also known as ‘net excess generation,’ onto the grid and to bank this energy production. In other words, when the customer feeds electricity back into the grid, the electricity meter credits the onsite generation at the customer’s retail price of electricity (which includes all taxes, transmission, distribution, and generation costs associated with the electricity production and sales). On the other side, the customer may draw power from the grid when on-site power consumption exceeds on-site power generation.

If a utility customer produces more power than it consumes over a month, the amount of net excess generation is rolled forward and credited to the next month’s bill. In Maine, the limit for the size of the renewable energy system is 100 kW. The net excess generation is granted to the customer’s next bill at the retail electricity rate, but at the end of a 12 month cycle any additional capacity is gifted to the utility. In addition sustainable energy sources, small
combined heat and power (CHP) units of 65% or 80% efficiency or greater (depending on CHP size) are eligible for net metering. The figure below illustrates how net metering might work with a customer producing energy using solar panels.\textsuperscript{15}

**Feed-in-tariffs**
A feed-in-tariff is a policy tool designed to encourage the use of sustainable energy technologies. A feed-in-tariff guarantees free grid access and a set, long-term contract price for electricity produced using sustainable energy. Contract prices are generally set higher than the standard electricity rate in order to provide an economically justifiable case for construction of sustainable energy projects. Contracts are typically offered in a non-discriminatory way, although there are often limitations on the total amount of sustainable energy production eligible under feed-in-tariff laws.

The Maine legislature recently approved the Community Based Renewable Energy Production Incentive as a pilot program to test the concept of feed-in-tariffs through 2015. All common and many uncommon types of sustainable energy are eligible under the program. Local ownership is required, defined as “individuals, state and local government entities, federally recognized Indian tribes, nonprofit corporations organized under laws of the state, and business entities organized in the state with 51% local ownership.” The program offers a cost incentive for small programs ($0.10/kWh) or a Renewable Energy Credit (REC) multiplier of 1.5 for sale of RECs on the Regional Greenhouse Gas Initiative Carbon market.

### 5.2 Municipal Financing Options

There are a number of ways a municipality can finance one or more of the energy efficiency and sustainable energy technologies mentioned in the previous Step 4. There are the standard methods to finance projects, such as through operating expenses or capital improvement budgets. Then there are the slightly more advanced methods such as borrowing money from banks or government programs to fund projects. Finally, there is a suite of proven energy-improvement financing options, many of them designed specifically for municipalities, that your local energy committee (LEC) can consider to help make energy investments more beneficial to your community.

#### 5.2.1 Balance Sheet Financing

In some cases a town may be able to finance energy projects using cash reserves or working capital, also known as balance sheet financing. This option may be best suited for replacing failed equipment or for implementing smaller projects. For upgrades and retrofits, there may be capital reserve accounts set aside for maintenance to town buildings or even capital improvement programs (CIPs) that include schedules for such activities.

Balance sheet financing raises issues associated with high up-front expenditures. Additionally, such projects may leave the site host with technology and performance risk for some projects. Finally, a

\textsuperscript{15} [http://www.mysolarshop.co.uk/-i-95.html](http://www.mysolarshop.co.uk/-i-95.html)
government is unable to benefit from the federal tax benefits generated by the project using this financing option. Depending on the situation, other financing options may be more advantageous.

**Budgeting**
Consider the political realities of your projects. Budgeting is the process a municipality goes through to appropriate dollars. Municipalities typically have a long list of projects waiting for capital improvement funds. High pressures force municipalities to make tough tradeoffs about municipal spending. Ask your town for a copy of its capital improvement plan, and you will see just how high priority some of the projects are on that list. In order to implement existing and proposed projects funded using balance sheet financing, municipalities are now using emergency funds balances, cutting programs, raising taxes, or some combination of the three.

**Spending**
Like with budgeting, each town controls spending in different ways. In larger towns, different directors (for example, a director of public works and a director of police) control spending based on their allocations. In many municipalities, spending over $10,000 needs to be approved by the board of selectmen or city council, and may need to go out to bid, depending on the circumstances.

In 2007, the City of Saco dedicated $300,000 of capital funds to energy efficiency projects in its community. Saco opened up the fund to all departments and had each department submit projects along with estimated investment and payback period. The full $300,000 was spend on cost beneficial projects and is achieving significant cost savings from energy efficiency.

**Audits and Education Programs**
Energy audits and educational programs are a great match for balance sheet financing because of their low costs. Energy audits are essentially like contracting out a study of the feasibility to perform energy efficiency projects. Municipalities commonly hire consultants using balance sheet financing to study the feasibility of investing money in a certain area. Educational programs are essentially a ‘service’ a local government can perform for its citizens. There is no doubt that these efforts produce benefits, not the least of which is the foundation for significant future energy efficiency improvements.

### 5.2.2 Debt Financing

**Bank Loans**
Municipalities can apply for smaller loans for energy efficiency projects through traditional bank loan programs. They may also take advantage the Efficiency Maine Small Business Program’s Low Interest Loans, which provide up to $35,000 at 1% interest for qualified projects.

**Municipal Bonding (CEEBs and CREBs)**
Currently, the Clean Energy Efficiency (CEEB) and Clean Energy Renewable Bond (CERB) bond is not available. Historically, the program has offered billions of federal funds to local governments and other government entities to finance new clean energy projects. The bonds were awarded to municipalities to finance municipal or community wind, closed-loop biomass, open-loop biomass, geothermal, small irrigation, hydropower, landfill gas, marine renewable, and trash combustion facilities, as well as transmission projects to link renewable energy systems to customers. Some of the funding was used for the development of leading edge biofuels with commercial promise and demonstrated GHG reduction potential. One third of the authorized funding was made available for qualifying projects of state/local/tribal governments, one-third for public power providers, and one-third for electric cooperatives. Check frequently to see if this funding option is reopened.
Qualified Energy Conservation Bonds (QECBs)
QECBs are available to Maine municipalities for energy efficiency and sustainable energy technologies, and it appears that there are no limitations on the types of energy efficiency or sustainable energy technologies permitted under the bond. Municipalities typically will pay a discount rate of 5-5.5% on the bonds, which are administered by the U.S. treasury. The Maine legislature signed LD1530 into law in order to legally allow Qualified Energy Conservation Bonds (QECBs) in the State of Maine. The program has made $3.2 billion in bonds available.

