Green Power and Energy Efficiency Opportunities for Municipalities in Massachusetts

Promoting Community Involvement in Energy and Environmental Decisions

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Executive Summary

Introduction

The purpose of this report is to identify and characterize the range of options available to municipalities for purchasing green power and improving the efficiency with which electricity is consumed. Municipalities have several viable options for purchasing electricity in a fashion that is consistent with the energy, cost, and environmental goals of the community. Municipalities are in a better position to achieve certain policy goals than are individual customers through their collective buying power. A municipality's advantage lies in the size of its electricity load, in the potential for more sophisticated decision-making than individual customers can apply, and in the potential for reflecting more of the public interest in the decision-making process.

There are many reasons why cities and towns should consider purchasing power from generators with low environmental impacts, frequently called "green power." Electricity generation creates a host of pollutants that lead to some of society's most threatening environmental problems, including acid rain; ground-level ozone; health risks due to air-borne particulates; highly-dangerous and long-lived nuclear wastes; and climate change with its potentially devastating ecological impacts. Green power offers communities a chance to change the way that electricity is generated, and to reduce these environmental problems.

Municipal policymakers should be aware that renewable energy is extremely popular with the general public for all of the reasons mentioned above. In February, a survey was conducted on behalf of the Massachusetts Technology Collaborative's Renewable Energy Trust that demonstrated widespread support in Massachusetts for renewable energy. In particular, a significant number of residents expressed a willingness to pay more for their electricity if it is based upon clean, renewable sources of electricity, especially wind and solar.

The RET survey and other similar surveys that have been taken across the nation affirm two related ideas. First, about half the population is willing to pay more to purchase green power for their own consumption. Second, a larger majority believes that it makes sense to publicly purchase green power so that "we all pay" for what is essentially a public good. The RET survey and others show particularly strong support for the idea of putting solar on schools. That general concept of public procurement is achieving tangible results in many places – with San Francisco being a leading example.

Energy efficiency also offers important benefits for a community. There is a multitude of energy efficiency technologies that cost significantly less than the price of electricity. Thus, energy efficiency offers a huge, untapped resource for towns and cities to reduce their electricity costs. Energy efficiency also has significant environmental benefits. Every kWh that is saved through efficiency results in less electricity generation, and thus less environmental damage.

Municipalities as Power Consumers

Managing, Planning and Prioritizing

There are many opportunities available for municipal governments to purchase green power for meeting municipal load, and for improving the efficiency of municipal buildings and facilities. Given these opportunities, plus new opportunities for reducing electricity costs from competitive generation companies, municipal governments should consider hiring an energy manager to investigate and manage the options available to meet municipal electricity needs.

Municipal governments should explicitly determine the goals and priorities for purchasing power and managing the municipal load. The two primary goals to consider are reducing the cost of electricity services, and reducing the environmental impacts of electricity generation and consumption. Sometimes these goals can be achieved through the same means (e.g., through energy efficiency), and sometimes these goals must be traded off against each other.

Municipal governments should consider how they want to integrate the community's electricity objectives – such as low cost power and local economic growth – and environmental objectives – such as those embodied in climate change action plans. Defining clear environmental objectives will help in striking the appropriate balance between reducing electricity costs and reducing environmental impacts.

Municipalities should develop strategies for obtaining energy efficiency and green power to meet their goals and priorities. These strategies should include a combination of (a) the procurement of low-cost electricity from the competitive market, (b) the procurement of green power resources, and (c) the implementation of aggressive, cost-effective energy efficiency programs.

Green Power Opportunities

- Whenever municipal governments solicit proposals for new power supplies, they should also inquire about green power products. If acceptable green power products are not available in the short-term, municipal governments should avoid long-term contracts (e.g., greater than one year) that would preclude the purchase of green power products that may become available in the future.
- In order to fully test the competitive electricity market, municipal governments should issue RFPs for purchasing green power. The RFPs should solicit proposals for various types of green power products, in order to identify the tradeoffs between more stringent environmental goals and higher electricity costs, and to investigate various options for integrating electricity and environmental policies.
- Municipal governments should communicate periodically with the Massachusetts Energy Consumers Alliance, MMA, the Massachusetts Health and Education Facilities Authority (HEFA), and other similar organizations to inquire about purchases from green power aggregators.

