

LIGHTING THE WAY:

**A New Era of
Clean Energy
Solutions**



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Introduction

Massachusetts, like the rest of the country, is facing daunting energy use challenges. Rising fuel costs, an aging electric grid, and externalities associated with energy production are just a few of the numerous energy related issues we face. Energy production and consumption are directly connected to the health of the economy, the condition of the environment, and quality of life now and in the future. The fact that energy is the key building block for modern society makes addressing energy challenges a tremendous and in many ways quite overwhelming undertaking. Due to the size of the challenge, national and state level policies, laws, and programs will be a major part of the solution to our energy problems. Also, a great amount of the work that will need to be done to address energy challenges will happen at the local/community level – municipalities are emerging as critical lynchpins that can develop policies and regulations that have a positive impact on energy efficiency and conservation. Local governments are ideally positioned to coordinate energy concerns with such issues as land use, transportation, housing and the built environment, and environmental quality. This is a new role for local governments and while potentially quite challenging, local governments already possess the policy tools to start taking formative steps in addressing energy efficiency and conservation. Private sector leadership on energy issues has also become critically important as has the role of utilities.

As Massachusetts moves to address energy use, municipalities and the private sector are looking for ways to become more energy efficient (getting more work from the same amount of energy) and to conserve energy (using less energy). One of the ways to address this challenge is through the promotion and support of a host of energy efficiency and conservation strategies and practices associated with buildings and the built environment. The Commonwealth of Massachusetts has become a national leader in addressing sustainability/green development issues through policy and regulatory action. Beyond state action, utilities, the private sector, and local governments are playing and will continue to play critical roles in creating green communities and encouraging the adoption of innovative practices and technologies to minimize energy use and environmental impacts.

Over the past several years there has been a flurry of activity around energy issues; the sheer volume of this activity has left energy policy stakeholders (notably municipal governments and the private sector) scrambling to stay abreast of all the news, opinions, and policy/regulatory changes. This guide is intended to organize some of the important components of this activity into something that will help frame these issues and will be easy to digest. This guide will review:

- What are the benefits and barriers of energy efficiency/conservation practices;
- Municipal planning for energy efficiency/conservation;
- The Commonwealth's recent regulatory and policy changes related to energy use; and
- NSTAR programs related to energy efficiency and conservation.

What are the Benefits and Barriers of Energy Efficiency and Conservation Practices?

Energy efficiency and energy conservation are two different things. Energy efficiency means getting more work from the same energy source whereas energy conservation means choosing to use less energy.¹ By default the energy saving result of an efficiency is energy conservation. Taken together, energy efficiency and conservation measures can have an enormous impact on energy usage.

If the US economy had used the same amount of energy per unit of GDP in 2004 as it did in 1973, US energy use in 2004 would have been 90% higher – efficiency saved 90 quadrillion BTUs in 2004². There is still huge potential for cost effective energy savings in the future. The US Department of Energy's National Laboratories estimate increasing energy efficiency throughout the economy could cut national energy use by about 20% by 2020.³ The public and private sectors can gain many benefits from energy efficiency and conservation efforts the most tangible of which are related to cost savings resulting from using less energy. There are also obvious environmental benefits. Beyond direct cost savings, recent studies suggest there are additional and often unreported benefits from conserving energy, which can contribute value worth an additional 18%-50% of the energy savings.⁴ These benefits include:

- Extended equipment lives – if a lighting system is operating 30% fewer hours per year it could last up 30% longer;
- Reduced maintenance costs – when equipment runs fewer hours per year, maintenance (parts/labor) requirements are reduced; and
- Reduced risk to energy supply spikes – if less energy is consumed an operational budget is less vulnerable when prices hit seasonal or unexpected spikes.⁵

There are other longer term strategic benefits through efficiency/conservation. Though in its infancy, the ability to sell carbon credit reductions through conservation efforts offers firms opportunities for financial gain.⁶ Firms and local governments that conserve energy can differentiate themselves as environmentally friendly – enhancing their public image.

¹ Kelley, Ingrid. *Energy in America: A Tour of Our Fossil Fuel Culture and Beyond*. Lebanon, NH: University of Vermont Press, 2008.

² Elliott, R. Neal. *America's Energy Straightjacket: Report Number E065*. Washington, DC: American Council for an Energy-Efficient Economy, April 2006.

³ Interlaboratory Working Group. *Scenarios for a Clean Energy Future*. Washington, DC: Interlaboratory Working Group on Energy-Efficient and Clean-Energy Technologies, US Department of Energy, Office of Energy Efficiency and Renewable Energy, 2000.

⁴ Woodroof, Eric. *The Secret Benefits of Energy Conservation: Beyond the Utility*. <http://www.industryweek.com>. Web. 6 August, 2009.

<http://www.industryweek.com/PrintArticle.aspx?articleID=15730>.

⁵ Woodroof, Eric., Tuner, Wayne. and Heinz, Steven. (2008), "The Secret Benefits from Energy Conservation." *Strategic Planning for Energy and the Environment*, Vol 28(1).

⁶ Ibid.

Obviously, homeowners can take advantage of the benefits of energy efficiency and conservation and it makes sense for municipalities to promote homeownership efficiency/conservation measures in municipal policy. Conservation measures undertaken by homeowners can be easy to implement, relatively inexpensive, brought on line quickly, reduce maintenance, and result in adding value to a home.

Despite all of the benefits, there are many barriers to energy efficiency and conservation. A report developed by the Oak Ridge National Laboratory in Tennessee in 2008 identified multiple barriers to energy efficiency in buildings: industry structure, incomplete/imperfect information, high first costs, and technical risks.⁷

Perhaps the greatest barrier to efficiency is industry structure. A dizzying array of stakeholders are involved in building construction (investors, owners, occupants, builders, code enforcement officials, architects, equipment manufacturers) and their interests in efficiency generally do not align.⁸ For example, tenants in leased office space generally pay their own utility costs, which provide little if any incentive for the owners of leased property to focus on making their buildings energy efficient.⁹ Individuals and families who rent face the same dilemma. It's no great surprise that no apartment property has yet earned a LEED-EB certification and the US Green Building Council's Leadership in energy and Environmental Design rating system for existing buildings.¹⁰ Likewise, homebuilders, in an effort to depress construction costs, may choose not to use energy efficient building techniques and materials, passing higher future energy costs on to the eventual homeowner.¹¹

Energy efficiency measures are often not undertaken as a result of lack of information on the part of the consumer.¹² For example, it is difficult for homeowners to ascertain how much energy they are using and on what, which obscures the cost-effectiveness of end-use efficiency improvements.¹³ Increasingly, consumers will have access to a detailed and real-time breakdown of how much electricity they are using for specific appliances at specific times through home automation systems.¹⁴

Perceived upfront costs can be a barrier for implementing energy efficiency measures.^{15,16} The reality is that comparing costs between green buildings and conventional buildings is very difficult. The report *Cost of Green Revisited* detailed how a construction cost consulting group (July 2007) examined the issue by analyzing data on 221 buildings,

⁷ Brown, Marilyn, Chandler, Jess, Lapsa, Melissa, Sovacool, Benjamin. *Carbon Lock-In: Barriers to Deploying Climate Change Mitigation Technologies*, ORNL/TM-2007/124. Oak Ridge, TN: Oak Ridge National Laboratory, November 2007, Revised January 2008.

⁸ Parfomak, Paul, Sissane, Fred, Fischer, Eric. *Energy Efficiency in Buildings: Critical Barriers and Congressional Policy*. Washington, DC: Congressional Research Service, 24 June, 2009.

⁹ Kelley, 2008.

¹⁰ Berton, Brad. (2009) "Upgreening Existing Properties." *Urban Land*, Vol 68(6).

¹¹ Parfomak, 2009.

¹² Ibid.

¹³ Brown et al., 2008.

¹⁴ Pearce, Jim. "Becoming Part of the Process." *Oak Ridge National Laboratory Review* 42:2 (2009): 6-7.

¹⁵ Malin, Nadav. "High Perceived Cost of Green Persists, Says Survey." *Environmental Building News* 15:12 (2008):2.

¹⁶ "Green Buildings and First-Costs: The Controversy That Will Not Die." *Building Design & Construction* November 2004: 19-21.

concluded “there is no significant difference in average cost for green building as compared to non-green buildings.”¹⁷ From its analysis of the difference between LEED-seeking and non-LEED buildings the report concludes that:

- There is very large variation in costs of buildings, even within the same building program category;
- Cost differences between buildings are due primarily to program type;
- There are low-cost and high-cost green buildings; and
- There are low-cost and high-cost non-green buildings.¹⁸

Technical risks can be major barriers when there is insufficient validation of a technology’s performance, and they often hinder the introduction of new technologies. Without validated technical information, the less proven technology will find it hard to compete with incumbent products and approaches. In addition, with high technical risks come difficulties in attracting the investment capital needed for product improvements and production cost-reductions.¹⁹

There are many market risks associated with the commercialization and deployment of new energy technologies. Consumers are not likely to adopt otherwise costly energy-reducing technologies and practices in the absence of policies or incentives. Market risks include: low demand typical of emerging technologies; uncertain costs of production; the possibility that a superior technology will emerge making the newly commercialized technology obsolete; and lack of indemnification.²⁰

Policy uncertainties abound for energy efficient technologies. At the macro level, investors, electric utilities, and other key stakeholders who deal with fuel futures must decide what to build as a next generation of power plants and transportation fuels, not knowing if CO₂ and other GHGs will remain uncontrolled by policies.²¹ Though Massachusetts has become a leader nationally among states in promoting renewable energy options and created a comprehensive regulatory program to address climate change, there is no guarantee that these efforts cannot be changed or erased by future policy changes.

Technologies that are otherwise expected to be successful may still face difficulties commercializing, deploying, or expanding deployment due to infrastructure limitations. Infrastructure limitations, as a barrier, cover a wide range of issues, including: inadequate physical systems and facilities that are critical to the success of a new technology; shortage of key complementary technologies that improve the functionality of a new technology, and insufficient supply and purchasing channels.²²

¹⁷ Matthiessen, Lisa Fay, Peter Morris. Cost of Green Revisited: Reexamining the Feasibility and Cost Impact of Sustainable Design in the Light of Increased Market Adoption. Davis Langdon, July, 2007. Web. 22 July 2010.

¹⁸ Ibid.

¹⁹ Brown et. al., 2008.

²⁰ Ibid.

²¹ Ibid.

²² Ibid.

Municipal Planning for Energy Efficiency and Energy Conservation

Saving money, reducing greenhouse gases (GHG), and improving the quality of life in our communities are some of the reasons that municipal leaders are embracing energy efficiency and conservation. Moreover, local governments are ideally positioned to consider energy in the context of such issues as land use, transportation, housing, and environmental quality. Civic leaders in municipalities around the country, including in the 495/MetroWest region of Massachusetts, have begun utilizing municipal planning tools to address energy efficiency and conservation issues. Municipal leaders are developing policies and practices focused on energy issues because they recognize that these measures, while saving energy and money, will lead to improved public health, increased worker productivity, and enhanced livability and quality of life.

While potentially quite challenging, local governments already possess the policy tools to start taking formative steps in addressing energy efficiency and conservation. Beyond policy tools, municipalities, particularly municipal planning departments, are ideally suited to create a structure for dialogue on energy issues through visioning, facilitation, and advocacy. Energy efficiency and conservation efforts can be applied to municipal policy through a number of venues already common to municipal leaders including: comprehensive planning; zoning and subdivision requirements, capital improvement planning, and building codes. As a tool for addressing energy efficiency issues the comprehensive plan is arguably the most important as it can identify barriers and advance and support changes to zoning and building codes that will promote energy efficiency. Similarly, comprehensive plans can also help identify capital improvement priorities related to energy issues.

Comprehensive Planning

Comprehensive planning is most generally the process that determines community goals and aspirations of physical development at the municipal level. Comprehensive planning is an effort to effect political and technical coordination in community development and to inject long-range considerations into the determination of short-range actions. The end product of comprehensive planning is a comprehensive plan (in Massachusetts most commonly referred to as a master plan). Comprehensive plans cover a wide range of issues or elements. As a municipality's major policy tool to guide physical growth, the comprehensive plan is ideally positioned to coordinate energy concerns. It is not uncommon for comprehensive plans to include a specific section on energy or energy and utilities. Addressing energy issues in a specific section of a comprehensive plan is important but it is also equally critical to connect and coordinate energy concerns with such issues as land use, transportation, community facilities, housing, and economic development.

Land Use

The land use element of a comprehensive plan shows the general distribution, location, and characteristics of current and future land uses and physical form. Land use planning limiting efficient use of land resources for roads and infrastructure and that limit low density areas and segregated land uses can contribute significantly to lower energy

consumption. Comprehensive plans can support land use practices that are connected to reduced energy consumption such as: focusing on infill development and redevelopment, promoting higher density development and mixed used while discouraging segregated land uses and sprawling development, encouraging solar orientation as a component of site plan review, and identifying and creating opportunities for transit oriented development (TOD). Energy consumption becomes a significant land use issue from a number of perspectives. These include the siting of energy generation and transmission facilities, which is a requirement for qualifying as a Green Community (see Text Box 1 on page 12). Renewable energy, transportation policy, resource conservation, industrial development, waste management, and site design can all be addressed in a comprehensive plan's land use element.

Transportation

Though this report is focused primarily on electrical energy conservation and efficiency, energy use from, and the types of energy typically used for, transportation should be a significant concern for municipalities throughout the state as greenhouse gas reductions have become a major focus of state environmental policy. The Massachusetts Executive Office of Energy & Environmental Affairs already requires examination of greenhouse gas impacts for development projects, including mitigation strategies through implementation of the Massachusetts Environmental Policy Act (MEPA) as part of project reviews during the permitting process. The state's purpose is to further its emissions reductions goals under the Global Warming Solutions Act and related commitments (See page 33 for more information on the Global Warming Solutions Act). Municipalities should be aware of these state priorities when developing their comprehensive plan's transportation element. Generally, the transportation element requires conducting an inventory of the municipality's current transportation system, assessing current and future needs and considering needs and accommodations for other modes of transportation beyond the automobile. Municipalities can use the transportation element to prioritize and promote resource efficient transportation outcomes including:

- Reduction in vehicle trips and vehicle miles traveled (VMT) through compact, infill, and mixed use development;
- Use of alternatives to the drive-alone automobile ("single occupant vehicle" or SOV), including walking, bicycling, and public transit;
- Development and use of vehicles powered by renewable fuel sources;
- Local street designs that encourage pedestrian and bicycle use and discourage high speed traffic;
- More accessible street designs that support/enhance access between neighborhoods and to neighborhood-based commercial developments;
- Greater affordability, providing efficient transportation alternatives for everyone, especially low-income households, seniors, and others comprising 30 percent of the national population that cannot or do not own cars; and
- Attracting businesses and developers, who are looking at ways to reduce vehicle trips, in part, to more easily meet state permitting requirements.