According to the Database for State Incentives and Renewable Energy USA (DSIREUSA), “for QECBs issued after March 18, 2010, the bond issuer may make an irrevocable election to receive a direct payment from the Department of Treasury equivalent to the amount of the non-refundable tax credit described above, which would otherwise accrue to the bondholder. The direct payment comes in the form of a refundable tax credit to the issuer in lieu of a tax credit to the bondholder... The advantage of either option is that it creates a lower effective interest rate for the issuer because the federal government subsidizes a portion of the interest costs.

“In contrast to CREBs, QECBs are not subject to a U.S. Department of Treasury application and approval process. Bond volume is instead allocated to each state based on the state’s percentage of the U.S. population as of July 1, 2008”

Large local governments (over 100,000 in population) are then directly allocated a portion of the bonds, and local municipalities are eligible to competitively apply for funds. 70% of bonds must be used to finance public (i.e. municipal) energy efficiency and sustainable energy projects, and the remainder can be allocated for used for private activity bonds. Projects funded by the bonds must be sustainable energy projects, broadly defined ‘green community’ programs, or energy efficiency projects that generate 20% or higher savings for buildings. For more information see an explanation of QECBs and Maine QECB Legislation LD1313.

5.2.3 Third Party Financing
Third party financing involves having outsiders, typically companies, work with a municipality to provide all of the upfront capital for a project. Third party financing also gives for-profit corporations the ability to monetize tax credit and other tax-subsidy benefits which would not normally accrue to a tax-exempt municipality. Additional benefits are potential operations and maintenance savings where the implementation is owned by a third-party. In the third-party model, new businesses will be able to create an income stream and take over the insurance, performance assurance, and maintenance of an energy efficiency or sustainable energy project.

Benefits of Third-Party Ownership
There are several benefits that appear for the municipality that is considering a third-party financing strategy.

- Ability to Monetize Federal Tax Incentives. Federal tax incentives for some projects can equal 30% of the installed capital cost. In addition, businesses can accelerate the depreciation of the cost of some systems and installations using a five-year schedule, generating further tax-related benefits that can be passed on to the municipality. Together, these two incentives can have a tremendous impact on both the cost of and the financial returns on a project. Local governments, however, cannot directly benefit from these incentives. The third-party ownership model introduces a taxable entity into the
structure that can benefit from the federal tax incentives, lowering the overall cost to the non-taxable entity.

- Low/No Up-front Costs. Even with grants and incentives to provide support to municipalities, up-front costs can still be remarkably high. Given the current economy and budget constraints, a large initial investment is difficult to achieve regardless of the return on the investment. A third-party structure places the responsibility of the increased initial cost on to the investor or developer of the project.

- Operations and Maintenance. Another attractive feature of the third-party ownership structure is the fact that new equipment can result in lower operation and maintenance expenses and in some cases, the entire cost and responsibility can shift to the project developer.

- Eventual Ownership. As a final issue, third-party structures can be pre-crafted to permit and even encourage local government buyout provisions. This allows the municipality to consider advanced purchase options if circumstances change in a way that makes this pathway more beneficial. If, for instance, a grant program becomes available, such funds can be used to accelerate the ownership path and provide for a more immediate “vesting” of full savings opportunities. Otherwise, these arrangements usually provide for a number of options at the end of the term. The three likely scenarios for the host would be to: 1) extend the arrangement, 2) purchase the energy improvements, or 3) ask that the improvements be removed.

- Predetermined Energy Pricing. Some third party models fix the price of energy generation or efficiency at a certain price. This can help reduce investment risk and save money on energy.

Concerns with Third-Party Structures
- Ownership and the Host Facility. In some cases, ownership and facility access is important. Some facilities and staff may not be comfortable with a third party having access to and installing equipment on the property. Ongoing site access is critical to the performance of the system.

- Contract Issues. Be sure to check with your municipal lawyer to determine potential legal constraints and procedures that must be addressed when considering third party structures for energy efficiency and sustainable energy projects.

Third-Party Models
This section refers to two common third party financing models employed by municipalities in Maine, the power purchase agreement (PPA) and performance contracting by an energy service company (ESCo).

- Power Purchase Agreement (PPA). A PPA transfers risk from the municipality to the company and financiers of a renewable energy project. In a PPA, a third party company will work with a municipality to size a sustainable energy installation, for example a solar panel array on a town hall. Then, the company will install and maintain the system. The municipality then pays a “fixed” price for energy, for example, ten cents per kWh. In most cases, the price of electricity in PPA is usually set at or below the customer’s current retail rate. Although no Maine municipalities have executed PPAs to date, at least one Maine business has. PPA agreements been signed by municipalities in New Hampshire as well, which have a more stringent and lengthy PPA approval process than most Maine municipalities.
In most cases, PPAs set a first year price and then the price escalates annually for term of the contract (in a solar PPA, these terms are usually 20 – 25 years). For solar projects, an annual price escalator of 3-3.5% is common and significantly lower than current rates of increase for Maine electricity supply costs.

Performance Contracting by an Energy Service Company (ESCo)

Typically, performance contracting involves hiring an energy service company (ESCo) to handle all aspects of energy improvements on one or more building. An ESCo designs, finances, installs, and maintains energy efficiency projects and is then repaid by the municipality over time.

The bad news is that an ESCo will only implement a performance contracting arrangement for a large building (20,000± square feet), an energy intensive building (like a wastewater treatment plant), or for a collection of government buildings. Also, an ESCo will generally not perform weatherization services or otherwise implement technologies that save money on heating oil use. This is because electrical savings can be monitored and verified more easily.

If your municipality has an adequate scale of building energy use, strongly consider the performance contracting arrangement. After defining the scope of buildings to be considered for the energy efficiency retrofit, a municipality submits a request for qualifications (RFQ). An Energy Service company that is selected for work will finance and implement the entirety of the project, with cooperation from the municipality in the following stages:

Note that a PPA might be considered an installment contract or debt instrument. In that case, a municipality will need to seek the same authorization to enter into a PPA as it would need to incur other types of debt. That is, legislative body (town meeting) approval will be needed in most non-charter communities, and charter communities will need to review their charters to see if the council may incur the debt of if a referendum is needed.

- Performance Contracting by an Energy Service Company (ESCo)
1. Perform detailed electrical building energy audits to identify and evaluate energy savings opportunities,
2. Develop appropriate architectural plans and engineering designs for potential retrofits,
3. Manage the project from design to implementation to monitoring,
4. Arrange for financing, and assume all project risk by agreeing to pay the municipality money if the appropriate energy savings targets are not reached, and
5. Train staff to provide maintenance service post-implementation.

Generally speaking, the model works by implementing energy efficiency retrofits that provide a substantial savings on energy costs each year. Periodically, the ESCo takes a portion of that energy saving costs from the savings in the traditional operating expense line (i.e. utility bills). After a defined period (usually 3-15 years), the municipality has an option to purchase the installed energy efficient equipment, often for $1, and to benefit from all operating expense savings.