- Municipal governments should investigate the opportunities for installing renewable and other clean distributed generators (e.g., solar PV, wind, fuel cells) on municipal facilities and sites. They should issue RFPs to identify the costs, benefits and other implications of installing generators at specific sites. Municipal governments could also work with suppliers or renewable developers regarding opportunities to fund specific new renewable installations.

Energy Efficiency Opportunities

- Municipal governments should work with their local distribution companies to identify all opportunities for participating in on-going energy efficiency programs. They should also consider investing their own funds to implement cost-effective efficiency measures beyond those financed by the distribution company programs.
- For those facilities with the largest electricity consumption, municipal governments should hire ESCOs to perform technical assessments of efficiency potential and to offer financial packages for achieving that potential.
- Municipal governments should ensure that all municipal buildings comply with building energy codes, ensure that building inspectors are well-trained, and require building inspectors to enforce the building codes for residential and commercial buildings.
- Municipal governments should establish protocols to investigate and purchase ENERGY STAR equipment whenever new municipal equipment is purchased.

Municipal Aggregation

The Restructuring Act allows cities and towns to establish a municipal aggregator, which will have the authority to purchase power on behalf of all the customers within the community. A municipality must first obtain local approval to become an aggregator, through town meeting or city council votes. It must also obtain approval for its aggregation plan from the DTE. Customers do not have to actively choose to be a part of the aggregation, but they have the opportunity of opting out if they wish. Municipal aggregators can also implement energy efficiency programs for their communities, in place of those offered by the local distribution company, and can apply for funds to support renewable resources from the Renewable Energy Trust.

In the newly restructured electricity market in Massachusetts, municipal aggregation offers the best opportunity to reduce the electricity costs to all customers within a community and to make purchases consistent with public policy objectives. In fact, it may be the only way that small commercial, residential and low-income customers will be able to realize electricity savings from the competitive electricity market. In addition to reducing power supply costs, municipal aggregators can serve as advocates for the community on a variety of energy and environmental issues.

Municipal governments may have to incur considerable costs in order to develop an aggregation plan, have the aggregation plan approved by the DTE, and negotiate

favorable contracts with power suppliers. However, these up-front costs could be quickly paid back through successful negotiations for power supply for the community.

Communities interested in municipal aggregation should begin investigating municipal aggregation options soon. This will allow enough time to develop and obtain approval of an aggregation plan, so that the community will be poised to take advantage of low-cost power supply options in 2005 when the standard offer is eliminated.

Municipal aggregation offers significant green power opportunities for all members of the community – not just for the municipal electricity load. Municipal aggregators may be able to combine higher priced green power with cost reductions from power supply deals or energy efficiency programs, thereby creating a package that is more economically and politically acceptable.

With regard to energy efficiency, municipal aggregators are well positioned to design and implement much more aggressive and successful efficiency programs than those currently provided by electric distribution companies. Municipal aggregators are not driven by powerful incentives to increase electricity sales and profits; they place greater value in environmental protection and local economic development; they can use their extensive local networks to promote efficiency programs; they can pursue innovative initiatives; they can ensure that efficiency funds raised within a community are spent within the community; and they are in a better position to respond to local concerns and priorities.

However, municipal aggregators should only undertake efficiency initiatives if they can improve upon the programs that are currently delivered by the distribution companies. Municipal aggregators face the risk that their administrative costs outweigh the benefits that might be gained from replacing the distribution company's efficiency programs. This risk increases as the size of the municipality decreases, because many administrative costs are essentially fixed.

Those cities and towns whose electricity demand is relatively small (e.g., less than the Cape Light Compact's), should be very cautious about implementing efficiency programs because of the high administrative costs.[1] Communities should consider joining together to establish a centralized energy efficiency program administrator that could serve several municipal aggregators. A centralized energy efficiency administrator with a large efficiency budget can reduce the risk of high administration costs undermining the efficiency programs.

Communities that pursue municipal aggregation should ensure that there is meaningful public input to the decision-making process. This should include input from local representatives and municipal agencies, as well as input from citizens and businesses.

[1] Among the communities participating in this study, Boston's electricity demand (6,150 GWh) is nearly three times larger than the Compact's, Cambridge's demand (3,738 GWh) is slightly less than the Compact's, and the others are all much less than the Compact's.