Text Box 1: Qualifying for Green Community Designation

Qualifying as a Green Community allows a community to apply for grants to finance all or a portion of the cost of studying, designing, constructing and implementing energy efficiency activities, including but not limited to energy efficiency measures and projects; procurement of energy management services; installation of energy management systems; adoption of demand side reduction initiatives, and the adoption of energy efficiency policies. These funds can also be used to finance siting and construction of renewable and alternative energy projects on municipally owned land.

The Green Communities Grant Program is divided into two parts, a designation process and a grant application process. In order to be considered for grant funding, the applicant must first be designated as a Green Community. If the municipality qualifies as a Green Community it may then apply for grant funding. The designation process is a rolling one.

Requirements to Qualify as a Green Community

Criteria 1: As-of-Right Siting – Renewable/Alternative Energy

Provide for the as-of-right siting of renewable or alternative energy generating facilities, renewable or alternative energy research and development (R&D) facilities, and/or renewable or alternative energy manufacturing facilities in designated locations.

Criteria 2: Expedited Permitting

Adopt an expedited application and permitting process under which these energy facilities may be sited within the municipality and which shall not exceed 1 year from the date of initial application to the date of final approval.

Criteria 3: Energy Baseline/20% Energy Reduction Plan

Establish an energy use baseline inventory for municipal buildings, vehicles, street and traffic lighting prior to submitting a designation form, and put in place a comprehensive program designed to reduce this baseline by 20% within 5 years of initial participation in the program.

Criteria 4: Purchase Only Fuel Efficient Vehicles

Purchase only fuel-efficient vehicles for municipal use whenever such vehicles are commercially available and practicable.

Criteria 5: Minimize Life-Cycle Costs

Require all new residential construction over 3,000 square feet and all new commercial and industrial real estate construction to minimize, to the extent feasible, the life-cycle cost of the facility by utilizing energy efficiency, water conservation and other renewable or alternative energy technologies.

Visit the state's Green Communities Division [website](#) for more information about the Green Communities designation.

Community Facilities

An energy conscious municipality looks at making energy use efficient as possible in all its community facilities, which include everything from sewage treatment plants to schools, and police departments. The community facilities element of a comprehensive plan is the ideal place to start making that goal a reality as it details future plans for the physical facilities owned by the municipality. A critical goal in this element should be gathering and coordinating data about current energy use among facilities and departments. A baseline analysis of energy use will allow a municipality to target reduction goals and develop strategies for implementation. Reduction in municipal energy use is a key requirement of the state's Green Communities

designation. The state's The Green Communities Division provides to Massachusetts municipalities, at no cost, a new, robust, easy-to-use energy information tool called [MassEnergyInsight](#). The tool sorts information from utility companies into a comprehensive database that will benchmark the consumption of electricity, natural gas,

and heating oil in public facilities, in order to reveal energy usage and costs. It also helps municipalities to identify priority targets for energy efficiency investments, and to inventory, track, and report greenhouse gas emissions.

Housing

The purpose of a housing element in a comprehensive plan is to assess local housing conditions and project future housing needs, especially for affordable housing, in order to assure that a wide variety of housing is available for a community's existing residents. The housing element is an ideal venue to address the many issues associated with energy efficiency and residential dwellings including: energy efficiency in the units themselves, density of residential units in neighborhoods and mixed use development, solar orientation, and installation of renewable energy technologies for electricity and heat.²³ Municipalities can use the housing element as an opportunity to require the gathering of energy data on residential buildings in the community, develop criteria for energy efficient design and building techniques in affordable and market rate housing, identify ways to incentivize energy efficient residential development, and detail a clear municipal commitment in support of installing renewable energy options like solar panels or wind turbines on residential property.

Text Box 2: Energy Efficient Features Standout in Wayland Affordable Housing Development

Oxbow Partners LLC has completed the successful development of 89 Oxbow in Wayland, MA, the location of a former Nike Missile site. Set on 2.75 acres, the 16 affordably priced starter homes range in price from \$161,834 to \$239,213, are deed restricted to preserve affordability, and contain several energy smart features. The project was made possible through the support of the Town of Wayland through Community Preservation Act funding. Oxbow received funding through the Massachusetts Department of Housing and Community Development and the Massachusetts Technology Collaborative that allowed the development to include energy producing photovoltaic roof panels that generate electricity for each home and build a highly insulated envelope and provide energy efficient utility systems. The combination of these benefits is expected to save homeowners as much as \$1,000 per year in energy costs. 89 Oxbow has been certified as exceeding Energy Star Program requirements. Homeowners in the development are eligible for Federal and Commonwealth solar tax credits.

Economic Development

Traditionally, addressing economic development in a comprehensive plan has been to forecast economic growth and to provide policy guidance on how the municipality will provide for appropriate land and infrastructure to accommodate economic growth.

Over time the perspective of what economic development is has broadened. Economic development is no longer thought of as merely meeting land-use and infrastructure needs; it now extends to workforce development, development financing, and to the creation of mechanisms/organizations to promote development such as community development corporations, business incubators, and specialized public-private partnerships. The connection between energy and economic growth has also become an issue of interest to economic development policy. Increasingly, comprehensive planning is addressing the connections between energy and economic development.

²³ Kelley, 2008.

One of the ways to think about local government planning for economic development and energy is from the perspective of *preparedness*. Regardless of personal opinion regarding global warming and the greenhouse gas mitigation debate, trends are pointing toward a future in which low-carbon economies will be rewarded.^{24,25} Changes to energy cost, delivery and availability are certain, whether those changes result from increased global demand, geopolitical forces, and volatile prices, or whether carbon pricing is implemented on a national or state level. With this change as the only certainty, how localities prepare for this paradigm will impact their future economic opportunities and challenges. Preparedness in the face of a shifting global energy market and increasing pressures to reduce GHG emissions is essential for capitalizing on an economy's assets, while buffering and bolstering its weaknesses. Municipalities can prepare for the transition to a low-carbon energy efficient economy by addressing the following issues in their comprehensive plan:

- **Develop policies that promote energy efficiencies in the private sector.** An ideal policy mix would include some form of direct financing, tax incentives, and municipal regulations that strengthen the demand for cleaner sources of energy and promote energy efficiency.²⁶
- **Strengthen existing resources.** Work to reengineer current economic development activities to address energy efficiency challenges and opportunities including: helping existing businesses meet new demands, targeting industries with potential to prosper under low-carbon requirements, and training workers for new opportunities.²⁷
- **Identifying new partnerships, and new ways of working to meet energy efficiency requirements.** The focus on energy efficiency demands new thinking about what organizations and stakeholders need to be involved in the economic development process; new partnerships between municipal departments, across layers of government, and with the private sector will need to be identified and developed.²⁸

Adopting a Stand-Alone Municipal Energy Conservation Plan

Municipalities also have the option of developing stand alone energy conservation plan as a policy document separate from the more encompassing comprehensive plan. One of the benefits to this approach is that it allows municipalities the ability to develop an energy plan outside of the long interim between comprehensive plan rewrites.

Developing a stand alone energy plan can also bring attention to energy efficiency challenges and galvanize a community around the issue in ways that embedding energy policy into a comprehensive plan cannot. A step-by-step approach might include all or some of the following elements; overall, a successful plan requires both *organization* to institutionalize energy improvements within a municipality, and a *plan*.

²⁴ Thorstensen, Liz, Nourick, Shari. *Getting Prepared: Economic Development in a Transforming Energy Economy*. Washington, DC: International Economic Development Council, June, 2010.

²⁵ Buntin, John. "Cap & Fade". *Governing*. December, 2010.

²⁶ Stone, Tyer. *Mintz Levin Strategy Alert: Incentivizing Energy Efficiency Across the American Economy*. November, 2010. Web. 7 December, 2010.

http://www.mintz.com/newsletter/2010/Advisories/0781-1110-NAT-MLS_ECT/web.html.

²⁷ Thorstensen, 2010.

²⁸ Ibid.

Organization

Make a formal commitment to reducing municipal energy use. There are formal programs such as the U.S. Conference of Mayors Climate Agreement that help garner recognition for achievements as the community progresses, or a municipality can make a simple, vision- or mission-oriented statement, ideally defining general goals such as operational savings.

Establish an energy or sustainability task force. These bodies often include a mix of municipal staff and local volunteers. A task force is generally given a timeline by which it must report interim and final recommendations to the municipality's leadership on how to shape its energy future. It may have more specific goals too, such as preparing the municipality to create an energy office or prepare for near-term goals before a more formal organization is in place, such as to pursue time-sensitive grants or rebates.

Designate or create a lead office and/or energy manager position. Successful policies and the authority for implementation must come from one office, whether it's the planning department, city or town manager's office, public works, environmental services, or a special energy office. This doesn't mean, however, that the lead office is the only department involved.

Engage professional assistance. An initial site visit with Massachusetts Department of Energy Resources' (DOER) Green Communities program consultants, community audits by in-house personnel, engaging a municipal and climate change consultant, or partnering with utilities or a non-profit organization like ICLEI (see Text Box 2 on page 16) can provide valuable guidance and help identify potential financial assistance like grants and rebates to help support actions.

Determine how much is spent on energy; track and account for all energy costs by department and sector. This information can help prioritize energy efficiency investments. Some municipalities expand beyond public buildings into the residential, commercial and transport sector.

Identify key community energy efficiency concerns, goals, and opportunities.

Link energy programs with other community goals. Piggyback energy issues with existing community goals, e.g., providing a range of housing types, public transit, pedestrian connectivity, and commercial redevelopment.

Build community support and involvement. Task forces, meetings with citizens, informal networking, and meetings with business leaders, utilities, and interest groups establish allies and a clear picture of the financial resources needed for a project.

Developing an Energy Plan

Prioritize actions, develop a draft action plan outline, then a full plan. Work with community members and leaders to create a list of options and their costs, benefits, environmental effects, economic and technological potential, funding resources, and political acceptability to prioritize the tasks that will produce the greatest benefit). *Note that for Green Communities designation, both the general government and school district are required to adopt an Energy Reduction Plan ("Criteria 3"), the Commonwealth has provided a [Sample Energy Reduction Action Plan Outline](#).*



Text Box 3: ICLEI – Local Governments for Sustainability

Implementing energy efficiency policies and practices is not something that small municipal departments typical in the region, let alone one staff person, can make progress with on their own. It takes collaboration and external support. In addition to seeking Green Communities funding, strategies and resources offered by non-profit organizations like the 'International Council for Local Environmental Initiatives', now known as **ICLEI—Local Governments for Sustainability**. ICLEI is an alliance of over 1,000 local governments and their associations that have made a performance-based commitment to sustainable development and can provide needed technical assistance at the local level. More than 25 municipalities from throughout Massachusetts are ICLEI members. ICLEI provides technical consulting, training, and information services, toolkits, and software to build capacity, share knowledge, and support local government in the implementation of greenhouse gas emissions reductions and sustainable development at the local level. In 2005 alone, through ICLEI's Cities for Climate Protection® (CCP) Campaign, more than 160 U.S. local governments reported collective savings of over 23 million tons of global warming pollution and \$600 million in related energy and fuel costs.

ICLEI's resources can help pursue Green Communities efforts that complement climate action planning for municipalities that seek ways to tie together multiple sustainability planning initiatives more holistically. For example, in conducting a baseline energy assessment, the municipality may also decide to assess greenhouse gas emissions calculated from the energy consumption data. To assist local governments with emissions baselines and climate mitigation, ICLEI has developed a **Five-Milestone** process:

Milestone One: Conduct a baseline emissions inventory and forecast;

Milestone Two: Adopt an emissions reduction target;

Milestone Three: Develop a local climate action plan;

Milestone Four: Implement policies and measure; and

Milestone Five: Monitor and verify results.

The process requires leadership commitment at each step, just as with other aspects of municipal energy resource planning. To assist local governments as they work through the Five Milestone process, below are a few links to ICLEI's Small Communities Toolkit resources, and similar ICLEI tools and trainings.

- [Getting Started](#)
- [Education and Outreach](#)
- [Community Engagement](#)
- [Developing Partnerships](#)
- [Ordinances and Policies](#)
- [Financial Resources](#)
- [Planning Resources](#)
- [Additional Resources](#)
- [Case Studies](#)
- [Clean Air Climate Protection \(CACAP\) Software](#)
- [Decision Support Tool \(CAPP\)](#)
- [GHG Protocols](#)
- [Skills Trainings](#)

Submit the draft plan for agency and/or public review Once approval is obtained based on suggested improvements, a formal plan can proceed.

Finalize and adopt the formal energy action plan and submit it to relevant stakeholders.

Implement the plan. Concentrate on what is low-cost/no-cost, produces the greatest impact, and needs simple attention, then on what needs financing and is realistic for both the short- and long-term.

Evaluate success and update the plan. Such policy should be a living document, with short-term plans being reevaluated and updated every 2 or 3 years, and long-term plans every 5 years, based on evaluations of tracked metrics and savings like reduced vehicle miles traveled or reduced energy expenses.

Publicize the benefits. Use marketing, public relations, and media events to clearly communicate the policy/plan's benefits, build community trust, and assure taxpayers of the municipality's effective services, fiscal responsibility, and stewardship of local resources for years to come.

Leverage successes. Apply recognition for dedication to change and performance achievements to seek additional financial assistance and continue implementation of the energy plan beyond the immediate future. Take advantage of public resources and utility programs, but also reach out to potential private partners like foundations that have interests in climate action, and hence in energy planning.

Assess and reduce greenhouse gas emissions. Calculate the community's baseline emissions and reduction targets either in tandem with the energy planning process or throughout all of the steps above. Or, while less efficient, build upon information from the energy planning process to help develop a climate adaptation plan/emissions reduction plan later on.