5.2.4 Other Financial Instruments

Revolving Loan Funds (RLF)
This funding mechanism was initially developed to provide loans for small business developments, but has now been extended to include funding for energy efficiency and sustainable energy projects. The municipal energy efficiency RLF concept depends on a central fund capitalized with funds from some source—usually grants, capital improvement funds, or municipal bonds. The central fund can then be used for either municipal or community energy projects with a provable economic return. Projects that are funded need to repay the RLF at an agreed-upon rate for a specified period of years. Generally, the RLF charges an interest rate for the funds to help recover default risk and to grow the size of the RLF fund. The RLF helps to overcome one of the largest barriers to municipal energy efficiency—financing—by providing an ongoing (and theoretically constantly growing) fund for energy efficiency projects.

Energy Office
The Energy Office model is a concept promoted by ICLEI – Local Governments for Sustainability. The Energy Office is based on the idea that an initial investment in energy efficiency—through a grant program, municipal funding, or a combination of the two—may generate sufficient economic savings that can be redirected to hire staff for an energy office. The part- or full-time staff person could then continue to identify energy efficiency opportunities, as well as grant and financing assistance, to help achieve continued economic savings. The revenues from these savings can be continually directed to the energy office, or some or all of these additional savings can be returned to cash reserve accounts or to reduce the municipal tax burden.

For smaller Maine municipalities, it may make sense to set up a regional energy office in order to ensure adequate, cost-effective energy saving opportunities in high enough volume to support a part- or full-time staff person.

Joint Purchasing
Municipalities are familiar with joint purchasing of raw materials such as road salt and asphalt. So too can they purchase electricity, heating fuel, transportation fuel, and energy efficient products at a reduced rate!
Maine Power Options (MPO) is the primary provider of joint purchasing services for municipal electricity, heating fuel, and transportation fuel in the state. Customers can save up to 20% of energy costs using the joint purchasing services of MPO.

In addition to traditional joint purchasing offerings such as road salt, municipalities in the Greater Portland Council of Governments (GPCOG) region will soon be able to take advantage of a joint purchasing program for energy efficient and environmentally preferable office products.

5.3 Community Financing Options

Property Assessed Clean Energy (PACE)

Property Assessed Clean Energy (PACE) is a program that helps to overcome the largest barrier in residential energy efficiency improvements—the cost and risk of upfront capital. PACE eliminates that barrier by capitalizing a central municipal Revolving Loan Fund (RLF) for energy efficiency improvements (see above). The RLF differs from the standard model, however, in that the cost of the project is repaid over a longer payback period (8-20 years) and is paid as a surcharge on the property tax of homeowners or landlords. If and when the residential property transfers ownership, the property tax surcharge continues to be assessed on the individual owning the property. The new homeowner, however, also enjoys the continued energy efficiency benefits of the home and so still benefits from the transaction. Nationally PACE legislation has hit roadblocks regarding lien priority status. Maine’s PACE law avoids these stumbling blocks by placing the PACE mortgage in a junior or subordinate position to first mortgages.

Maine has received $30 million from the federal government in order to design and administer a PACE program in support of local municipalities. Of this amount $20 million will go to capitalize a RLF.

to Efficiency Maine will administer the loan program at the state level to help achieve an economy of scale to lower administration costs and improve processing of payments through a dedicated call center and delivery team. However, if a municipality wants to administer a PACE program locally, they will be eligible to do so.

There has been a considerable amount of activity around PACE programs nationwide. In August 2010, Efficiency Maine officially rolled out their PACE program. For up to date information contact Dana Fischer, dana.fischer@efficiencymaine.com, who will be administering PACE programs for the state of Maine.

The Additional Resources section below includes significant resources for towns, including an official frequently asked questions document which provides background information on Maine’s PACE enabling legislation, LD1717. Also included is a model PACE ordinance designed for municipalities that choose to have Efficiency Maine administer a local PACE program. Most municipalities will chose this route, although it is within the law for any municipality to administer a PACE program themselves.

All Maine cities and towns will have equal access to the program. Towns will be granted an initial, renewable $200,000 allocation that will be replenished as needed from the $20,000,000 pot of money.

There are three requirements for towns and cities:

1. The full use and endorsement of the one-stop Maine Home Performance program with its certified installation program and quality control assurances to deliver the retrofits,
2. Have a municipal PACE ordinance or other authorization in place, and
3. Have a demonstrated commitment to local marketing and outreach.

The Efficiency Maine and the Maine Home Performance Program estimate that the PACE loans will each have a 10 to 20 year maturity at an average of $8,000 per loan. They estimate the average home will save 200-300 gallons of oil per year under the program. Efficiency Maine eventually hopes to capitalize the RLF at $384 million of total assets in order to achieve the scale of weatherizations needed to make a significant impact in Maine.

**BENEFITS OF PACE CLEAN ENERGY FINANCING DISTRICTS**

There are over 150 clean energy efficiency financing programs in the U.S., often run by utility companies, in addition to the many traditional loan products offered by financial institutions. Limitations of these financing programs often include short repayment periods, high interest rates, stringent credit requirements that do not account for energy savings, lack of options for recent homebuyers who have not built up equity, and limited availability for households most in need, to name a few. Energy Financing Districts have several advantages for participants over other financing options, such as:

- **Longer repayment period**
  Energy Financing Districts offer a longer term of up to 20 years, compared to the standard 5 to 7 years of many utility programs and conventional loans, thus allowing participants to do more comprehensive work and more closely match their payments with the energy savings.

- **Repayment transfers with ownership**
  Many property owners do not want to invest in energy efficiency or solar energy improvements if they plan to sell their property in a few years. Energy Financing Districts allow the current owner to invest today, knowing that the repayments and the financed improvements will transfer to the new owner if he or she decides to sell the property.

- **Information from a trusted source**
  Trust is a key issue in encouraging residents to act. People are getting information from an overwhelming number of sources. Local governments are an objective source of information, providing tools and resources to enable residents and businesses to take action. For example, local governments can offer a single source of information on how to get started with clean energy upgrades, and many local governments provide educational workshops about the options available to their constituents.

- **Low interest rates**
  Low rates may be available due to the lower interest on municipal bonds and other sources of financing available to local governments, although administrative fees may push the cost of an Energy Financing District program up above conventional options such as a home equity loan or second mortgage.