Municipal Electric Utilities

Between 1889 and 1926, when the Massachusetts electricity industry was in its infancy, several towns and cities established municipal electric utilities to provide their own electricity service. These utilities own the transmission and distribution facilities within their borders, and either own power plants or purchase generation from other's power plants. There are currently 40 municipal electric utilities in Massachusetts, serving roughly 13 percent of retail electricity sales. They are different from the investor-owned utilities in Massachusetts, in that they are not for profit; they set their own electric rates; they are not subject to many DTE regulations; they are not subject to many provision of the Restructuring Act; and they are not required to allow retail competition within their borders.

Creating a municipal electric utility provides a community with the greatest amount of local control over the provision of electricity services within the town or city. Government representatives will operate, purchase and manage the electricity generation, transmission, distribution, metering, billing, green power development, and energy efficiency within the community. The municipal electric utility will be exempt from most DTE regulations, and will probably be exempt from the competitive market provisions of the Restructuring Act unless it wishes to sell power in other jurisdictions.

Creating a municipal electric utility would be an extremely difficult undertaking under current conditions. The local distribution company is likely to oppose such an effort with all of its financial, political, regulatory and public relations resources. The process required to create a municipal electric utility could take as long as five years or more, and it is not likely that the effort will be successful. In sum, the creation of a municipal electric utility potentially has the greatest risks and greatest rewards for a community.

Even if a community could convert to a municipal electric utility, the conversion itself is no guarantee of improvement upon the way that power is provided now by the local distribution companies. The results of a new municipal initiative – in terms of power costs, reliability, customer service, green power and energy efficiency – would depend critically upon how the municipal electric utility is managed, how the key policy decisions are made, the political climate of the government, and the public input from the community.

Those municipal electric utilities that do exist in Massachusetts should investigate and pursue all of the green power options that are available and are consistent with the wishes of their community. This would include all of the opportunities listed above for municipals as power consumers, but would also include additional opportunities for owning all or part of renewable generators in order to meet all of the community's energy load.

Municipal electric utilities should also develop energy efficiency programs for all customer types, in order to both reduce total electricity costs and reduce the environmental impacts of electricity consumption within the community. They should use the electricity rates to raise funds for energy efficiency programs, and should coordinate with and build off of the efficiency programs that are currently being offered by the electricity distribution companies in Massachusetts.

Public Input

Regardless of whether a municipality is purchasing power for itself, as an aggregator, or as an electric utility, municipal governments should ensure that their actions do indeed reflect the wishes of the community. There are now many more opportunities and pitfalls associated with purchasing electricity in Massachusetts as a result of the Restructuring Act. Municipal agencies have an important role to play in addressing the interests of their citizens in order to make the most of these opportunities.

Many municipalities may need to establish new procedures for obtaining adequate public input. It may require a public education campaign to inform customers of the importance of electricity purchases – in terms of the economic and environmental implications. Meetings of city councils and boards of selectman can be used to solicit input from local citizens and businesses.

Municipalities can also establish a community energy board or commission, composed of public representatives from several perspectives (e.g., low-income, businesses, environment). The role of the community board would be to represent the public views to the municipal agency, the municipal aggregator or the municipal electric utility. The community board could also play a role in encouraging citizens and businesses to personally participate in electricity-related offerings, such as green power programs and energy efficiency programs.

1. Introduction

With the restructuring of the electricity industry in Massachusetts, municipalities now have greater opportunities for lowering power costs, improving the efficiency of electricity consumption, and reducing the environmental impacts of electricity generation. In fact, towns and cities may be in the best position – relative to all other customer types – to take advantage of some of the new provisions of the Massachusetts Restructuring Act. The purpose of this report is to identify and characterize the range of options available to municipalities for purchasing green power and improving the efficiency with which electricity is consumed. It discusses green power and energy efficiency with regard to a municipality's own power needs, with regard to the power needs of the customers within their communities, or both.

There are many reasons why cities and towns should consider purchasing power from generators with low environmental impacts, frequently called "green power." Electricity generation creates a host of pollutants that lead to some of society's most threatening environmental problems, including acid rain; ground-level ozone; health risks due to air-borne particulates; highly-dangerous and long-lived nuclear wastes; and climate change with its potentially devastating ecological impacts. Green power offers communities a chance to change the way that electricity is generated, and to reduce these environmental problems.