Synopsis of Renewable Energy and Energy Efficiency Laws, Programs, and Policies Enacted and Implemented in Massachusetts: 2008-2010

In 2008, the Massachusetts Legislature enacted and Governor Deval Patrick signed several pieces of legislation designed to promote the development of renewable energy and to increase energy efficiency in the Commonwealth. In this short time span, the following bills were enacted, the **Green Communities Act**, the **Green Jobs Act**, the **Global Warming Solutions Act**, the **Clean Energy Biofuels Act** and the **Oceans Act**. These acts establish the legal framework for many new or enhanced state energy programs and authorize funding to support energy efficiency and the development of renewable energy. In addition to the programs authorized under these acts, the Patrick Administration has implemented and is implementing a number of other programs to further the Commonwealth's energy goals. The following summaries, most of which have been authored by state energy agencies, provide updated information about these acts, these programs, and the energy efficiency and renewable energy opportunities they create for Massachusetts cities and towns, businesses, and non-profit institutions.

The Green Communities Act

The Green Communities Act, (Chapter 169 of the Acts of 2008) contains numerous comprehensive reforms to the state's energy policies in its fifty-three pages. Very briefly, the Green Communities Act can be divided into five areas:

- **Efficiency program expansion** - requires investor owned utility companies to purchase all available energy efficiency improvements that cost less than generating power to meet the same energy need;
- **Green communities program** - partners with cities and towns by providing support and technical assistance, and up to \$10 million per year statewide in grants, to promote energy efficiency and renewable energy;

- **Regional Greenhouse Gas Initiative (RGGI)** - gives legislative approval for participation in RGGI, requires auctioning of pollution allowances, and directs RGGI auction revenues to be used primarily for energy efficiency programs;
- **Updating of state building code** - requires the State Board of Building Regulations and Standards to adopt, as its minimum standard, the latest edition of the International Energy Conservation Code; and
- **Renewable energy goals** - doubles the rate of increase in the Renewable Portfolio Standard (RPS), requiring utilities and other electricity suppliers to obtain energy from renewable power, so that Massachusetts will generate 15% of its electricity from renewables by 2020.²⁹

Energy Efficiency Program Expansion

Under the new law, the state will make energy efficiency programs compete in the market with traditional energy supply. Utility companies (NSTAR Electric, National Grid, Western Mass. Electric Company, Unitil) will be required to purchase all available energy efficiency improvements that cost less than it does to generate power, ultimately saving money on consumers' electricity bills. Utility companies will offer rebates and other incentives for customers to upgrade lighting, air conditioning, and industrial equipment to more efficient models, whenever those incentives cost less than generating the electricity it would take to power their older, less-efficient equipment.³⁰

Previously, the sole mechanism for funding electric energy efficiency was a fixed System Benefits Charge (SBC) of 2.5 mils for every kilowatt-hour sold. That amounted to approximately \$125 million annually, depending upon actual electric sales.

Electric companies are now under a mandate to procure all cost effective energy efficiency. Programs will be funded by a combination of revenue sources. The SBC is retained in the Green Communities Act but is now supplemented by other revenues: proceeds from the Forward Capacity Market (FCM), the Regional Greenhouse Gas Initiative (RGGI) and "other funding that may be approved by the Department (of Public Utilities)..."³¹

The Green Communities Act allows RGGI auction proceeds to be used, without further appropriation, to fund the Green Communities program of incentives and assistance for municipalities to adopt energy efficiency and renewable energy measures; to support

²⁹ Massachusetts Department of Environmental Protection, "Climate Protection & Green Economy Advisory Committee Briefing Book." Official Website of the Massachusetts Department of Environmental Protection, 11 May 2009. Web. 16 Apr 2010. <http://www.mass.gov/dep/public/committee/briefing.htm>.

³⁰ Office of the Governor, "Governor Patrick Signs Energy Bill." Official Website of the Governor of Massachusetts. Commonwealth of Massachusetts 2 Jul 2008. Web. 13 Apr 2010. http://greenlineproject.com/wp-content/uploads/2008/08/governorpatrickpressrelease_greencommunitiesact_07-02-08.pdf.

³¹ Massachusetts Energy Efficiency Advisory Council, "Energy Efficiency Advisory Council Responsibilities." Massachusetts Energy Efficiency Advisory Council, n.d. Web. 13 Apr 2010. <http://www.ma-eeac.org/docs/081118-EEAC-Responsibilities.pdf>.

energy efficiency, conservation and demand response programs; and to reimburse the Commonwealth for administrative costs associated with the cap-and-trade program.³²

Gas companies are now under the same Least Cost Procurement mandate as the electric companies. Gas Program Administrators (PA's) will propose plans and "fully reconciling funding mechanism" to fund the programs.³³

There has been no gas SBC. In the past gas PA's submitted five year plans with annual adjustments and sought recovery following the end of each program year. Previous settlements resulted in annual expenditures of \$25 million statewide.

The Green Communities Act creates an Energy Efficiency Advisory Council, whose members will play a key role in designing and approving the Commonwealth's utility – and municipal aggregator-operated energy efficiency programs.

Electric and gas PA's are required to develop three-year energy efficiency plans that seek to acquire all cost-effective energy efficiency that is less than the cost of supply.

The Plans are required to be comprehensive; they are required to be statewide; they are required to address integration of electric and gas initiatives; they are required to provide at least minimum percentages of programs and benefits for low income customers and otherwise equitably serve the various customer classes.³⁴

On January 28, 2010, the Department of Public Utilities (DPU) approved the three-year energy efficiency plans for 2010 - 2012, which, according to the DPU, "are expected to provide net benefits of approximately \$3.9 billion, resulting in almost three dollars in benefits for every dollar spent, over the lifetime of the efficiency measures installed. Total lifetime energy savings associated with the proposed energy efficiency programs will cost roughly 4.6 cents/kWh for electric efficiency programs, and 31 cents/therm for natural gas efficiency programs, well below the cost of the traditional energy resources that would otherwise need to be purchased by consumers. In addition, the energy efficiency programs in the Three-Year Plans are expected to reduce statewide carbon dioxide emissions by roughly 15 million tons and create nearly 3,900 local jobs throughout the lifetime of the measures installed in Massachusetts."³⁵

³² Office of the Governor, "Greenhouse Gas Auction Yields \$14.8 Million For Energy Efficiency Jobs, Investments." Official Website of the Governor of Massachusetts. Commonwealth of Massachusetts, 19 Dec 2008. Web. 13 Apr 2010.

http://www.mass.gov/?pageID=gov3pressrelease&L=1&L0=Home&sid=Agov3&b=pressrelease&f=081219_rggi&csid=Agov3.

³³ Massachusetts Energy Efficiency Advisory Council, "Energy Efficiency Advisory Council Responsibilities." Massachusetts Energy Efficiency Advisory Council, n.d. Web. 13 Apr 2010.

<http://www.ma-eeac.org/docs/081118-EEAC-Responsibilities.pdf>.

³⁴ Ibid.

³⁵ Department of Public Utilities, "D.P.U. 09-116 through D.P.U. 09-120 Executive Summary" Massachusetts Energy Efficiency Advisory Council. Commonwealth of Massachusetts, 28 Jan 2010. Web. 20 Apr 2010. <http://www.ma-eeac.org/docs/DPU-filing/1-28-10%20DPU%20Order%20Electric%20PAs.pdf>.

Development of the Green Communities Program

The Green Communities Act also created the Green Communities Division within the Department of Energy Resources (DOER) to serve as the hub for all Massachusetts cities and towns on all matters related to energy.³⁶

The Green Communities Act creates a grant and loan program for those communities who meet criteria involving zoning and permitting of energy facilities, energy use benchmarking and plans for reducing energy use, fuel efficient vehicles, and minimizing life-cycle energy costs for new construction. The funds will afford these communities the opportunity to implement significant energy efficiency measures, construct large renewable energy projects, or pursue other innovative projects that further the communities' efforts to reduce their fossil fuel energy consumption.³⁷ The Grant program began accepting applications in March 2010. Municipalities with Green Communities designation in MetroWest include: Acton, Harvard, Hopkinton, Marlborough, Medway, Sudbury, and Wayland.

The Green Communities Grant Program, provides up to \$10,000,000 annually (\$8.1 million in 2010) in grant funding to cities and towns that meet five specific criteria. The grant program will fund energy efficiency and renewable energy activities. The five criteria include:

1. Provide for the as-of-right siting of renewable or alternative energy generating facilities, renewable or alternative energy research and development (R&D) facilities, or renewable or alternative energy manufacturing facilities in designated locations.
2. Adopt an expedited application and permitting process under which these energy facilities may be sited within the municipality and which shall not exceed 1 year from the date of initial application to the date of final approval.
3. Establish an energy use baseline inventory for municipal buildings, vehicles, street and traffic lighting, and put in place a comprehensive program designed to reduce this baseline by 20 percent within 5 years of initial participation in the program.
4. Purchase only fuel-efficient vehicles for municipal use whenever such vehicles are commercially available and practicable.
5. Require all new residential construction over 3,000 square feet and all new commercial and industrial real estate construction to minimize, to the

³⁶ Lusardi, Meg. "Helping Massachusetts Municipalities Create a Greener Energy Future." Green Communities Program. Department of Energy Resources, 28 May 2009. Web. 13 Apr 2010.
http://www.epatechforum.org/documents/2008-2009/2009-05-28/5-28-09_Lusardi.pdf.

³⁷ Executive Office of Energy and Environmental Affairs "Green Communities Grant Program" Official Website of Executive Office of Energy and Environmental Affairs. Commonwealth of Massachusetts Web. 13 Apr 2010.
http://www.mass.gov/?pageID=eoeeterminal&L=3&L0=Home&L1=Energy%2C+Utilities+%26+Clean+Technologies&L2=Green+Communities&sid=Eoeea&b=terminalcontent&f=doer_green_communities_gc-grant-program&csid=Eoeea.

extent feasible, the life-cycle cost of the facility by utilizing energy efficiency, water conservation and other renewable or alternative energy technologies.³⁸

Communities can meet the Green Communities qualification criteria to minimize life cycle energy costs for new construction by adopting the stretch code detailed later. The stretch code was approved by the Board of Building Regulations and Standards (BBRS) in May 2009. Recognizing that cities and towns may need guidance to meet these criteria, the Green Communities Division has established Green Communities Regional Coordinators.³⁹

Funding for the competitive grants is made possible through the Regional Greenhouse Gas Initiative (RGGI) and is provided by the Green Communities Division. The maximum amount of funds a Green Community was allowed to apply for in the first round was \$1,000,000, regardless of the number of projects.⁴⁰

Regional Greenhouse Gas Initiative

The Green Communities Act gives final legislative approval to the Commonwealth's participation in the Regional Greenhouse Gas Initiative (RGGI). In January 2007, Massachusetts joined RGGI, a cooperative effort by Northeast and Mid-Atlantic states to reduce emissions of carbon dioxide, a greenhouse gas that contributes to global climate change.

To address this important environmental issue, RGGI and its member states have developed a regional strategy for controlling emissions, including a market-based, multi-state cap-and-trade program that requires electric power generators to reduce their emissions of carbon dioxide.⁴¹

RGGI is a cooperative effort by ten Northeast and Mid-Atlantic states to limit greenhouse gas emissions. RGGI is the first mandatory, market-based CO₂ emissions reduction program in the United States.⁴²

³⁸ Department of Energy Resources, "Program Opportunity Notice (PON) – Green Communities Grant Program - Planning Assistance 7/10/09 (revised 07/29/09)" Official Website of the Department of Energy Resources. Commonwealth of Massachusetts, Web. 13 Apr 2010.

³⁹ Department of Energy Resources, "Patrick Administration Appoints Two Regional Coordinators for Green Communities Program" Official Website of the Massachusetts Department of Energy Resources. Commonwealth of Massachusetts, 30 Jul 2009. Web. 3 Mar 2011.

http://www.mass.gov/Eoeea/docs/doer/green_communities/pubs_reports/regional_coordinators.pdf.

⁴⁰ Department of Energy Resources "Program Opportunity Notice (PON), Green Communities Grant Program, Fiscal Year 2010: Application for Designation and Competitive Grants," Official Website of the Massachusetts Department of Energy Resources. Commonwealth of Massachusetts, Web 19 March 2010 http://www.mass.gov/Eoeea/docs/doer/green_communities/grant_program/Green_Communities_Grant_Program_2010_PON.doc.

⁴¹ Massachusetts Department of Environmental Protection, "Massachusetts & the Regional Greenhouse Gas Initiative (RGGI)." Official Website of the Massachusetts Department of Environmental Protection (MassDEP). Commonwealth of Massachusetts, n.d. Web. 13 Apr 2010.

<http://www.mass.gov/dep/air/climate/rggi.htm>.

⁴² RGGI.org, "Regional Greenhouse Gas Initiative - About RGGI." Regional Greenhouse Gas Initiative (RGGI) CO₂ Budget Trading Program. RGGI.org, n.d. Web. 21 Apr 2010. <http://www.rggi.org/design>.

The states of Connecticut, Delaware, Maine, Maryland, Massachusetts, New Hampshire, New Jersey, New York, Rhode Island, and Vermont are signatory states to the RGGI agreement. These ten states have capped CO2 emissions from the power sector, and will require a 10 percent reduction in these emissions by 2018.⁴³

RGGI is composed of individual CO2 Budget Trading Programs in each of the ten participating states. These ten programs are implemented through state regulations, based on a RGGI Model Rule, and are linked through CO2 allowance reciprocity. Regulated power plants can use a CO2 allowance issued by any of the ten participating states to demonstrate compliance with the state program governing their facility. Taken together, the ten individual state programs function as a single regional compliance market for carbon emissions.⁴⁴

How Cap-and-Trade Works

To reduce emissions of greenhouse gases, the RGGI participating states are using a market-based cap-and-trade approach that includes:

- Establishing a multi-state CO2 emissions budget (cap) that will decrease gradually until it is 10 percent lower than at the start;
- Requiring electric power generator to hold allowances equal to their CO2 emissions over a three-year control period;
- Providing a market-based emissions auction and trading system where electric power generators can buy, sell and trade CO2 emissions allowances;
- Using the proceeds of allowance auctions to support low-carbon-intensity solutions, including energy efficiency and clean renewable energy, such as solar and wind power; and
- Employing offsets (greenhouse gas emissions reduction or sequestration projects outside the electricity sector) to help companies meet their compliance obligations.⁴⁵

RGGI's phased approach means that reductions in the CO2 cap will initially be modest, providing predictable market signals and regulatory certainty. Electricity generators will be able to plan for and invest in lower-carbon alternatives and avoid dramatic electricity price impacts.⁴⁶

The Green Communities Act allows RGGI auction proceeds to be used, without further appropriation, to fund the Green Communities program of incentives and assistance for municipalities to adopt energy efficiency and renewable energy measures; to support energy efficiency, conservation and demand response programs; and to reimburse the Commonwealth for administrative costs associated with the cap-and-trade program.⁴⁷

⁴³ Ibid.