- **Tax benefits**
  The interest portion of the repayments is tax deductible, similar to a mortgage. Homeowners are also eligible for the federal income tax credit (FITC), a 30% investment tax credit for residential and commercial solar installations.

---

Reduced transaction costs
Energy Financing Districts often offer an easier process than applying for a home equity line or second mortgage. They are specifically designed to finance clean energy improvements so the steps to adoption are clearly spelled out in program guidelines, avoiding the need for property owners to arrange for financing on their own.

FROM THE POINT OF VIEW OF LOCAL GOVERNMENTS, ENERGY FINANCING DISTRICTS OFFER THE FOLLOWING ADVANTAGES:

- Direct support for constituents’ actions
  Energy Financing Districts are a way for local governments to support climate and environment-friendly building improvements with very little direct cost to government.

- Job creation
  This new economic activity stimulates the local economy and creates new jobs as the solar energy and energy efficiency sectors grow.

- Positive publicity
  The local governments that have been involved with Energy Financing Districts thus far have received positive attention from the media and local civic groups.

LIMITATIONS OF ENERGY FINANCING DISTRICTS
These advantages make Energy Financing Districts an attractive option for property owners, but there are certain limitations local governments should recognize.

- Program Focuses on Property Owners
  First, this program is available only to property owners; renters cannot access this program directly. The main issue is split incentives – the owner would need to invest in the improvements but tenants generally pay the utility bills. In some cities a significant percentage of the residents and commercial businesses are renters. Residential renters also tend to have low or moderate incomes, meaning that those most in need often will not be able to access this program. This effect may be offset by MaineHousing which performs over a thousand residential weatherizations annually for low-income homeowners and renters, including multi-family units. Local governments may need other targeted policies and incentives for rental properties in addition to the existing low-income weatherization programs. However, it is possible that the advantages of this mechanism may still attract rental property owners who see the value of investing in their property in order to capture higher rents (subject to rent control laws) and better retention of tenants; it is too early to tell how rental property owners will respond.

- Mandatory Long Expected Life of Installed Improvements
  Another limitation is that the expected life of the installed improvements must be at least as long as the repayment period and be attached to the property. Thus, when a property changes hands, the new owner will continue receiving energy generation or savings. The program cannot finance portable items such as efficient light bulbs and refrigerators because they can be easily removed when the current owner leaves. Efficiency Maine already has incentives to encourage homeowners to install these types of equipment.

- Staff Time from Local Governments
A final limitation is that setting up and administering an Energy Financing District requires staff time on the part of local governments. Local governments with existing Energy Financing Districts have dedicated staff with the time and motivation to pursue new ideas in this arena, combined with support from their local mayors, council members, and other government officials.

Efficiency Maine is designing the program appropriately for local governments. They are also establishing a draft model ordinance for initiatives, and have agreed to handle the financial administration of the program so that towns do not need to administer these projects.

On-Bill Financing
Whereas PACE financing requires local government involvement, on-bill financing requires the involvement of a utility. On-bill financing is essentially a loan from a utility to a homeowner or business that is paid back over time by surcharges on the utility bill. There are currently not plans for on-bill financing in Maine.

Tax Increment Financing (TIF)
Tax Increment Financing, or TIF, is a method for a municipality to encourage redevelopment or community improvement projects. The concept depends critically on the belief that financing current improvements will generate future gains, which can pay for a future increase in taxes.

Energy Improvement Mortgages (EIM)
An Energy Improvement Mortgage (EIM) is another option to refinance mortgages through a bank. This limits the number of participants to those who are willing and able to qualify for refinancing and to use additional equity on their home.

5.4 Additional Resources
This section contains additional resources relevant to Identifying Financing Options in your community.

If you are viewing this document on a computer, simply click on the blue hyperlinks below to access each resource.

If you are viewing this document on paper, you will notice that while some additional resources have links that you can type into your web browser, some have no links at all. Each additional resource without a web link can be found in the Step 5: Identify Financing Options webpage on the new Energy Working Group Website, to be released in late 2010. See the current Energy Working Group webpage for an announcement of the new website launch.

Section 5.1 Grants, Donations, and Incentives

Grants
Guide to American Recovery and Reinvestment Act (ARRA) Funding 2009
Guide to Municipal Grants in Maine 2009 Maine Municipal Association
Maine Department of Environmental Protection Micro-Grants www.mainedep.com
Department of Energy Grants http://www1.eere.energy.gov/wip/eeCBG.html
Retrofit Ramp-Up Grants (PACE Grants) www.efficiencymaine.com/pace
Efficiency Maine Grants and Incentives [www.efficiencymaine.com](http://www.efficiencymaine.com)
Environmental Funder’s Network Grants [www.environmentalfundersnetwork.org](http://www.environmentalfundersnetwork.org)
Maine Community Foundation Grants [www.mainecf.org](http://www.mainecf.org)
New England Grassroots Environmental Fund [www.grassrootsfund.org](http://www.grassrootsfund.org)
Maine Initiatives [www.maineinitiatives.org](http://www.maineinitiatives.org)

**Subsidies**

- Cash Incentives Guide 2010 Efficiency Maine
- Cash Incentives 2010 Efficiency Maine
- Database of State and Federal Energy Efficiency and Sustainable Energy Incentives [www.dsireusa.org](http://www.dsireusa.org)

**Donations**

- Private Donation Information for the US [www.givingusa.org](http://www.givingusa.org)
- How to Fundraise with Private Donations [www.nonprofitmaine.org](http://www.nonprofitmaine.org)

Section 5.2 Municipal Financing Options

**Municipal Financing Options**

- Balance Sheet Energy Spending Freeport 2008-2010
- Municipal Borrowing Frequently Asked Questions 2010 Maine Municipal Association
- Energy Office 2009 ICLEI – Local Governments for Sustainability

Section 5.3 Community Financing Options

**Qualified Energy Conservation Bonds (QECBs)**

- QECBs Explained 2009 Jones Hall
- QECBs Explained 2009 State of Washington
- Maine QECB Legislation LD1313

**Community Financing Options**

- Community Financing Options 2010 New Energy Financing
- Community Financing Options 2010 Environmental Protection Agency

**Property Assessed Clean Energy Financing (PACE)**

- PACE Official Efficiency Maine Two Page Summary
- PACE Official Efficiency Maine Frequently Asked Questions
- PACE Model Ordinance Version 2
- PACE Efficiency Maine Statement of Objectives
- PACE Efficiency Maine Application for Funding
- Maine PACE Legislation 1717
Step 6: Evaluate and Prioritize Projects

You likely have a list of projects developed from combing all of the previous steps. It is now time to rank projects in the order of priority. When doing so, the largest consideration for your community will likely be financial priorities. Use the remainder of this section to help rank projects according to their returns as determined by simple payback, net present value (NPV), and internal rate of return (IRR) analyses.