The case for energy efficiency is even more compelling. There is a multitude of energy efficiency technologies that cost significantly less than the price of electricity. Thus, energy efficiency offers a huge, untapped resource for towns and cities to reduce their electricity costs. Many efficiency measures have a payback period of two years or less. Energy efficiency also has significant environmental benefits. Every kWh that is saved through efficiency results in less electricity generation, and thus less pollution. In fact, because it reduces both electricity costs and environmental impacts, efficiency offers a win-win situation – a "no regrets" approach to meeting environmental and energy service goals.

Both green power and energy efficiency also offer other significant benefits to a community, including:

- Renewable resources and efficient technologies do not rely upon fossil fuels and their inherently unstable supply and price characteristics, and thus provide price stability and security for a municipality's electricity budget.
- In many cases, renewable resources and efficiency programs will create local jobs and prevent the exporting of local dollars to pay for fossil fuels that are obtained from other parts of the US or other countries.
- Renewable resources and energy efficiency can improve the reliability of electricity supply, by reducing demand growth and increasing the diversity of the fuels used to generate electricity.

- Energy efficiency and distributed renewable resources and can reduce the need for new transmission lines and substations, and can help address problems associated with overloaded distribution circuits.

Cities and towns (as well as other government agencies) can play a key role in promoting the development of green power and energy efficiency. By purchasing green power and energy efficiency to meet their own needs, municipalities can help develop the market for renewable and efficient technologies, thereby making it easier for others to make similar purchases over time. Furthermore, there are several ways that municipalities can purchase green power and efficiency on behalf of all the customers within their community, thereby making an even bigger impact.

Municipal governments are well-positioned to take advantage of green power and energy efficiency opportunities. They can represent public sentiment and allow for community input to the decision-making process. Given recent opinion polls that show increasing public preference for addressing environmental problems, municipal agencies may be inclined to make more environmentally benign electricity purchases than other customers of similar size and influence.

This study is focused on opportunities to improve the environmental impacts of electricity consumption. It does not address other forms of energy consumption – such as energy consumed in oil and gas furnaces or transportation energy – which also contribute to environmental problems. Nonetheless, some of the lessons learned from the electricity sector could motivate communities to address these other sectors as well.

This study begins with a description of the Massachusetts Restructuring Act and the many actors and systems that make up the electricity industry in Massachusetts today. It then presents opportunities available to municipalities in three different contexts: (a) when a municipality purchases electricity to meet its own electricity loads; (b) when a municipality purchases electricity as a municipal aggregator, on behalf of all customers within the community; and (c) when a municipality purchases or generates electricity as a municipal electric company, on behalf of all customers within the community. The last section of this study provides a summary of conclusions and recommendations.

This study was prepared with a focus on five cities and towns in the metropolitan Boston area, including Boston, Brookline, Cambridge, Somerville and Newton. Representatives of these municipalities have actively participated as Planning Partners in the Massachusetts Energy Consumers Alliance green power aggregation research effort, funded by the Massachusetts Technology Collaborative's Renewable Energy Trust and the John Merck Fund. This study has benefited from the assistance of representatives from these five cities, and attempts to provide recommendations specific to their needs. It is hoped that the findings of this study will be useful to other cities and towns throughout Massachusetts.

2. Background, Definitions and Green Power Issues

The Massachusetts Electricity Restructuring Act has introduced a confusing array changes and new initiatives. This section provides a brief description of some of the electricity services, public policy mechanisms, and major actors operating in the electricity industry in Massachusetts today. It also presents an important discussion of the challenges of defining green power.

2.1 Definitions

Default service. The generation service provided by the local distribution company to those customers who are no longer receiving standard offer service, and are not receiving generation service from a competitive supplier. This is intended to be a security net from the local distribution company for all customers that cannot obtain competitive power, for whatever reason. The price for default service is intended to represent the competitive market price for electricity. Each distribution company is required to purchase generation services from competitive suppliers, using periodic competitive bidding processes. The price for default service is based on the results of those processes, and is reviewed by the DTE. The prices for default services in Massachusetts have been significantly higher than the prices for standard offer services, although that gap has been closing in recent months.