⁴⁴ Ibid.

⁴⁵ Ibid.

⁴⁶ Ibid.

⁴⁷ Office of the Governor, "Governor Patrick Directs Greenhouse Gas Allowance Proceeds to Fund Energy Efficiency, Municipal Assistance, and Winter Energy Cost Efforts." Official Website of the Governor of Massachusetts. Commonwealth of Massachusetts, 29 Sep 2008. Web. 13 Apr 2010.

Updating the State Building Code

The Green Communities Act requires the State Board of Building Regulations and Standards to adopt, as its minimum standard, the latest edition of the International Energy Conservation Code (IECC) as part of the State Building Code. This will keep Massachusetts building standards at the highest international levels of energy efficiency.⁴⁸

The Green Communities Act of 2009 requires that Massachusetts adopt each new IECC within one year of its release. The IECC is updated on a 3 year cycle, so the next version will be IECC 2012.⁴⁹

In accordance with the statutory requirements of the Green Communities Act, the Board of Building Regulations and Standards (BBRS) amended the Building Code as of January 1, 2010, requiring the use of the 2009 International Energy Conservation Code (IECC) with MA amendments, instead of IECC 2006.⁵⁰

The 'stretch code' is an optional appendix to the Massachusetts building energy code that allows cities and towns to choose a more energy-efficient option. This 'stretch code' option increases the energy efficiency code requirements in any municipality that adopts it, for all new residential and many new commercial buildings, as well as for those residential additions and renovations that would normally trigger building code requirements.⁵¹

The stretch code appendix offers a route to achieving approximately 20% better energy efficiency in new residential buildings, and 20% in new commercial buildings, than is required by the existing base energy code.⁵²

The stretch code appendix applies to both residential and commercial buildings. All Residential buildings from single family homes up to and including buildings 3 stories or less of any size are included in the code. This includes both new and existing residential

http://www.mass.gov/?pageID=gov3pressrelease&L=4&L0=Home&L1=Key+Priorities&L2=Job+Creation+%26+Economic+Growth&L3=Clean+Energy+%26+Smart+Growth-Smart+Energy&sid=Agov3&b=pressrelease&f=080929_greenhouse_gas_allowance_&csid=Agov3.

⁴⁸ Office of the Governor, "Governor Patrick Signs Energy Bill Promoting Cost Savings, Renewable and Clean Energy Technology." Official Website of the Governor of Massachusetts. Commonwealth of Massachusetts, 02 Jul 2008. Web. 13 Apr 2010.

http://www.mass.gov/?pageID=gov3pressrelease&L=1&L0=Home&sid=Agov3&b=pressrelease&f=080702_bill_energy_clean&csid=Agov3.

⁴⁹ Executive Office of Energy and Environmental Affairs, "Summary of the Massachusetts Building Code Appendix 120.AA, 'Stretch' Energy Code". Executive Office of Energy and Environmental Affairs. Commonwealth of Massachusetts, n.d.. Web. 3 Mar 2011.

http://www.mass.gov/Eeops/docs/dps/inf/summary_of_the_ma_building_code_appendix_120.doc.

⁵⁰ Don Finocchio, Technical Analyst, BBRS/DPS, "Advisory on Energy Efficiency Requirements MA Building Code, 780 CMR, 7th Edition." The Commonwealth of Massachusetts Department of Public Safety. Commonwealth of Massachusetts, 5 Jan 2010. Web. 20 Apr 2010. <http://www.ma-eeac.org/docs/DPU-filing/1-28-10%20DPU%20Order%20Electric%20PAs.pdf>.

⁵¹ Executive Office of Energy and Environmental Affairs, "Stretch Appendix to the Energy Code in Massachusetts." Official Website of Executive Office of Energy and Environmental Affairs. Commonwealth of Massachusetts, 15 Sep 2009. Web. 20 Apr 2010.

http://www.mass.gov/Eoeaa/docs/doer/green_communities/grant_program/q_and_a_stretch_code.pdf.

⁵² Ibid.

buildings that are renovated. Historic buildings and existing buildings not being renovated are exempt from both the stretch code and the base code.⁵³ New Commercial buildings over 5,000 square feet in size, including multi-family residential buildings over 3 stories are included. Specialized facilities with unusual energy usage requirements such as supermarkets, laboratories, and warehouses up to 40,000 square feet are excluded. Other building types with unusual energy usage profiles can also apply for a waiver from the stretch code from the BBRs.⁵⁴

Renewable Energy Goals and the Development of Renewable Energy

The Green Communities Act directed changes in the state's **Renewable Energy Portfolio Standard (RPS)** to double the rate of increase in the use of new renewable energy, create a new "Class II" RPS to support the continued operation of older (pre-1998) renewable energy generating facilities, and establish a new Alternative Energy Portfolio Standard (APS) to support other innovative energy technologies. Established as part of the utility restructuring act in 1997, the RPS is designed to diversify the state's electricity supply portfolio and create market demand to spur the development of renewable power. It requires retail electricity suppliers to purchase a certain amount of RPS-eligible energy (through Renewable Energy Certificates) as a percentage of the power they sell to consumers.⁵⁵

Percentages for the RPS are applied to the total load served by all of the state's Load Serving Entities (LSEs). This load is expressed in Megawatt hours (MWh). For example, the estimated total statewide load served in 2009 was 50,243,788 MWh. The percentage of that total statewide load that needed to be met by renewable sources in 2009 would then be 4% of that total or 2,009,751 MWh. The primary way they are able to accomplish this is through purchasing Renewable Energy Certificates (RECs).⁵⁶

What are Renewable Energy Certificates (RECs)?

Electricity produced by new renewable energy generators qualified for the RPS program is broken into two products: the electricity production that is used on-site or delivered to the grid and the positive environmental attributes associated with this clean energy production.⁵⁷

RECs represent the second product. One REC is created each time a qualified system generates 1 MWh (or 1000 kWh) of electricity. In order for LSEs to meet their compliance obligations as set by the RPS, they must purchase a number of RECs equal to the percentage for that particular compliance year. For example, in 2010 all LSEs are

⁵³Ibid.

⁵⁴Ibid.

⁵⁵Executive Office of Energy and Environmental Affairs, "Patrick Administration Announces Rules Providing More Support for Renewable and Alternative Energy" Official Website of the Executive Office of Energy and Environmental Affairs. Commonwealth of Massachusetts, 06 Jan 2009. Web. 15 Apr 2010. http://www.mass.gov/?pageID=eoeea&L=1&L0=Home&sid=Eoeea&b=pressrelease&f=090106_pr_rps_regs&csid=Eoeea.

⁵⁶Massachusetts Department of Energy Resources, "RPS Solar Carve-Out Program Overview." Official Website of the Executive Office of Energy and Environmental Affairs. Commonwealth of Massachusetts, n.d. Web. 15 Apr 2010. <http://www.mass.gov/Eoeea/docs/doer/renewables/solar/RPS-Solar-Carveout-Prog-Overview.pdf>.

⁵⁷.Ibid.

required to purchase an amount of RECs equal to 5% of the total load they served in Massachusetts.⁵⁸

RECs are created on the New England Power Pool Generation Information System (NEPOOL GIS). However, before a REC can be created on NEPOOL GIS, a generator unit must first apply for and receive a Statement of Qualification to sell RECs from DOER. As of May 2009, eligible technologies included solar PV, solar thermal electric, wind, ocean thermal electric, wave/tidal energy, fuel cell, landfill methane gas, low impact small hydroelectric, low-emission advanced biomass, marine or hydrokinetic energy, and geothermal energy projects.⁵⁹

In order to determine the prices for RECs, DOER has set an Alternative Compliance Payment (ACP) Rate. This rate serves as a ceiling price and exists as a penalty payment that LSEs must pay if they do not meet their RPS compliance obligation in a given year. Essentially, for every MWh they are short of meeting their obligation, they must provide an alternative payment to the DOER. Thus, the incentive is for LSEs to purchase RECs from qualified projects for something less than [the ACP rate] in order to meet their compliance obligation and avoid ACP payments.⁶⁰

On January 6, 2009, the Division of Energy Resources promulgated new regulations to implement the following changes:

RPS Class I Renewables: The rate of increase in the renewable energy required of utilities and other electricity suppliers from renewable energy generating facilities created since 1998, formerly known as "New Renewables," rises from 0.5 percent of sales annually to 1 percent per year; that is, from 4 percent in 2009 to 15 percent in 2020 and continuing thereafter. As a result, utilities and other electricity suppliers are required to obtain renewable power equal to 5 percent of sales in 2010, rising to 15 percent in 2020 and upward from there. Geothermal, hydroelectric, and marine and hydro-kinetic (including wave and tidal) energy were made eligible technologies under RPS Class I, as is algae, as an eligible biomass fuel. Compliance by utilities and other electric suppliers with the RPS requirement will be by purchase of the renewable attributes of electricity generated by eligible renewable energy facilities in the form of Renewable Energy Certificates or by making an Alternative Compliance Payment.⁶¹

RPS Class II Renewables: This new class of RPS, created by the Green Communities Act to support the continued operation of older renewable energy facilities, is limited to generation that went online on or before December 31, 1997.⁶² RPS Class II mandates that a minimum percentage of electricity sales come from each of two sources, renewable energy and waste energy. The current RPS Class II Renewable Generation obligation is 3.6 percent, and the Waste Energy Generation obligation is 3.5 percent. The obligation

⁵⁸ Ibid.

⁵⁹ Ibid.

⁶⁰ Ibid.

⁶¹ Executive Office of Energy and Environmental Affairs, "Patrick Administration Announces Rules Providing More Support for Renewable and Alternative Energy" Official Website of the Executive Office of Energy and Environmental Affairs, Commonwealth of Massachusetts, 06 Jan 2009. Web. 15 Apr 2010. http://www.mass.gov/?pageID=eoeea&L=1&L0=Home&sid=Eoeea&b=pressrelease&f=090106_pr_rps_regs&csid=Eoeea.

⁶² Ibid.

does not increase annually. A Supplier must comply with both the minimum percentage of Renewable and Waste Energy obligations.⁶³

The Alternative Energy Portfolio Standard (APS) was established as of January 1st 2009, under the Green Communities Act of 2008. APS offers a new opportunity for Massachusetts businesses, institutions, and governments to receive an incentive for installing eligible alternative energy systems, which are not renewable. Similar to the RPS, it requires a certain percentage of the state's electric load to be met by eligible technologies, which for APS include Combined Heat and Power (CHP), flywheel storage, coal gasification, and efficient steam technologies. These resources contribute to the Commonwealth's clean energy goals by increasing energy efficiency and reducing the need for conventional fossil fuel-based power generation. In 2009, the Suppliers obligation was 1%, and is set to increase 0.5% each following year until 2014, when the growth rate will be reduced to 0.25% per year.⁶⁴

Renewable Portfolio Standard Solar Carve-Out

The Renewable Portfolio Standard (RPS) Solar Carve-Out is a market-based incentive program to support residential, commercial, public, and non-profit entities in developing 400 MW of solar photovoltaic (PV) across the Commonwealth. The RPS Solar Carve-Out is specifically designed to facilitate the development of solar photovoltaic energy and mandates that a certain percentage of the state's total electricity supply must be provided by solar PV. This percentage is designed to increase each year until 400 Megawatts (MW) of PV is installed, providing approximately 1% of the state's total electricity supply.⁶⁵

The RPS Solar Carve-Out is a part of the larger Massachusetts Renewable Portfolio Standard that was established in regulations issued by the Massachusetts DOER in 2002.⁶⁶

What are Solar Renewable Energy Certificates (SRECs)?

SRECs are essentially the same as RECs in how they are created, how they function, and how they are bought and sold. The difference lies in that SRECs are RECs specifically created from energy generated by solar PV systems, and that they are likely to have a significantly higher market value. This is because DOER has set a ceiling price with an

⁶³ Executive Office of Energy and Environmental Affairs, "RPS and APS Program Summaries RPS Class I and II" Official Website of the Executive Office of Energy and Environmental Affairs, Commonwealth of Massachusetts, N.D. Web. 3 Mar 2011.

http://www.mass.gov/?pageID=eoeeterminal&L=4&L0=Home&L1=Energy%2C+Utilities+%26+Clean+Technologies&L2=Renewable+Energy&L3=Renewable+Energy+Portfolio+Standard+%26+Alternative+Energy+Portfolio+Standard+Programs&sid=Eoeea&b=terminalcontent&f=doer_rps_aps_program_sum&csid=Eoeea

⁶⁴ Ibid.

⁶⁵ Massachusetts Department of Energy Resources, "About RPS Solar Carve-Out Program" Official Website of the Executive Office of Energy and Environmental Affairs, Commonwealth of Massachusetts, n.d. Web. 21 Apr 2010.

http://www.mass.gov/?pageID=eoeeterminal&L=5&L0=Home&L1=Energy%2c+Utilities+%26+Clean+Technologies&L2=Renewable+Energy&L3=Solar&L4=RPS+Solar+Carve-Out&sid=Eoeea&b=terminalcontent&f=doer_renewables_solar_about-the-rps&csid=Eoeea

⁶⁶ Ibid.