It is very likely that you will not be able to perform a full, detailed analysis for all of the potential project you have identified. If your community wants to implement a comprehensive, large scale retrofit, consider hiring professional help. Not only will the job get done more quickly, but experience will help bring added credibility and recognize the full economic implications of possible projects. In the end, this will help maximize economic savings.

6.1 Overview

All types of organizations and businesses should analyze prospective investments based on their expected cash flows. If a business is contemplating an investment to support a higher level of sales, it should weigh the cost of the investment and any related operating expenses against the additional cash benefits to the business from the projected incremental sales. Only if the expected cash inflow is more valuable than the expected outflow should the investment move forward.

Building upgrades for energy performance also generate cash flow, but not through sales; instead, they reduce the cash flowing out to pay for energy. In some circumstances, energy efficiency investments can also produce non-energy cash benefits, such as maintenance savings. From the standpoint of the organization’s financial health, reduced cash out-flow—such as savings in energy and maintenance costs—is just as valuable as increased cash inflow from sales.

Organizations typically employ one or more financial analysis tools rooted in cash flow to study, rank, and choose among investment opportunities. To successfully compete for capital against other investments, building upgrades should be evaluated using the same tools.

6.2 Analytic Conventions

All of the analysis tools explained in this chapter share some conventions and simplifying assumptions. An investment is measured by its impact over time—positive or negative—on the organization’s cash
position. Positive cash flow indicates an inflow of cash or the equivalent reduction in cash expenditures. Negative cash flow indicates an investment of cash or a reduction in cash receipts.

For straightforward energy-efficiency investments, an initial outlay, or first cost (a negative cash flow), is followed by energy savings (a positive cash flow). The savings can continue for several years.

Normally, savings from energy-efficiency investments occur more or less continually. For simplicity, however, it is customary to assume that all cash flows occur at one-year intervals, and that the first year’s worth of positive cash flows is not received until one year after the initial investment. By convention, the time of the initial outlay is designated Year 0. Savings from the investment are then recorded as occurring in Year 1, Year 2, and so on.

Because corporate income taxes add significant complexity to investment analysis, taxes are omitted from the initial explanations of the analysis tools and taken up later in the chapter. Only for-profit businesses need concern themselves with including taxes in the analysis.

6.3 Cash-Flow Analysis Tools

Three cash-flow analysis tools—payback period, net present value, and internal rate of return—are commonly used to evaluate building upgrade investments that improve energy performance.

Payback Period
The most basic, and probably most common, financial gauge of a building upgrade investment is its payback period. It is defined as the time, in years, required for an investment’s cumulative cash flow (including the initial outlay) to reach zero.

Suppose you are presented with a proposal to upgrade a building’s shell for greater energy efficiency. The contractor says that the installed cost will be $20,000 and that you can expect annual energy savings of $4,000. Assume that your organization plans to occupy the building for at least another 10 years.

Table 6.1 shows the expected cash flow from this investment over 10 years. On a cumulative basis, cash flow is negative until reaching zero in Year 5, so this investment has a five-year payback.

Of course, the same result could be obtained by dividing the initial outlay of $20,000 by the annual savings of $4,000. Suppose, however, that savings were expected to increase after Year 1 due to rising energy prices. In that case, an accurate estimate of payback would require accumulating the yearly cash flows, as in Table 6.1, rather than simply dividing the outlay by the first year’s savings.

Even with fluctuating cash flows, the payback period is easy to understand and calculate. Payback can also serve as a rough measure of investment risk: The shorter the payback, the lower the chances that something will interfere with the productivity of an investment before the initial outlay has been recovered.

As an investment analysis tool, however, payback has its shortcomings. It does not account for the cash flows that occur after payback has been achieved and thus does not measure the long term value of an investment. Also, it treats all cash flows the same, whether they occur in Year 1 or in Year 5. In financial
terms, payback ignores the time value of money: the principle that money received in the future is not as valuable as money received today.

Table 6.1: Calculation of payback period

Payback is achieved when the cumulative cash flow reaches zero. In this example, payback occurs in Year 5.

<table>
<thead>
<tr>
<th>Year</th>
<th>Initial investment ($)</th>
<th>Energy savings ($)</th>
<th>Cumulative cash flow ($)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>-20,000</td>
<td>—</td>
<td>-20,000</td>
</tr>
<tr>
<td>1</td>
<td>—</td>
<td>4,000</td>
<td>-16,000</td>
</tr>
<tr>
<td>2</td>
<td>—</td>
<td>4,000</td>
<td>-12,000</td>
</tr>
<tr>
<td>3</td>
<td>—</td>
<td>4,000</td>
<td>-8,000</td>
</tr>
<tr>
<td>4</td>
<td>—</td>
<td>4,000</td>
<td>-4,000</td>
</tr>
<tr>
<td>5</td>
<td>—</td>
<td>4,000</td>
<td>0</td>
</tr>
<tr>
<td>6</td>
<td>—</td>
<td>4,000</td>
<td>4,000</td>
</tr>
<tr>
<td>7</td>
<td>—</td>
<td>4,000</td>
<td>8,000</td>
</tr>
<tr>
<td>8</td>
<td>—</td>
<td>4,000</td>
<td>12,000</td>
</tr>
<tr>
<td>9</td>
<td>—</td>
<td>4,000</td>
<td>16,000</td>
</tr>
<tr>
<td>10</td>
<td>—</td>
<td>4,000</td>
<td>20,000</td>
</tr>
</tbody>
</table>

Courtesy: E source ENERGY STAR®

Net Present Value
Net present value (NPV) is a measure of investment worth that explicitly accounts for the time value of money. Like payback period, NPV is computed from the stream of cash flows resulting from the investment. Unlike payback period, those cash flows are adjusted (or “discounted”) so as to place relatively greater value on near-term cash flows and relatively lesser value on cash flows that are more distant in the future.

The discount rate is an interest rate used to adjust a future cash flow to its present value: its value to the organization today, which normally corresponds to Year 0. The discount rate is expressed either as a percentage or as its decimal equivalent—for example, 10 percent or 0.1.

Mathematically, if r is the discount rate, then the present value (PV) of a single cash flow (CF) received one year from now—that is, in Year 1—is defined by this equation:

$$PV = CF \times \frac{1}{1 + r}$$

For example, if the discount rate is 10 percent, then the present value of a $4,000 cash flow expected one year from now is:

$$PV = 4,000 \times \frac{1}{1 + 0.1} = 3,636$$
More generally, for any cash flow received in Year t (where t represents the elapsed time in years), the present value is the product of the future cash flow and the present value factor, $1/(1 + r) t$:

$$PV = CF \times \frac{1}{1 + r} t$$

For example, if the discount rate is 10 percent, the present value of $4,000 received five years from now is:

$$PV = \$4,000 \times \frac{1}{1 + 0.1} 5 = \$4,000 \times 0.621 = \$2,484$$

You might find it useful to think of discounting as the inverse of earning interest. In fact, if you invested $2,484 today in a certificate of deposit (CD) that paid 10 percent interest annually, then in five years the CD would be worth $4,000.

The NPV of an investment is the sum of the present values of all the cash flows, including the initial outlay (expressed as a negative number). Refer to Table 6.2, which shows the calculation of NPV for the same investment example used in Table 6.1. The sum of the present values is $4,578.

Interpreting and applying net present value. NPV is a measure of the investment’s financial worth to the organization, taking into account the preference for receiving cash flows sooner rather than later. An investment is financially worthwhile if its NPV is greater than zero, because the present value of future cash flows is greater than the outlay. In the rare case of an opportunity with a zero NPV, the organization should theoretically be indifferent between making or not making the investment. A positive NPV is the net gain to the organization from making the investment—assuming that the discount rate properly adjusts for the timing of the cash flows.

Besides helping to decide whether an investment is worthwhile, the NPV can be used to choose among alternative investments. If an organization has two or more investment opportunities but can only pick one, the financially sound decision is to pick the one with the greatest NPV.

Selecting the discount rate. The discount rate has a strong direct effect on the NPV. To illustrate this, Figure 6.1 shows how the NPV for the example project in Table 6.2 varies for discount rates ranging from 0 to 20 percent. If the discount rate is high enough—in the example, just over 15 percent—the NPV turns negative and the investment flips from being financially attractive to unattractive. Obviously, the choice of a discount rate is an important matter.
Table 6.2: Calculation of net present value

The project laid out here is the same as in Table 3.1, with the additional assumption that the discount rate is 10 percent (0.1). The net present value (NPV) is the sum of the present values of all of the cash flows—in this case, $4,578.

<table>
<thead>
<tr>
<th>Year</th>
<th>Initial investment ($)</th>
<th>Energy savings ($)</th>
<th>Present value factor</th>
<th>Present value of cash flow ($)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>-20,000</td>
<td>—</td>
<td>1</td>
<td>-20,000</td>
</tr>
<tr>
<td>1</td>
<td>—</td>
<td>4,000</td>
<td>0.909</td>
<td>3,636</td>
</tr>
<tr>
<td>2</td>
<td>—</td>
<td>4,000</td>
<td>0.826</td>
<td>3,308</td>
</tr>
<tr>
<td>3</td>
<td>—</td>
<td>4,000</td>
<td>0.751</td>
<td>3,006</td>
</tr>
<tr>
<td>4</td>
<td>—</td>
<td>4,000</td>
<td>0.683</td>
<td>2,732</td>
</tr>
<tr>
<td>5</td>
<td>—</td>
<td>4,000</td>
<td>0.621</td>
<td>2,494</td>
</tr>
<tr>
<td>6</td>
<td>—</td>
<td>4,000</td>
<td>0.564</td>
<td>2,258</td>
</tr>
<tr>
<td>7</td>
<td>—</td>
<td>4,000</td>
<td>0.513</td>
<td>2,053</td>
</tr>
<tr>
<td>8</td>
<td>—</td>
<td>4,000</td>
<td>0.467</td>
<td>1,866</td>
</tr>
<tr>
<td>9</td>
<td>—</td>
<td>4,000</td>
<td>0.424</td>
<td>1,686</td>
</tr>
<tr>
<td>10</td>
<td>—</td>
<td>4,000</td>
<td>0.386</td>
<td>1,542</td>
</tr>
</tbody>
</table>

NPV | 4,578

Note: r = the discount rate; t = the elapsed time in years. Courtesy: E source

Figure 6.1: How the discount rate affects net present value

The project in Table 6.2 is shown here with varying discount rates. With no discounting—a discount rate of zero—the net present value of a project is the simple sum of all of its cash flows, including the initial outlay as a negative cash flow. As the discount rate is increased, the NPV declines and eventually turns negative.

Courtesy: E SOURCE
As the starting point for the discount rate, most organizations use their cost of capital—the rate of return that must be earned in order to pay interest on debt (loans and/or bonds) used to finance investments and, where applicable, to attract equity (stock) investors.

Suppose an organization could obtain a loan to finance the entire cost of an energy-saving building upgrade and that the loan carried an interest rate of 8 percent. The cost of capital for this project would be 8 percent. If, using an 8 percent discount rate, the NPV were greater than zero, the project would be financially worthwhile, because the cash flows would be sufficient to pay off the loan and have some money left over.

Some organizations use discount rates slightly higher than their cost of capital in order to lend a conservative bias to investment analyses. A higher discount rate serves to make risky projects less attractive and to screen out investments that are only marginally profitable. On the other hand, a lower discount rate might be used for investments that are perceived as less risky than the organization’s normal business activities. A risk-adjusted discount rate is one that has been tailored to the risk characteristics of the project being analyzed.

Building upgrades typically involve proven technologies and generate predictable savings. This makes them, in most cases, fairly low-risk investments. Where an organization’s overall business activities are riskier than its energy-efficiency opportunities, a discount rate below the organizational cost of capital would be appropriate.

When multiple capital sources—loans, bonds, internally generated funds, and stock—and varying levels of project risk are involved, determining the cost of capital and the appropriate discount rate can get quite complicated. Rather than trying to select the discount rate yourself, you should consult financial experts within your organization to determine if there is a standard discount rate or a standard methodology for selecting the discount rate.

Computing NPV.
With spreadsheet software, computing NPV is not difficult. Following Table 3.2, it can be done using year-by-year present value factors. Built-in NPV calculators in some spreadsheet software (including Microsoft Excel) can make the evaluation even easier.

Alternatively, NPV can be computed using certain handheld calculators. Both Hewlett-Packard and Texas Instruments make several models of financial calculators that can store a series of cash flows and compute the NPV.

Internal Rate of Return
The internal rate of return (IRR) is an alternative cash-flow analysis tool closely related to NPV. IRR is a percentage figure that describes the yield or return on an investment over a multiyear period. For a given series of cash flows, the IRR is the discount rate that results in an NPV of zero.