ACP rate of \$550/MWh, as well as a price support auction account at \$300/MWh, which serves as a floor price.⁶⁷ DOER's goals and objectives for the RPS Solar Carve-Out include:

- Cultivate solar development through varied generator sizes across multiple sectors (residential, commercial, and utility-scale);
- Develop a sustainable solar market that reduces dependence on state subsidies and has long-term growth potential;
- Create a smooth transition from upfront, rebate-only incentives to production-based, market-priced Solar Renewable Energy Certificates (SRECs); and
- Minimize impact on ratepayers.⁶⁸

To participate in the RPS Solar Carve-Out, solar photovoltaic Generation Units must meet the following eligibility criteria:

- Have a capacity of 6 MW (dc) or less;
- Be located in the Commonwealth of Massachusetts, which includes municipal light district territories;
- Use some of its generation on-site and be interconnected to the utility grid; and
- Have a Commercial Operation Date of January 1, 2008, or later.⁶⁹

Generators can sell their SRECs to meet a regulatory compliance requirement. They can also sell them to voluntary markets or "retire" their credits as a means of voluntarily supporting solar power. All regulated and competitive Retail Electricity Suppliers that serve the Massachusetts load (also known as Load-Serving Entities) need SRECs to meet the RPS Solar Carve Out compliance obligation (Municipal Light Districts are exempted).⁷⁰

Net Metering

The law also makes it possible for people who own wind turbines and solar-generated power to sell their excess electricity into the grid ("net-metering") at favorable rates, for

⁶⁷ Ibid. See also: Executive Office of Energy and Environmental Affairs, "Alternative Compliance Payment Rates" Official Website of the Executive Office of Energy and Environmental Affairs. Commonwealth of Massachusetts, N.D. Web. 3 Mar 2011.

http://www.mass.gov/?pageID=eoeeterminal&L=5&L0=Home&L1=Energy%2C+Utilities+%26+Clean+Technologies&L2=Renewable+Energy&L3=Renewable+Energy+Portfolio+Standard+%26+Alternative+Energy+Portfolio+Standard+Programs&L4=Compliance+Information+for+Retail+Electric+Suppliers&sid=Eoeea&b=terminalcontent&f=doer_rps_aps_alt_comp_pay_rates&csid=Eoeea.

⁶⁸ Ibid.

⁶⁹ Executive Office of Energy and Environmental Affairs, "About RPS Solar Carve-Out Program" Official Website of the Executive Office of Energy and Environmental Affairs. Commonwealth of Massachusetts, N.D. Web. 3 Mar 2011.

http://www.mass.gov/?pageID=eoeeterminal&L=5&L0=Home&L1=Energy%2c+Utilities+%26+Clean+Technologies&L2=Renewable+Energy&L3=Solar&L4=RPS+Solar+Carve-Out&sid=Eoeea&b=terminalcontent&f=doer_renewables_solar_about-the-rps&csid=Eoeea.

⁷⁰ Ibid.

installations of up to 2 megawatts (up from 60 kilowatts currently). The new DPU rules govern the financial relationship between the Commonwealth's electric utility companies and customers who install renewable energy systems through a practice known as "net metering." The order approved by the DPU establishes a "model tariff" enabling electric customers who install wind and solar power to be compensated at retail rates for selling excess electricity they generate back to their electric companies. Prior to the Green Communities Act of 2008, customers who opted to net meter could only be compensated at the lower wholesale rate for their excess power.⁷¹

Through net metering, customers who generate electricity for their own consumption can earn credits from their electric distribution company if they generate more power than they use. Credits may be banked or allocated to other customers, allowing those without facilities to take advantage of net metering benefits as well.⁷²

In June 2009, the DPU adopted net metering regulations reflecting Green Communities Act changes that lifted a previous restriction limiting net metering to on-site generation with a capacity of 60 kilowatts or less. Now, customers who own larger wind turbines or solar power installations – up to 2 megawatts – can offset their electric bills with credits for the extra power they don't use, and at the higher retail price. The regulations also provide for "neighborhood net metering," allowing credits for renewable power generation to be shared among households in a neighborhood.⁷³

On October 15, 2010, Governor Patrick signed into law Chapter 359 of the Acts of 2010. Section 29 of this Act established new net metering caps for governmental and non-governmental Class II and III facilities. Prior to this change, there was a single net metering cap of 1% for all net metering facilities. The new caps are:

- 1) One Percent (1%) of a distribution company's peak load for the aggregate net metering capacity of facilities that are not net metering facilities of a municipality or other governmental entity
- 2) Two Percent (2%) of a distribution company's peak load for the aggregate net metering capacity of facilities that are net metering facilities of a municipality or other governmental entity. The maximum amount of generating capacity eligible for net metering by a municipality or other governmental entity shall be 10 megawatts.⁷⁴

The Department of Public Utilities held a technical conference to assist in the implementation of some of the changes on February 14, 2011.

⁷¹ Executive Office of Energy and Environmental Affairs, "New DPU Regulations Promote Adoption of Renewable Energy." Official Website of the Executive Office of Energy and Environmental Affairs. Commonwealth of Massachusetts, 21 Aug 2009. Web. 27 Apr 2010.
http://www.mass.gov/?pageID=eoeepressrelease&L=1&L0=Home&sid=Eoeea&b=pressrelease&f=090821_pr_netmetering&csid=Eoeea.

⁷² Ibid.

⁷³ Ibid.

⁷⁴ Massachusetts Department of Energy Resources "Green Communities Designation Applications Due This Friday" 11/17/2010 E-mail

Long Term Contracts

The Green Communities Act requires utility companies to enter into 10 to 15 year contracts with renewable energy developers to help developers of clean energy technology obtain financing to build their projects.⁷⁵ The Green Communities Act requires the Department of Public Utilities (Department) to adopt rules and regulations necessary to implement various provisions relating to long-term contracts for renewable energy in order to "facilitate the financing of renewable energy generation within the jurisdictional boundaries of the [C]ommonwealth, including state waters, or in adjacent federal waters." St. 2008, c. 169 § 83 (codified as G.L. c. 169, §83 or "Section 83").⁷⁶

Under the Green Communities Act, electric distribution companies must solicit long-term contracts for renewable power at least twice by July 1, 2014, for a total of 3 percent of each company's distribution sales. Eligible projects are those that qualify for Renewable Energy Credits (RECs) under the Massachusetts Renewable Portfolio Standard (RPS) Class I regulations. Both the RPS and the new requirement for long-term contracting are meant to provide certainty for clean energy developers and help them obtain the financing needed to build successful projects.⁷⁷

On August 27, 2010, the DPU approved an Order Approving a Proposed Timetable and Method for the soliciting and executing long-term contracts for renewable energy.⁷⁸

On November 22, 2010, the Department of Public Utilities gave approval to a 15-year power purchase agreement between National Grid and Cape Wind Associates.⁷⁹

Utility Solar Ownership

Designed to promote the development of renewable energy and stimulate the Commonwealth's clean energy economy, the Green Communities Act gave utility companies the ability to own and operate solar electric installations up to 50 MW. Just as

⁷⁵ Executive Office of Energy and Environmental Affairs, "Department of Energy Resources Coordinates Solicitation for Long-term Renewable Energy Contracts by Electric Utilities" Official Website of the Executive Office of Energy and Environmental Affairs. Commonwealth of Massachusetts, 20 Jan 2010. Web. 15 Apr 2010.

http://www.mass.gov/?pageID=eoeepressrelease&L=1&L0=Home&sid=Eoeea&b=pressrelease&f=100119_pr_renew_energy_contracts&csid=Eoeea.

⁷⁶ Executive Office of Energy and Environmental Affairs, "Long-term Contracts, D.P.U. 08-88, D.P.U. 09-77, D.P.U. 09-138 (Section 83)." Official Website of the Executive Office of Energy and Environmental Affairs. Commonwealth of Massachusetts, 12 Jun 2009. Web. 22 Apr 2010.

<http://www.env.state.ma.us/dpu/docs/gas/08-88/61209dpuord.pdf>.

⁷⁷ Executive Office of Energy and Environmental Affairs, "Department of Energy Resources Coordinates Solicitation for Long-Term Renewable Energy Contracts by Electric Utilities." Official Website of the Executive Office of Energy and Environmental Affairs. Commonwealth of Massachusetts, 20 Jan 2010. Web. 15 Apr 2010.

http://www.mass.gov/?pageID=eoeepressrelease&L=1&L0=Home&sid=Eoeea&b=pressrelease&f=100119_pr_renew_energy_contracts&csid=Eoeea.

⁷⁸ Department of Public Utilities "D.P.U. 10-76, August 27, 2010," The Commonwealth of Massachusetts Web. 3/3/2011.

⁷⁹ Executive Office of Energy and Environmental Affairs, "Department of Public Utilities Approves Contract for Offshore Wind Power." Official Website of the Executive Office of Energy and Environmental Affairs. Commonwealth of Massachusetts, 22 Nov 2010. Web. 3 Mar 2011. [Energy and Environmental Affairs - - Press Release](#).

utilities bill customers for the cost of fossil-fuel generated electricity, the cost of utility-owned solar power will be recouped through ratepayer revenues.

In August 2009, the Department of Public Utilities (DPU) approved the first utility company proposal to own and operate solar energy installations, as authorized by the Green Communities Act of 2008, giving a green light to Western Massachusetts Electric Company's (WMECO) plans to construct and deploy approximately 6 megawatts (MW) of solar photovoltaic power throughout its service territory. WMECO's solar installations are expected to be fully operational by the end of 2012, at which time they will contribute to the local supply of renewable power, helping the Commonwealth meet its Renewable Portfolio Standard (RPS).⁸⁰

In October 2009, the DPU approved National Grid's plans to construct and deploy approximately 5 megawatts (MW) of solar photovoltaic power at five company-owned sites, marking the department's second approval of utility company ownership and operation of solar energy installations under the Green Communities Act of 2008. The location of National Grid's approved solar projects are in Dorchester, Everett, Haverhill, Revere, and on the Sutton/Northbridge border.⁸¹

Green Jobs Act and an Act Relative to Clean Energy

The Green Jobs Act (Chapter 307 of the Acts of 2008) will provide support for the growth of a clean energy technology industry, helping Massachusetts to meet goals for reducing greenhouse gas emissions. [Initially] backed by \$68 million in funding over five years (\$43 million from the FY07 surplus [later reduced by \$10 million] and \$5 million per year from the Massachusetts Renewable Energy Trust), this legislation gave initial authorization for \$5 million in Renewable Energy Trust funding (described below) for seed grants to companies, universities, and nonprofits; workforce development grants to state higher ed, vocational schools, and nonprofits; and low-income job training (Pathways Out of Poverty); plus \$100,000 for a study of the clean energy sector.⁸²

The Green Jobs Act created the Massachusetts Clean Energy Center⁸³ to accelerate job growth and economic development in the state's clean energy industry.⁸⁴ The

⁸⁰ Executive Office of Energy and Environmental Affairs, "Department of Public Utilities Approves First Utility Solar Ownership Proposal under Green Communities Act." Official Website of the Executive Office of Energy and Environmental Affairs. Commonwealth of Massachusetts, 18 Aug 2009. Web. 20 Apr 2010. http://www.mass.gov/?pageID=eoeepressrelease&L=1&L0=Home&sid=Eoeea&b=pressrelease&f=090818_pr_wmeco&csid=Eoeea.

⁸¹ Executive Office of Energy and Environmental Affairs, "Department of Public Utilities Approves Second Utility Solar Power Plan under Green Communities Act." Official Website of the Executive Office of Energy and Environmental Affairs. Commonwealth of Massachusetts, 26 Oct 2009. Web. 20 Apr 2010. http://www.mass.gov/?pageID=eoeepressrelease&L=1&L0=Home&sid=Eoeea&b=pressrelease&f=091026_pr_national_grid&csid=Eoeea.

⁸² Office of the Governor, "Governor Patrick Signs Bills to Reduce Emissions and Boost Green Jobs." Official Website of the Governor of Massachusetts. Commonwealth of Massachusetts 13 Aug 2008. Web. 15 Apr 2010. http://www.mass.gov/?pageID=gov3pressrelease&L=1&L0=Home&sid=Agov3&b=pressrelease&f=080813_green_jobs&csid=Agov3.

⁸³ Executive Office of Energy and Environmental Affairs, "Governor Patrick Signs Law Consolidating State Support For Clean." Official Website of the Executive Office of Energy and Environmental Affairs. Commonwealth of Massachusetts, 25 Nov. 2009. Web. 22 Apr 2010.

Massachusetts Clean Energy Center's mission is to accelerate job growth and economic development in the state's clean energy industry. This new quasi-public agency serves as a clearinghouse and support center for the clean energy sector, making direct investments in new and existing companies, providing assistance to enable companies to access capital and other vital resources for growth, and promoting training programs to build a strong clean energy workforce that capitalizes on the job opportunities created by a vital new industry.⁸⁵

In November 2009, Governor Deval Patrick signed legislation, An Act Relative to Clean Energy, that transferred the state's Renewable Energy Trust to the Massachusetts Clean Energy Center (MassCEC), streamlining support for the Commonwealth's green economy by making a single agency responsible for fostering the development and installation of clean energy technologies.

Pathways out of Poverty

Authorized by the Green Jobs Act, the Executive Office of Energy and Environmental Affairs' (EEA) Pathways out of Poverty grants are designed to jumpstart training in clean energy careers for low- and moderate-income residents. As directed by the Green Jobs Act, grants are financed with funds appropriated by the Legislature for the Massachusetts Alternative and Clean Energy Investment Trust Fund.⁸⁶

On February 3, 2011, the MassCEC announced a second round of grants available through the Pathways Out of Poverty Program, which funds green job training programs offered by clean energy companies, community-based nonprofit groups, educational institutions, and labor organizations throughout the Commonwealth. Eligible projects must include on-the-job training (OJT) models that serve the target population and provide targeted services and activities that address employer workforce needs and optimize opportunities for participant learning, career development and economic advancement within the clean energy industry. Projects must assure that individuals will improve their economic circumstances as a result of participation in the program. MassCEC will award a total of \$734,000 in grants to projects through competitive selection. The deadline for submitting proposals is April 15, 2011.⁸⁷

http://www.mass.gov/?pageID=eoeepressrelease&L=1&L0=Home&sid=Eoeea&b=pressrelease&f=091125_pr_cec_mret&csid=Eoeea.

⁸⁴ Massachusetts Department of Environmental Protection, "Climate Protection & Green Economy Advisory Committee Briefing Book." Official Website of the Massachusetts Department of Environmental Protection (MassDEP). Commonwealth of Massachusetts, 11 May 2009. Web. 16 Apr 2010. www.mass.gov/dep/public/committee/cpgebfbk.doc.

⁸⁵ Massachusetts Clean Energy Center, "About Us." Massachusetts Clean Energy Center. Massachusetts Clean Energy Center, n.d. Web. 15 Apr 2010.

<http://www.masscec.com/index.cfm/page/Our-Mandate/pid/10234>.