In Figure 6.1, the IRR is the point where the curve crosses the horizontal axis: slightly above 15 percent. It would be possible—though extremely tedious—to determine the exact IRR (15.1 percent, in this case) through a trial-and-error procedure, testing different discount rates until homing in on the one at which NPV equals zero. Fortunately, this task can be automated using spreadsheet software or a financial calculator.
Once a potential project’s IRR is in hand, the question becomes, is it high enough to justify the investment? The answer, unsurprisingly, is that it depends on the organization’s discount rate: If the IRR is greater than the discount rate, the investment is financially worthwhile. If no formal discount rate has been established, try comparing the IRR for the project in question to the IRRs for other projects that the organization has recently funded. Or if project-specific financing will be used, compare the IRR to the interest rate on the financing.

When used as the threshold for an acceptable IRR, the discount rate is often called the hurdle rate. As with NPV, it may be appropriate to apply a hurdle rate greater than the cost of capital to prospective investments that are especially risky—or one below the cost of capital to investments of low risk. Energy-efficiency projects that rely on proven technologies are often in the latter category. As with the selection of a discount rate, it is important to consult with financial experts within the organization in order to determine an appropriate hurdle rate.

6.4 Selecting an Analysis Tool

Which financial analysis tool should you use to evaluate energy-saving building upgrades: payback period, net present value, or internal rate of return? The short answer is to use whichever tool your organization normally applies to evaluate investments. For instance, if all investment decisions in your organization are evaluated using payback period, then you should at least include the payback period in any proposal to fund a building upgrade.

Be aware, however, that relying solely on payback may result in forgoing building upgrades that will more than pay for themselves if given enough time. It is not uncommon for organizations to have informal rules that restrict discretionary investments to projects with two-year or better payback. That means a building upgrade costing $7,500 and yielding $2,500 in savings for 10 years would be rejected—even though the cash-flow stream provides an impressive 31.1 percent IRR.

If there is leeway to choose the evaluation tool or to present more than one result, either NPV or IRR is a better choice than payback period. Both measures are rooted in time value of money concepts and account for the benefit stream over the entire useful life of an investment. There are some circumstances, however, in which IRR analysis might yield misleading or confusing results. One such situation involves choosing between mutually exclusive investments—that is, when faced with an either/or decision. The option with the higher IRR is not necessarily the better choice, because the other option might provide greater total worth.

Table 6.3 illustrates this situation. Suppose an organization is considering two ways to turn off unnecessary lights. Option A, using occupancy sensors, costs $42,000 and will save $12,200 annually in energy. Option B, using a central time clock, costs less up front ($9,000) but also saves less ($3,550 annually). Considering only the IRRs, option B looks better: It provides a 37.9 percent return, well above the 26.2 percent return from option A. The NPVs, however, show that option A is worth over twice as much in present value terms as option B.

Another issue with IRR is that some cash-flow streams may have indeterminate IRRs, or even two or more IRRs. These anomalous results can occur when one or more negative cash flows occur following some years of positive cash flows. Because of these and other issues with IRR, NPV is generally
considered the superior analysis tool. Although the circumstances in which IRR might yield misleading results are fairly uncommon, NPV will always point to the financially correct decision.

ENERGY STAR, in partnership with Building Owners and Managers Association (BOMA) International and the BOMA Foundation, developed the Building Upgrade Value Calculator, a Microsoft Excel–based tool designed specifically for analyzing the financial impact of energy efficiency investments in commercial office buildings. It projects cash flows and computes IRR, NPV, and other investment measures commonly used in the real estate industry. The Building Upgrade Value Calculator is available as a free download from the ENERGY STAR web site (www.energystar.gov/index.cfm?c=comm_real_estate.building_upgrade_value_calculator).

Table 6.3: Use NPV to choose between mutually exclusive investments
Faced with a choice between two upgrades, use net present value (NPV) rather than internal rate of return (IRR) to guide the decision, because NPV measures the total value of the investment to the organization.

<table>
<thead>
<tr>
<th>Year</th>
<th>Option A: occupancy sensors</th>
<th>Option B: central time clock</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Initial investment ($)</td>
<td>Energy savings ($)</td>
</tr>
<tr>
<td>0</td>
<td>-42,000</td>
<td>-</td>
</tr>
<tr>
<td>1</td>
<td>-</td>
<td>12,200</td>
</tr>
<tr>
<td>2</td>
<td>-</td>
<td>12,200</td>
</tr>
<tr>
<td>3</td>
<td>-</td>
<td>12,200</td>
</tr>
<tr>
<td>4</td>
<td>-</td>
<td>12,200</td>
</tr>
<tr>
<td>5</td>
<td>-</td>
<td>12,200</td>
</tr>
<tr>
<td>6</td>
<td>-</td>
<td>12,200</td>
</tr>
<tr>
<td>7</td>
<td>-</td>
<td>12,200</td>
</tr>
<tr>
<td>8</td>
<td>-</td>
<td>12,200</td>
</tr>
<tr>
<td>9</td>
<td>-</td>
<td>12,200</td>
</tr>
<tr>
<td>10</td>
<td>-</td>
<td>12,200</td>
</tr>
</tbody>
</table>

| IRR  | 26.2%                        | 37.9%                        |
| NPV (10% discount rate) | 80,000                      | 26,500                      |

Courtesy: E sourceENERGY STAR®

6.5 The Investment Analysis Process

Whether IRR or NPV is the basis for making investment decisions, several principles should be followed in constructing a cash-flow analysis.

Choose the Right Time Frame
The analysis should cover as many years as an organization can reasonably expect to receive the benefits of the investment. That period often corresponds to the useful life of the equipment involved, but it might be shorter, depending on the certainty of plans for future use of the building. If, for example, the organization has a 10-year lease on a building in which upgrades are to be installed, it
should probably limit its analysis to 10 years, even if the equipment is capable of generating savings beyond that point.

Do not shortchange a project by cutting the analysis short when a longer time frame can be justified. Consider, for example, that the cash-flow stream shown in Table 6.1, which has a 15.1 percent IRR, would have an 18.4 percent IRR if the benefits continued for another five years. If the organization’s hurdle rate were 16 percent, those additional years could be decisive.

Consider All of the Impacts on Cash Flow
The cash-flow examples used so far in this chapter follow a very simple pattern: A single investment is followed by several years of steady cash flows from energy savings. In the real world, building upgrades are not always so simple, and there are additional impacts on cash flow that must be taken into account.