⁸⁶ Executive Office of Energy and Environmental Affairs, "Patrick Administration Announces "Pathways out of Poverty" Green Collar Job Training Grants." Official Website of the Office of Energy and Environmental Affairs. Commonwealth of Massachusetts, 28 May 2009. Web. 15 Apr 2010.

http://www.mass.gov/?pageID=eoeepressrelease&L=1&L0=Home&sid=Eoeea&b=pressrelease&f=090528_pr_pathways&csid=Eoeea.

⁸⁷ Massachusetts Clean Energy Center, "MassCEC Announces "Pathways Out of Poverty" Green Collar Job Training Funds", Massachusetts Clean Energy Center, 3 February 2011 Web. 25 Feb 2011.

MassCEC's Workforce Capacity Building is a \$1 million initiative targeted towards increasing the ability of Massachusetts vocational-technical high schools, colleges and universities, and community-based non-profit groups to meet the workforce needs of the Commonwealth's clean energy sector.

MassCEC is working in collaboration with state's quasi-workforce development agency-Commonwealth Corporation to award six projects that will build capacity at several vocational schools, community colleges, a non-profit and two universities. The programs include curriculum and course development, professional development, an internship and apprenticeship program, and hands-on instructional training.⁸⁸

The Commonwealth has invested \$1.875 million to create an energy efficiency and buildings skills initiative funded through a portion of auction revenues from the Regional Greenhouse Gas Initiative (RGGI) that was earmarked for energy efficiency activities. MassGreen is creating a single repository for all Massachusetts training activities, materials and comprehensive delivery of residential energy efficiency services. The initiative focuses on the ongoing development of a competent and sustainable infrastructure of program participants (i.e., installers, builders, contractors, building design professionals, etc.) trained in the fundamentals of energy efficiency and building science.

In July 2009, Springfield Technical Community College was selected to serve as the statewide hub of programs to develop, train and maintain a cutting edge "green" workforce that will speed the growth of the Commonwealth's energy efficiency sector while expanding job opportunities for citizens. MassCEC contracted \$1 million in American Reinvestment and Recovery Act funds between STCC and the state's Department of Housing and Community Development for use in mock-up training sites, training, and equipment

In January 2010, MassCEC announced the first round of energy efficiency training courses at six Regional Training Centers at local community colleges:

- Roxbury Community College
- Berkshire Community College
- Bristol Community College
- North Shore Community College
- Greenfield Community College
- Quinsigamond Community College⁸⁹

<http://www.masscec.com/index.cfm/page/MassCEC-Announces-%22Pathways-Out-of-Poverty%22-Green-Collar-Job-Training-Funds/cdid/11828/pid/11189>.

⁸⁸ Massachusetts Clean Energy Center, "Workforce Capacity Building", Massachusetts Clean Energy Center, n.d. Web. 25. 2011. <http://www.masscec.com/index.cfm/page/workforce-capacity-building/cdid/11279>.

⁸⁹ Massachusetts Clean Energy Center, "MassGREEN (Energy Efficiency Skills) Initiative", Massachusetts Clean Energy Center, n.d. Web. 25 Feb 2011. <http://www.masscec.com/index.cfm/page/massgreen/cdid/11275/pid/11185>.

Global Warming Solutions Act

In August 2008, Governor Deval Patrick signed into law [Chapter 298 of the Acts of 2008](#) the Global Warming Solutions Act (GWSA), making Massachusetts one of the first states in the nation to move forward with a comprehensive regulatory program to address climate change.

The GWSA required the Massachusetts Executive Office of Energy and Environmental Affairs, in consultation with other state agencies and the public, to set economy-wide greenhouse gas (GHG) emission reduction goals for Massachusetts that will achieve a reduction of between 10 percent and 25 percent below statewide 1990 GHG emission levels by 2020 and a reduction of 80 percent below statewide 1990 GHG emission levels by 2050.⁹⁰

To ensure that these goals will be met, the GWSA required the Commonwealth to:

- Establish regulations requiring reporting of greenhouse gas emissions by the Commonwealth's largest sources by January 1, 2009.⁹¹
- Establish a baseline assessment of statewide GHG emissions in 1990, which will be used to measure progress toward meeting the emission reduction goals of the Act. The Legislature chose 1990 as the base year for these measurements because it is the base year used by many local, state and international climate agreements (including the Kyoto Protocol).
- Develop a projection of the likely statewide GHG emissions for 2020 under a "business as usual" scenario that assumes that no targeted efforts to reduce emissions are implemented. This projection estimates the levels of greenhouse gas emissions that will come from Massachusetts sources if no government action is implemented to require reductions, and will be used to analyze the extent of emission reductions that will be required to achieve the 2020 target established in the Act.
- Establish target emission reductions that must be achieved by 2020, and a plan for achieving them. The GWSA requires that these must be established by January 1, 2011.
- Through an advisory committee, analyze strategies and make recommendations for adapting to climate change. As required by the GWSA the committee submitted its [report](#) to the Legislature by December 31, 2009.⁹²

In July 2009, the state announced the baseline against which future greenhouse gas emission reductions will be measured, as well as a projection of greenhouse gas emissions in 2020 under a business as usual scenario, as required by the Global Warming Solutions Act. In addition, the Massachusetts Department of Environmental Protection

⁹⁰ Massachusetts Department of Environmental Protection, "Overview of the Global Warming Solutions Act (GWSA)." The Massachusetts Department of Environmental Protection (MassDEP). Commonwealth of Massachusetts, n.d. Web. 23 Apr 2010. <http://www.mass.gov/dep/air/climate/gwsa.htm>.

⁹¹ Ibid.

⁹² Ibid.

(MassDEP), which has the principal regulatory role for reducing greenhouse gases under the Act, announced final regulations requiring approximately 300 Massachusetts facilities to report their emissions annually.⁹³ On December 29, 2010 the Executive Office of Energy and Environmental Affairs (EEA) set the statewide greenhouse gas (GHG) emissions limit for 2020 required by the Global Warming Solutions Act of 2008 at 25 percent below 1990 levels, the maximum authorized by the Act, saying that measures already in place will get Massachusetts much of the way toward that goal.

EEA noted that "established state policies to promote energy conservation and cleaner energy sources are expected to produce GHG reductions of 18 percent below 1990 levels by 2020," and that the remaining question in making the determination was "where in the remaining statutory range of 18 to 25 percent reduction it is practical and appropriate to set the 2020 limit. Central to that question is what additional actions of policy, regulation, and legislation could be pursued that would achieve additional emissions reduction by 2020 and beyond."

The 136-page Clean Energy and Climate Plan for 2020 contains a "portfolio" of established and new measures that reduce energy waste, save money, and stimulate the adoption of clean energy technologies, thereby creating jobs at the same time that they reduce GHG emissions.

Existing policies include the Green Communities Act requirement of capturing all cost-effective energy efficiency, which has given Massachusetts the most far-reaching energy efficiency program in the country, projected to yield \$6 billion in customer savings from \$2 billion of investment over three years. Continuation of these energy efficiency efforts, plus additional building-related measures such as deep-energy improvements in buildings; advanced, flexible building energy codes; and a new energy rating and labeling system that will be the equivalent of miles-per-gallon auto fuel efficiency ratings for buildings, beginning as a pilot program in western Massachusetts will reduce GHG emissions statewide nearly 10 percent by 2020, according to the EEA.

The EEA noted that "in electricity supply, established programs like the Regional Greenhouse Gas Initiative and the Renewable Portfolio Standard will be supplemented by efforts to obtain additional clean energy imports such as Canadian hydropower and a proposed Clean Energy Performance Standard, which would require electricity suppliers to favor lower- and no-emissions sources in the mix of electricity delivered to their customers, will reduce emissions 7.7 percent by 2020. In transportation, MassDOT's recently announced GreenDOT sustainability program and other efforts to limit growth in driving, federal fuel efficiency standards, lower-carbon fuels, and potential incentives for clean cars to be studied and piloted are expected to produce 7.6 percent GHG reductions. And in non-energy related sources of emissions, new and expanded programs will

⁹³ Massachusetts Department of Environmental Protection, "Patrick Administration Establishes Key Benchmarks for Greening the Massachusetts Economy." Official Website of the Massachusetts Department of Environmental Protection (MassDEP). Commonwealth of Massachusetts, 6 Jul 2009. Web. 7 May 2010. <http://www.mass.gov/dep/public/press/070609ghgr.htm>.

address leaking refrigerants that are more powerful greenhouse gases than carbon dioxide, for additional reductions of 2 percent.⁹⁴

The EOEEA established two advisory committees to provide input on the implementation of the GWSA. The Climate Protection and Green Economy Advisory Committee (created under the GWSA), which is charged with advising the Executive Office of Energy and Environmental Affairs on measures to reduce greenhouse gas emissions in accordance with the GWSA, and The Climate Change Adaptation Advisory Committee (also created under the GWSA), which is charged with studying and making recommendations regarding strategies for adapting to climate change.⁹⁵

In tandem with the measures proposed under the GWSA, under the **Massachusetts Environmental Policy Act** (MEPA) GHG policy, major private developers are now required to analyze strategies for mitigating GHG increases due to their developments.⁹⁶

Oceans Act

On May 28, 2008, Governor Deval Patrick signed the Oceans Act of 2008, (Chapter 114 of the Acts of 2008)⁹⁷ legislation that required Massachusetts to develop a first-in-the-nation comprehensive plan to manage development in its state waters, balancing natural resource preservation with traditional and new uses, including renewable energy.

The bill amended section 15 of the Ocean Sanctuaries Act to allow for the siting of "appropriate scale" offshore renewable energy facilities in state waters except for the Cape Cod Ocean Sanctuary (offshore from the Cape Cod National Seashore on the Outer Cape) provided that the facility is consistent with the ocean plan.⁹⁸

The ocean management plan - finalized [on December 31, 2009], six months after release of the draft plan, in accordance with the Oceans Act of 2008 - provides new protections for critical environmental resources in nearly two-thirds of the Commonwealth's coastal waters and sets standards for the development of community-scale and commercial-scale offshore wind energy as well as other infrastructure. [I]n two areas comprising just 2

⁹⁴ Massachusetts Department of Environmental Protection, "Patrick-Murray Administration Announces Clean Energy and Climate Plan to Reduce Greenhouse Gas Emissions 25 percent by 2020" Official Website of the Massachusetts Department of Environmental Protection (MassDEP). Commonwealth of Massachusetts, n.d. Web. 25 Feb 2011.
http://www.mass.gov/?pageID=eoeepressrelease&L=1&L0=Home&sid=Eoeea&b=pressrelease&f=101229_pr_climate_plan&csid=Eoeea.

⁹⁵ Massachusetts Department of Environmental Protection, "Greenhouse Gases & Climate Change." Official Website of the Massachusetts Department of Environmental Protection (MassDEP). Commonwealth of Massachusetts, n.d. Web. 26 Apr 2010.
<http://www.mass.gov/dep/air/climate/gwsa.htm>.

⁹⁶ Massachusetts Department of Environmental Protection, "Climate Protection & Green Economy Advisory Committee Briefing Book." Official Website of the Massachusetts Department of Environmental Protection (MassDEP). Commonwealth of Massachusetts, 11 May 2009. Web. 16 Apr 2010.
www.mass.gov/dep/public/committee/cpgebfbk.doc.

⁹⁷ Office of the Governor, "Governor Patrick Signs Law Creating First-in-the-Nation Oceans Management Plan Balancing Preservation, Uses." Official Website of the Governor of Massachusetts. Commonwealth of Massachusetts, 05 Dec 2009. Web. 23 Apr 2010.
http://www.mass.gov/?pageID=gov3pressrelease&L=1&L0=Home&sid=Agov3&b=pressrelease&f=080528_oceans&csid=Agov3.

⁹⁸ Ibid.

percent of the planning area, the plan identifies zones suitable for commercial-scale wind energy development. Adjacent to these areas, [the Executive Office of Energy and Environmental Affairs] has identified potentially suitable locations in federal waters for commercial-scale wind energy development. At the Commonwealth's request, the US Minerals Management Service has convened a federal-state task force to assist in the planning and regulatory review associated with leasing areas of federal waters for large-scale wind energy development.⁹⁹

With regard to the two designated wind energy areas - off the Elizabeth Islands and south of Nomans Land, off Martha's Vineyard - the final Ocean Management Plan also grants those regional planning authorities with statutorily derived regulatory authority the ability to define the appropriate scale of renewable energy projects in state waters of their member communities. Under the Oceans Act and the ocean management plan, the concept of "appropriate scale" includes such factors as protecting interests associated with fishing, fowling and navigation; ensuring public safety; and minimizing incompatibility with existing uses and visual impacts.¹⁰⁰

For community-scale renewable energy projects, based in part on the comments of the regional planning authorities, the plan allocates a set number of turbines to each of the state's seven regional planning authorities on a sliding scale based on the region's length of shoreline and area of coastal waters and also requires that the host community endorse the project and that economic benefits from the project - in terms of energy, royalties, and/or other municipal improvements - are directed back to the host community.¹⁰¹

To ensure successful execution and the continued, informed evolution of ocean management in the Commonwealth, the plan establishes policies and procedures for updates and amendments, application of mitigation and compensation fees, disbursements from an Ocean Resources and Waterways Trust funded by those fees, and mechanisms for continued stakeholder input, expert advice, and partnerships.¹⁰²

Other Commonwealth Energy Programs

Commonwealth Wind Incentive Program

The goal of the Commonwealth Wind Incentive Program is to assist responsibly sited wind energy projects of all scales in achieving successful and timely installations, while also supporting Governor Patrick's goal of having 2,000 megawatts (MW) of wind power capacity installed in the Commonwealth by 2020. The Commonwealth Wind Incentive Program (CommWind) provides rebate, grant, and loan funding for the installation of wind projects in Massachusetts. Funding is available for residential, commercial, industrial, and public facilities that are customers of investor-owned electric distribution

⁹⁹ Executive Office of Energy and Environmental Affairs, "Patrick Administration Releases Final Blueprint for Managing." Official Website of the Massachusetts Department of Energy and Environmental Affairs. Commonwealth of Massachusetts, 4 Jan 2010. Web. 26 Apr 2010.

http://www.mass.gov/?pageID=eoeepressrelease&L=1&L0=Home&sid=Eoeea&b=pressrelease&f=100104_pr_ocean_plan&csid=Eoeea.

¹⁰⁰ Ibid.

¹⁰¹ Ibid.

¹⁰² Ibid.

utilities or Municipal Light Plant Departments that pay into the Renewable Energy Trust (MRET).¹⁰³

There are three initiatives within this program: Micro Wind, Community-Scale Wind, and Commercial Wind. The Micro Wind initiative exists as a rebate program and has been incorporated into the CommWind framework. **Micro Wind** provides rebates for the installation of wind projects that are up to 99 kilowatts. Typically, these funds are for residential, small commercial, or agricultural sites.

The **Community-Scale Wind** initiative replaced the Community Wind Collaborative (CWC) and the wind portion of the Large Onsite Renewables Initiative (LORI). The Commercial Wind initiative will support multi-turbine projects that are typically undertaken by private developers and primarily serve wholesale power markets.

Community-Scale Wind awards grants for qualifying wind projects with a nameplate capacity greater than or equal to 100 kW. These funds are typically used for large-scale, behind-the-meter projects, for example, schools, farms, or manufacturing facilities. The Trust offers support for three stages of the Community Scale development process: services for high level site assessment, available for public projects only; feasibility study grant support for in-depth technical and economic feasibility analyses; and grants for design and construction support.¹⁰⁴

The Commercial Wind initiative provides funding for development of commercial electric generating facilities that employ wind energy technologies. Commercial Wind seeks to reduce the early stage risk associated with commercial wind development projects. It provides funding for feasibility studies or development activities only. Site assessment and construction aspects of a project are not funded under the initiative.

Energy Efficiency and Conservation Block Grants

As part of the American Reinvestment and Recovery Act, the U.S. Department of Energy (DOE) allocated \$27 million in direct, population-based grants to 42 Massachusetts cities with greater than 35,000 residents. These grants will help install eligible clean technology and energy efficiency projects at municipal buildings and schools.

The DOE also allocated funds to state energy offices to provide programs for municipalities, including a sub-grant program for municipalities with fewer than 35,000 residents. The Mass. Department of Energy Resources (DOER) received \$14,752,100. The Green Communities Division has allocated this funding to facilitate investments in clean energy among Massachusetts' cities and towns through the following services:

- Awarded \$12.2 million in sub-grants (up to \$150,000 each) to 97 municipalities to execute solar thermal and photovoltaic installations, energy savings performance contracts, and thermal-efficiency projects;

¹⁰³ Renewable Energy Trust, "Commonwealth Wind Incentive Program." Massachusetts Technology Collaborative. n.d. Web. 26 Apr 2010. http://www.masstech.org/IS/commonwealth_wind/index.html.

¹⁰⁴ Ibid.

- Selected three vendors to provide technical assistance consulting services (totaling \$825,000) to 34 municipalities for solar photovoltaic and performance contracting projects
- Contracted Peregrine Energy Group to develop MassEnergyInsight -- a web-based data system for municipalities to manage energy use and costs of buildings and fuels; more than 100 municipalities have enrolled in and received training for this free tool;
- Awarded \$175,000 in funds to the Center for Ecological Training to develop building energy code training curriculum and offer free instruction on implementing the new energy code to all municipal building officials.¹⁰⁵

Other Existing Energy Programs

The Leading by Example Program (LBE) was established in April 2007 by Governor Deval Patrick's Executive Order No. 484, "Leading by Example - Clean Energy and Efficient Buildings". The program is overseen by the Executive Office of Energy and Environmental Affairs (EEA) and the Executive Office for Administration and Finance (A&F). Within these two offices, various divisions and departments manage specific aspects of the program, including the Department of Energy Resources, Department of Environmental Protection, Division of Capital Asset Management, and the Operational Services Division.

The LBE Program encompasses all of Massachusetts' executive agencies and public institutions of higher education. These agencies and institutions own 70 million square feet of buildings and 8,000 vehicles, employ over 65,000 people, and include 29 college campuses. Through various initiatives, LBE works to reduce the overall environmental impacts of state government operations, particularly climate and energy impacts. Executive Order 484 establishes higher energy efficiency standards in the operation of state buildings, setting short- and long-term targets and goals to advance clean energy and efficiency, and reduce greenhouse gas emissions that contribute to global warming. In addition, the LBE Program promotes sustainability activities within state government including waste reduction, water conservation, green buildings, alternative fuels, efficient transportation, and recycling.¹⁰⁶

¹⁰⁵ Executive Office of Energy and Environmental Affairs, "Energy Efficiency and Conservation Block Grant Program (EECBG)," Official Website of the Executive Office of Energy and Environmental Affairs, Commonwealth of Massachusetts, n.d.. Web. 25 Feb 2011.
http://www.mass.gov/?pageID=eoeeterminal&L=3&L0=Home&L1=Energy%2C+Utilities+%26+Clean+Technologies&L2=Green+Communities&sid=Eoeea&b=terminalcontent&f=doer_green_communities_eecbg-prg&csid=Eoeea.

¹⁰⁶Executive Office of Energy and Environmental Affairs, "Leading by Example". Official Website of the Executive Office of Energy and Environmental Affairs, Commonwealth of Massachusetts, n.d. Web. 25 Feb 2011.
http://www.mass.gov/?pageID=eoeeamodulechunk&L=1&L0=Home&sid=Eoeea&b=terminalcontent&f=eea_lbe_lbe_program&csid=Eoeea.

NSTAR Energy Efficiency Programs

About NSTAR

NSTAR is the largest Massachusetts-based, investor-owned electric and gas utility that delivers electricity and natural gas to 1.4 million customers in Eastern Massachusetts. NSTAR transmits and delivers electricity and gas to 1.1 million electric customers in 81 communities and nearly 300,000 gas customers in 51 communities. NSTAR employs more than 3,200 employees in its regulated business.

Energy efficiency is expected to be a key part of Massachusetts's strategy to address climate change. Energy efficiency is also more critical than ever in these trying economic times. When businesses, schools, hospitals and municipalities in the 495/ MetroWest region save energy, it is good for their bottom line, and good for the environment. NSTAR is one source for energy solutions. Through their energy-efficiency programs, NSTAR can help customers install new lighting, and heating and cooling systems to reduce energy use. Energy services offered by NSTAR include the following:

- **Comprehensive Design** - NSTAR can assist with technical support to achieve optimum energy efficiency for a new facility being constructed. By involving NSTAR early in the design process, energy efficiency measures can be incorporated into the facility, ensuring energy savings long after your facility is built.
- **ENERGY STAR Benchmarking Tool** - This tool allows NSTAR to work with you to identify improvements for your facility to optimize its energy use.
- **Commissioning** - Provides independent, third-party verification to show that your new, energy-efficient equipment rebated by NSTAR is meeting its energy savings goals.
- **Training** - NSTAR provides a wide variety of training sessions covering topics such as compressed air, lighting, motors and variable speed drives.
- **Engineering Services** - NSTAR technical experts can evaluate energy-efficiency opportunities and calculate potential incentives available.
- **Energy Awareness** - NSTAR can host an informative Energy Fair at your business where your employees can learn about the benefits of NSTAR commercial/industrial and residential energy services.
- **Energy Link** - A web-based energy usage monitoring tool which allows you to receive energy data daily or real-time in a user friendly format. By monitoring gas and electricity energy sources, you'll have the capability to more accurately budget and forecast energy costs and reduce energy usage.

Commercial Energy Efficiency Programs

For over 20 years, NSTAR has offered both commercial and residential energy efficiency programs to its customers. At NSTAR, the goal is to provide customers with the most

advanced information and advice on energy efficiency possible. These programs benefit NSTAR, its customers and design partners through:

- **Increased Efficiency** - Customers who use energy more efficiently become more profitable, competitive and are more likely to maintain business in NSTAR service territory.
- **Increased Property Value** -By installing energy efficient equipment, customers have better, longer lasting equipment. Conversely, by investing in customer's facilities, NSTAR is able to reduce electrical infrastructure expenditures thereby benefiting all customers.
- **Fewer emissions** - With each kWh saved, less CO₂, NO_x, and SO₂ are generated. Using energy wisely improves the living and work conditions for all.
- **Business Distinction** - Incorporating the latest, most advanced energy efficiency measures into building design can help set a firm apart from the competition and provide added value. NSTAR helps seamlessly incorporate energy efficiency measures into design while staying on time and on budget.

In the past five years alone, NSTAR's energy efficiency programs have helped customers save 6.5 million therms of natural gas and approximately 1,000,000 megawatt-hours of electricity. This is the equivalent of reducing carbon dioxide emissions by half a million tons. Such programs are available to both electric and gas customers, and are designed to not only reduce energy bills, but also to help the environment. Beginning in 2010, NSTAR, as well as other investor-owned utilities across the state, offer energy efficiency programs under the Mass Save name. This will provide any customer, C&I or residential, gas or electric, consistent incentives and information regardless of the service territory in which they are located. The two main programs for electric and gas customers on the commercial side are the Retrofit and **New Construction** programs.

All four programs offer NSTAR's commercial and industrial customers the opportunity to receive financial incentives, technical assistance and to commission services for their projects. The programs encourage customers, developers, design professionals and equipment vendors to select high-efficiency equipment and incorporate energy-efficient designs for buildings, electrical and mechanical systems, and gas technology equipment.

Retrofit

The Retrofit program assists in the implementation of efficiency improvements through retrofit opportunities for existing equipment and systems. This program features two tracks - Prescriptive and Custom - to enable

Through NSTAR's Customer Retrofit Program, Marlborough Hospital's energy conservation measures resulted in an incentive of \$19,572. Using latest technology gas equipment, two AutoFlame boiler controls were installed, saving 19,572 therms annually. As a result of the gas energy-saving measures completed, Marlborough Hospital expects to payback the cost of the project in 3½ years with anticipated yearly savings of \$23,537.



commercial customers to reduce energy consumption by incorporating energy efficient lighting fixtures, controls, high efficiency mechanical equipment and other strategies within their current facilities. Financial incentives cover up to 50% of total project cost for upgrading existing facilities, including up to 50% cost sharing for technical assistance such as engineering and commissioning services. Eligible energy efficiency measures include:

- High efficiency fluorescent lighting fixtures
- Other lighting and controls improvements
- Motors and variable speed drives
- High efficiency HVAC equipment
- Energy Management systems
- Building envelope measures
- Refrigeration improvements
- Boiler & Burner Controls
- Heat Recovery
- Other site specific measures



Looking for ways to keep energy costs in check, Staples implemented the WIL-KIL system, which uses motion detectors and infrared to determine when boxes and people are near the conveyor belt. The technology also shuts the fans and lights off, thus reducing energy usage. By taking advantage of the NSTAR incentives, the payback for the project was less than a year. Plus, operating costs are reduced because of these energy technologies in place. Staples has received the Green Power Leadership Award for the past two years by implementing energy savings projects with NSTAR and the Energy Star Team.

New Construction

Unlike retrofit projects which can be implemented at any point in time, the New Construction program is used for all projects such as new construction or major renovation that must be completed by a certain date or on a specific timeline. These situations include new construction, major renovation, failed equipment, and stocked equipment. When NSTAR is made part of the design team from the start, customers can seamlessly incorporate energy conservation measures into the design and avoid re-design or costly change orders.

The New Construction program provides four distinct tracks for commercial and industrial facilities. These tracks are named as follows:

- Prescriptive
- Advanced Buildings

- Custom
- Comprehensive Design

Prescriptive

The prescriptive approach is the simplest, most widely used, and has the lowest incentives. Prescriptive projects tend to focus strictly on individual pieces of equipment such as:

- High-efficiency fluorescent lighting fixtures
- Occupancy sensors and photo cells
- Daylight dimming systems
- Performance-based lighting
- Premium efficiency motors
- Variable speed drives
- Air- and water-cooled chillers and packaged HVAC equipment
- Compressed air systems
- Refrigeration systems
- High Efficiency Boilers & Water Heaters
- Improved thermal control and natural ventilation

The application process for prescriptive measures is streamlined and simple.

Application forms are available on the NSTAR website and the Mass Save website also, in Adobe Acrobat format which allow applicants to readily enter information and calculate the total incentive available.



The Westborough Office Park is one example of how NSTAR's Gas New Construction Program can benefit natural gas customers. In an effort to reduce gas usage and heating costs at two office buildings, Westborough Office Park proposed to utilize high efficiency condensing boiler technology. An analysis of the energy consumption using the proposed high efficiency equipment determined that estimated gas savings of 2,332 therms per year could be achieved. Westborough Office Park ultimately proceeded with this project through NSTAR's Custom Rebate Program, and in doing so received a NSTAR incentive totaling \$21,878.

Advanced Buildings

Advanced Buildings, as developed by the New Building Institute, provides a simple package of prescriptive measures for the most commonly developed commercial and institutional buildings. This package of measures has been developed to work in synergy with each other, as would an integrated design approach. This not only requires significantly less effort, but also allows the team to employ those technologies deemed most effective without the burden of energy analysis or an additional consultant.

Additionally, there are incentives and points available through NSTAR and the USGBC LEED programs, respectively, for qualifying Advanced Buildings projects.

Advanced Buildings, also referred to as AB Core Performance, while useful for all buildings, is most effective for office, retail and educational uses. Buildings with beds, such as residential, hospitality, or dormitory uses, those with complex system requirements, or facilities exceeding 100,000 square feet, are best supported with a Custom approach.

The prescribed measures are intended to exceed the present Massachusetts State Energy Code by approximately 20 to 30 percent. Additional measures described by the Advanced Buildings application, referred to as Enhanced Performance Strategies, will allow the customer to further exceed Massachusetts State Energy Code.

USGBC requires that all projects attain a minimum of two Energy and Atmosphere points to qualify for LEED certification. Advanced Buildings is one of two strategies recognized by USGBC to attaining Energy and Atmosphere points without the use of Energy Modeling. Additional training on this program is available through NSTAR both online and in person throughout the year.

The next level focuses on *systems* of equipment, which brings along the potential for increased incentives. Some examples include Comprehensive Chiller which focuses on end of life HVAC replacement and Performance Lighting which focuses on efficient lighting systems based on lighting power density. The most comprehensive approaches at the top of the pyramid focus on evaluating a building as a whole, or comprehensively, in which all the systems in the building and their interactive effects are taken into consideration. These earn the most enhanced incentives of all, and achieve the greatest energy savings.