Suppose, for example, that an organization is considering replacing conventional light fixtures that use incandescent bulbs with hard-wired compact fluorescent lamp (CFL) fixtures throughout a building. There will be an initial outlay for the fixtures and the CFLs themselves, followed by multiple years of energy savings, because the wattage used for lighting will be cut by roughly two-thirds. But there will be additional impacts on cash flow. If the analysis applies a 10-year time frame (because the new fixtures will last at least that long), it will also need to take into account:

- The avoided cost of incandescent bulbs. Because such bulbs normally last only about 1,000 hours, over a 10-year period quite a few replacement bulbs would have been purchased. Money not spent on these bulbs should be recognized as a positive cash flow.
- The cost of replacement CFLs. CFLs typically last 8,000 to 10,000 hours, so several replacement lamps might be needed over 10 years (depending, of course, on the hours the lights are in operation). The cost of those replacements would be a negative cash flow.
- Labor savings from fewer changes. Although either type of bulb needs periodic replacement, the CFLs would be changed much less often. If an organization pays $20 per hour for maintenance tasks and a worker can change, on average, 12 bulbs per hour, then the average change-out is costing $1.67 per bulb. The difference between the costs of two change-out schedules—that is, the value of the changes avoided each year by the switch to CFL—should be counted as a positive cash flow attributable to the upgrade.

The additional components of the cash-flow analysis are merely illustrative. For any measures added or removed through the upgrade, you need to think through all the ways in which expenditures could be increased or reduced and then quantify and include those cash flows in the analysis. For example, if the performance of an energy-saving upgrade is expected to degrade over time, the value of the savings should be reduced accordingly.

Account for Interactions Among Measures
As explained in Chapter 1, this manual recommends looking at the building as a whole and pursuing upgrades in a way that considers interactions among measures. Interactions can have a material effect on energy savings and consequently on the projected cash flows for a package of measures.

Take, for example, a lighting retrofit. More-efficient lighting produces less heat, thereby lowering the building’s HVAC load. If that factor is ignored, the actual savings will not match the estimate: If cooling is
the dominant HVAC load, the actual savings will be higher; if heating is the dominant HVAC load, the actual savings will be lower.

Interactions can also have important consequences for equipment selection. The reduction in cooling load resulting from an energy-efficient lighting system, for example, may be sufficient to justify a reduction in the size of the ducts, pipes, pumps, chillers, and cooling towers that serve that load. “Rightsizing” equipment in this way can produce additional savings, because smaller equipment is generally less expensive. The stages presented in the ENERGY STAR Building Upgrade Manual are designed to maximize savings by accounting for interactions among building systems. Each stage identifies changes that will affect the upgrades performed in subsequent stages, in an overall process that will yield the greatest energy and cost savings.

When considering multiple measures, building simulation software is the recommended approach. Simulation modeling will produce more-accurate estimates of the combined savings of a package of measures than merely summing up individual measure-by-measure analyses, and it can facilitate optimal sizing of the components of the package.

Include Anticipated Price Changes
Even if the physical energy savings attributable to an upgrade are expected to remain constant over the period of analysis, the value of those savings may vary due to changing energy prices. Rising energy prices will, of course, increase the cash flow from energy-efficiency investments. If an organization has access to price forecasts that are specific to its energy suppliers, it makes sense to factor those price changes into the analysis. Long-run national and regional price trends are forecast by the Department of Energy in its Annual Energy Outlook and are available online from the Energy Information Administration (www.eia.doe.gov). Price forecasts can also be purchased from a variety of business-information and specialty consulting firms.

Consider Sensitivity Analysis
Consider conducting sensitivity analysis around critical assumptions, especially ones that are highly uncertain. Suppose, for example, that you are considering an investment in an energy-saving measure that the manufacturer projects to have a useful life of 20,000 operating hours. If you do not have a high level of confidence in that projection, you might explore whether the investment would still be worthwhile if the useful life were only 10,000 hours. This type of analysis can shed light on the riskiness of the investment. It can also help pinpoint assumptions that merit further research before committing to an investment.

6.6 Other Considerations
Although this chapter strongly advocates analyzing building upgrades based on their cash flows, other considerations may be brought into the picture and might help sway decision-makers who are on the fence about building upgrades.

Qualitative Assessments
Frequently, the benefits of building upgrades extend beyond energy savings to other areas such as improvements in employee comfort and productivity or corporate image. If these benefits can be projected and expressed in monetary values, it is best to factor them into the cash flows. Often,
however, they are difficult to quantify. In such cases it is advisable to describe the benefits in words and include that information as a supplement to the financial analysis.

Similarly, it may be worthwhile to present qualitative information on the relative investment risk of the proposed building upgrades. Most energy equipment is dependable; the savings can be predicted accurately through careful engineering analysis and the value of savings will remain constant or increase, except in the unlikely event of a downturn in energy prices. This is not to say that building upgrades are totally risk-free: A decision to close down a facility prematurely may zero out several years of expected benefits. But in contrast to other investment opportunities that often hinge on highly unpredictable market forces, building upgrades generally carry low risk. Applying a lower discount rate is one way to adjust for risk; qualitatively highlighting the investment’s low-risk profile may be used instead of, or in addition to, a risk-adjusted discount rate.

6.7 Summary

To compete for investment capital, building upgrade projects should be evaluated using standard financial analysis tools that evaluate cash flow. Although reliance on payback period is widespread, other tools such as NPV and IRR are better choices, because they take into account the time value of money and the full stream of benefits over the life of the project.

Constructing a valid building upgrade investment analysis requires careful attention to several steps:
- Choosing an appropriate time frame
- Identifying and quantifying all of the contributing elements to cash flow, both positive and negative
- Considering interactions among measures
- Accounting for future energy price changes
- Adjusting for taxes, where applicable
- Examining the sensitivity of results to changes in key assumptions

The EPA’s ENERGY STAR program provides several downloadable spreadsheet tools that can assist in analyzing upgrade opportunities and demonstrating their value to the organization.
6.8 Additional Resources

This section contains additional resources relevant to Evaluating and Prioritizing Projects in your community.

If you are viewing this document on a computer, simply click on the blue hyperlinks below to access each resource.

If you are viewing this document on paper, you will notice that while some additional resources have links that you can type into your web browser, some have no links at all. Each additional resource without a web link can be found in the Step 6: Evaluate and Prioritize Projects webpage on the new Energy Working Group Website, to be released in late 2010. See the current Energy Working Group webpage for an announcement of the new website launch.

General Resources
EPA Cash Flow Opportunity Calculator
Energy-at-Risk Calculation Tool
Municipal Contracts Case Study 2009 Maine Municipal Association
Please email edits, comments, and updates to Rebecca Lambert at rlambert@gpcog.org.