Custom

When a customer wants to submit an **application** for a system or technology that is not already listed in the prescriptive approach, the custom application can be used. This is not to suggest that the technology under consideration is more or less effective but rather simply the energy savings have not yet been identified. For this reason, the onus is on the designer to credibly demonstrate the energy savings to the satisfaction of the NSTAR engineer. Frequently, NSTAR can help by providing an engineering services vendor to produce these calculations and can pay a portion of this service. Incentives under the Custom approach cover up to 75% of the incremental cost of qualifying EE equipment for the New Construction program and up to 50% of the total project cost under the Retrofit program.

Comprehensive Design

Today, more than ever, clients seek the most up-to-date energy efficiency measures for their buildings. NSTAR can help meet those demands cost-effectively and within the project schedule.

The Comprehensive Design Approach, as the name implies, is intended to be used with the largest, most complex projects. This is a custom program seeking the highest level of performance, using multiple interactive measures, energy efficient technology or



Genzyme Science Center Energy Solutions

Founded in Boston in 1981, Genzyme is one of the world's foremost biotechnology companies. Their new Science Center in Framingham, MA is a 6-story 175,000 sq. ft. research laboratory facility. In addition to the main building, there is also a central utility plant that produces steam and emergency power, and chilled water for several other Genzyme buildings.

To find practical energy efficiency solutions, Genzyme took advantage of NSTAR's Comprehensive Design Approach. Comprehensive Design offers incentives that cover up to 90% of the incremental cost of installing the energy efficiency measures. It works by looking at a building as an integrated system and identifies cost effective design alternatives to reduce energy use. "NSTAR was involved early on in a brainstorming session to talk about what was possible under their programs and to discuss the types of technologies we were thinking about", says Lisa Hartman, Genzyme's Principle Environmental Engineer.

As part of the program, NSTAR co-funded energy modeling, which uses computer-based tools to simulate and assess the energy use of a building, as well as quantify the savings attributable to the proposed design. Genzyme implemented a wide range of energy efficiency measures, including installing high efficiency boilers and chillers, and variable frequency drives on the hot water pump in the central building. They also installed high performance lighting, including occupancy sensors and daylight sensors for a sophisticated daylight harvesting control system.

equipment. These projects receive the greatest support from the program with enhanced incentives. It is essential to contact NSTAR and its consultants early in the design process to assist the team with the initial design through construction to ensure the building performs as anticipated. Incentives are available for construction, and ultimately, commissioning.

As general guidance, the Comprehensive Design Approach is designed for new construction projects that are not addressed by Advanced Buildings. Comprehensive projects must be wide in scope, including all possible electrical energy conservation measures and must have positive interactivity among measures. This program is best suited for building projects in excess of 100,000 square feet which require cooling capacity greater than two hundred tons and have substantial opportunities for HVAC and lighting improvements.

Under the Comprehensive Design approach, customer incentives cover up to 90 percent of incremental costs of installing the energy efficiency measures.

The Comprehensive Design Process

The process outlined here is for the Comprehensive Design Approach. As shown below, this process respects the conventional design process and seeks to add value at each step. Ideally, at the inception of a project, NSTAR is engaged to identify the program most suitable for the particular project, establish expectations for the project so as to assure the incentives are ultimately awarded, and familiarize the design team with the process itself and the technical assistance available to them. To ensure commitment and clarity of expectations, a memorandum of understanding (M.O.U.) must be signed by the participating parties (in other words the building owner, designers and engineers, and the installation contractors), for any Advanced Buildings, Comprehensive Design, or Comprehensive Chiller projects. Over the evolution of the design process, NSTAR staff will be available to provide suggestions as supported by the experience of the organization, assist the team with any technical questions pertaining to implementation of such technology, and finally identify opportunities to accomplish such measures most cost effectively. During construction and

ultimately building occupancy, NSTAR will continue its partnership to verify such technology is installed and performs as anticipated.

1) Preliminary Design - During Preliminary Design NSTAR should be contacted to review the project scope. In preliminary design, we will help your team establish energy efficiency goals, secure budget dollars, as well as brainstorm energy efficiency concepts and options. Due to the highly iterative nature of this process, it is critical to include appropriate decision makers at this stage. Please note that an M.O.U is required for any Advanced Buildings, Comprehensive Design, and Comprehensive chiller project.

2) Schematic Design

In this stage, the customer submits an Engineering Services Agreement, or E.S.A., and an associated Engineering Proposal to request Technical Assistance. The Engineering Proposal should define the project scope, deliverables and associated study costs. NSTAR will then review the proposal, and may authorize up to 50 percent co-share of E.S.A. costs. NSTAR engineers, or an NSTAR Technical Assistance vendor, will identify potential available energy conservation measures in the proposed schematic design. NSTAR engineers will review the proposed package of energy conservation measures for cost-effectiveness and explore alternative options.

3) Design Development

In this phase, the Architect and Mechanical and Electrical Engineers, and Plumbing Contractors review proposed options and finalize system designs.

4) Construction Documents

During the construction documents phase, NSTAR, or its Technical Assistance vendor, summarizes the potential annual energy savings of the proposed measures. Then, NSTAR estimates financial incentives based on proposed electric energy conservation measures.

5) Construction Administration

The construction administration step supplies documentation to the NSTAR program manager or account executive for the purpose of finalizing the incentive amounts. The documentation required includes a brief narrative of the measures installed and design intent, project plans, product cut-sheets for each piece of equipment to be installed, a completed application, and invoices. Incentives are finalized based on final submittal of construction documents and proper documentation.

6) Post-Construction

The final stage of the design process is post-construction, where NSTAR will inspect the installation of the energy conservation measures. When commissioning is required, NSTAR verifies operation of selected measures, and may pay up to 50 percent for fundamental commissioning services. NSTAR pays an incentive for installed energy conservation measures that have been verified through such post-construction inspection.

Regardless of which program is appropriate for a project, NSTAR will partner to guide customers through the process. The earlier NSTAR is engaged, the greater the opportunity for savings. Early engagement allows NSTAR to help customers choose the appropriate program.

Mass Save/GasNetworks®

GasNetworks® is a collaborative of natural gas utility companies working to promote energy efficient technologies, create common energy efficiency programs, educate consumers and promote contractor training and awareness of ever changing natural gas technologies. Member utilities in the 495 MetroWest Corridor include NSTAR Gas, National Grid (New England) and Bay State Gas. Programs offered through Mass Save & GasNetworks® are described below.

Small Commercial & Industrial High Efficiency Heating Rebate Program

Rebates (depending on the equipment efficiency rating) are available for eligible C&I customers who purchase high efficiency forced hot water boilers, high efficiency steam boilers, high efficiency furnaces and high efficiency furnaces equipped with Electronic Commutated Motor (ECM) or equivalent advanced furnace fan system. Natural Gas heating equipment eligible for these rebates include boilers up to 2,000 MBH input. Eligible equipment and requirements are as follows:

- Furnaces \geq 92% AFUE rating
- Furnaces \geq 92% AFUE rating and equipped with ECM or equivalent advanced furnace system
- Steam Boilers \geq 82% AFUE rating
- Hydronic Boilers \geq 85% AFUE rating
- Condensing Boilers \geq 90% AFUE rating

Small Commercial & Industrial High Efficiency Water Heating Rebate Program

Rebates are available for C&I customers who purchase high efficiency water heaters. This includes, “on demand” type water heaters having an Energy Factor (“EF”) of .82 or higher, indirect water heaters that are connected to a gas fired boiler and condensing and Energy Star rated storage type water heaters.

Commercial Food Service Equipment Program

Rebates are available for high efficiency commercial kitchen equipment including over 60 selected models of high efficiency natural gas fired fryers and several types of high efficiency ovens and griddles.

Energy Star Programmable Thermostat Program

The member utility pays a rebate for Energy Star rated programmable thermostats. Limit (2) per heating account.

Commercial & Industrial infrared Heating Equipment Rebate Program

The member utility pays a rebate for natural gas fired, low intensity infrared heating units (maximum 5 units per gas account).



BJ's Wholesale Club, headquartered in Westborough, elected to install gas-fired low intensity infrared heating at their distribution center located in Uxbridge. A total of 99 units were installed with an input of 9,990,000 BTUs. Using the GasNetworks® program with pre-approval from NSTAR, BJ's Wholesale Club received a \$500 rebate for each unit, totaling \$49,500

NSTAR Municipal Program

On April 22, 2009 NSTAR announced the formal launching of a Municipal Program to help cities and towns with the technical aspects of energy initiatives. \$10 million in annual revenue generated by the auctioning of greenhouse gas emission allowances was originally provided through loans and grants to communities that meet zoning and permitting criteria for energy facilities. Clean energy technologies where municipalities may look for financial assistance include retrofitting buildings, permitting renewable energy installations, and purchasing fuel-efficient vehicle fleets. Communities may also have an opportunity to tap into millions of dollars in funds from the federal stimulus package. The program has assigned four regional coordinators to provide communities with technical assistance on becoming “Green Communities” and investing in energy-saving measures through federal funds.

Improving efficiency is more critical than ever for municipalities. Reducing gas and electricity use enables municipalities to save energy and money while helping the environment. The Municipal Program, designed specifically for NSTAR municipal customers covers a number of energy efficiency measures including streetlights, lighting, HVAC, motors/drives, and refrigeration.

The Municipal Program offers NSTAR incentives to cover a portion of the project costs for the implementation of high efficiency equipment. NSTAR will verify that the new equipment is properly installed and operating to its design specifications. Finally, NSTAR is currently pursuing a custom low-interest loan program that allows municipal account customers to finance their portion of the project costs for a period of up to several years, based on project eligibility. Some examples of qualifying energy efficient measures for office buildings include new high performance lighting fixtures, lighting controls and occupancy sensors. HVAC measures include chiller system replacement or upgrades, variable-air-volume conversion, variable speed drive installations, and energy management system installation/optimization. Other miscellaneous projects such as improving hot water efficiency (electrically heated hot water) are also available for consideration.

Smart Grid

In 2009, NSTAR launched an innovative Smart Grid pilot program to increase consumers' awareness of how informed energy decisions can benefit the planet. Developed in response to the Massachusetts Green Communities Act, the program will provide customers with the real-time information they need to reduce energy usage while keeping costs lower than other Smart Grid approaches. NSTAR will accomplish this by using advanced technology to pair its existing automated meter reading equipment with broadband Internet service to provide two-way communications directly to a customer's computer and a home area network. Smart Grid technology can help reduce energy

usage and greenhouse gas emissions by giving customers the tools they need to make informed energy decisions. Approximately 3,000 NSTAR customers will be selected for the pilot program, which NSTAR will begin rolling out in early 2011.

Appendix: State Energy Contacts

Energy Efficiency Program Expansion

The Green Communities Act –
Massachusetts Energy Efficiency
Advisory Council

Massachusetts Energy Efficiency Advisory
Council
100 Cambridge Street
Boston, MA 02114
Steven Venzia
Telephone: 617.626.1000
steven.venzia@state.ma.us
www.ma-eeac.org/

Green Communities Program

Green Communities Division

Massachusetts Department of Energy
Resources
100 Cambridge Street, Suite 1020
Boston, MA 02114
Mark Sylvia, Director
mark.sylvia@state.ma.us
Telephone: 617.626.7339
Meg Lusardi, Deputy Director
meg.lusardi@state.ma.us
Telephone: 617.626.7364
www.mass.gov/energy/greencommunities

Green Communities Grant Program

Green Communities Division
100 Cambridge Street, 10th Floor
Boston, MA 02114
Cliff Sullivan
Telephone: 617.626.7300
cliff.sullivan@state.ma.us

Green Community Regional Coordinators

Western Region

Jim Barry, Regional Coordinator
436 Dwight Street
Springfield, MA 01103
Telephone: 413.755.2232
Mobile: 617.823.4588
jim.barry@state.ma.us

Central Region

Kelly Brown, Regional Coordinator
627 Main Street
Worcester, MA 01608
Telephone: 598.767.2703
Mobile: 617.780.8144
kelly.brown@state.ma.us

Northeast Region

Joanne Bisetta, Regional Coordinator
205B Lowell Street
Wilmington, MA 01887
Telephone: 978.694.3315
Mobile: 617.823.4029
joanne.bisetta@state.ma.us

Regional Greenhouse Gas Initiative

Massachusetts Department of Environmental Protection
1 Winter Street
Boston, MA 02108
William Space
Telephone: 617.292.5500
william.space@state.ma.us
www.mass.gov/dep/air/climate/rggi.htm

Regional Greenhouse Gas Initiative, Inc.
90 Church Street, 4th Floor
New York, NY 10007
Telephone: 212.417.3179
www.rggi.org/home

Updating the State Building Code

Board of Building Regulations & Standards
1 Ashburton Place
13th Floor, Room 1301
Boston, MA 02108
Mike Guigli
Telephone: 617.727. 3200
mike.guigli@state.ma.us
www.mass.gov/dps

Renewable Energy Goals/Development of Renewable Energy

RPS Solar Carve-Out Program

Department of Energy Resources
100 Cambridge Street, Suite 1020
Boston, MA 02114
Telephone: 617.626.7300
DOER.SREC@state.ma.us

Renewable Portfolio Standard

Renewable Portfolio Standard
Department of Energy Resources
100 Cambridge Street, Suite 1020
Boston, MA 02114
DOER.RPS@state.ma.us

Net Metering, Utility Solar Ownership, and Long Term Contracts

Department of Public Utilities
One South Station
Boston, MA 02110
Telephone: 617.305.3500

Global Warming Solutions Act

Greenhouse Gas Emissions Policy and
Protocol

Executive Office of Energy and
Environmental Affairs (EEA)
100 Cambridge Street, Suite 900
Boston, MA 02114
Telephone: 617.626.1020

Clean Energy Biofuels Act

Department of Energy Resources
100 Cambridge Street, Suite 1020
Boston, MA 02114
Telephone: 617.626.7300
DOER.energy@state.ma.us
www.mass.gov/doer

Oceans Act

Massachusetts Office of Coastal Zone
Management
251 Causeway Street, Suite 800
Boston, MA 02114
Telephone: 617.626.1200
czm@state.ma.us
www.mass.gov/czm/

Community Wind Program and Commonwealth Solar

Massachusetts Clean Energy Center
55 Summer Street, 9th Floor
Boston, MA 02110
Telephone: 617.315.9355
info@masscec.com