Department of Telecommunications and Energy (DTE). The agency that regulates the investor-owned electric companies in Massachusetts. The DTE determines the standard offer rates and the default service rates, and issues regulations and orders on a variety of policy issues affecting the electric distribution companies. The DTE also licenses competitive retail electricity suppliers.

Distributed generation (DG). Small, modular technologies for generating or storing electricity located near the point of use. The term "clean distributed generation" refers to those DG resources with low or no emissions, such as combined heat and power, microturbines, fuel cells, wind, and photovoltaics. There are other DG technologies, such as diesel engines, that have relatively high emission profiles.

Distribution company. The electric company that provides transmission and distribution services to a specific region. As a result of restructuring, the Massachusetts investor-owned electric utilities sold off their generation assets. The remaining companies now provide only distribution and transmission services (along with billing, metering and other operational services). Each distribution company serves as a monopoly business in a distinct geographic franchise. They continue to be regulated by the DTE.

Division of Energy Resources (DOER). The state agency responsible for statewide energy policy. DOER is responsible for implementing several provisions of the Restructuring Act, such as those pertaining to energy efficiency and the renewable portfolio standard.

Energy efficiency. The implementation of practices, measures or technologies that reduce the amount of energy needed to provide a given electricity service (e.g., heating, cooling, lighting, motor drive). An energy efficiency program provides customers with a package of financial, educational, technical and practical assistance to implement energy efficiency measures. A cost-effective energy efficiency measure or program is one whose total cost of implementation is less than the cost of generating, transmitting and distributing a comparable amount of electricity – i.e., one that results in a net reduction in electricity costs.

Generation attributes. The characteristics of a particular electricity generator that can be associated with the generator's production, including the generator's location, fuel type, air emissions, and vintage. Price is not considered a generation attribute. As an example, the Hull wind turbine's generation attributes would consist of its location (Hull, MA), its type (wind, renewable), its vintage (commissioned in 2001), its air emissions (none).

Generation company. An entity that engages in the business of generating electricity from power plants. Most generation companies sell electricity at the wholesale level, and do not sell power to retail customers, unless they also become a retail electricity supplier.

Green-e. A program of the Center for Resource Solutions for certifying retail electricity products as "green power," based upon environmental standards that are approved by a national board using input from regional advisory committees. The purpose of the green-e standard is to provide customers with a simple, widely accepted seal-of-approval to identify environmentally preferable green power offerings. For more information, see www.green-e.org.

Green power aggregator. An entity that represents many customers in researching, soliciting, negotiating for and purchasing green power. By combining the loads of many customers, an aggregator can increase the customers' buying and negotiating strength, and can significantly reduce the transaction costs associated with buying green power.

Independent System Operator – New England (ISO-NE). The operator of the bulk power transmission system for New England, responsible for the dispatch of power plants and the management of wholesale electricity transmission for NEPOOL. ISO-NE operates pursuant to a contract with NEPOOL.

Massachusetts Renewable Energy Trust (MRET). A trust fund designed to promote the increased availability, use and affordability of renewable energy, and to generate the maximum economic and environmental benefits from renewable energy. The MRET is financed by a small charge (currently 0.075 ¢/kWh) on all investor-owned utility electricity customers. It is managed by the Massachusetts Technology Collaborative.

Massachusetts Electricity Restructuring Act. This legislation introduced retail competition in Massachusetts, by allowing all electricity customers to choose among competitive generation companies. The Act, along with subsequent settlements and DTE regulations, required the existing electric utilities to sell their generation assets and become distribution companies. The Act included a number of other provisions such as those establishing standard offer services, default services, the system benefits charge, the

renewable portfolio standard, the Massachusetts Renewable Energy Trust, and municipal aggregation. The Act was passed in 1997 and allowed customers to begin choosing alternative generators in March 1998.

Municipal aggregation. When a municipality or group of municipalities acts as a power broker on behalf of all the electricity customers within their borders. Once established through local authorization and approval by the DTE, a municipal aggregator can automatically represent all customers within its communities, except for those customers that decide to opt out. Municipal aggregators can also implement energy efficiency programs for their communities, and apply for funds to support renewable resources from MRET.

New England Power Pool (NEPOOL). A power pool that establishes the rules governing the single regional electricity network in New England. In the past, NEPOOL has coordinated and directed the operations of nearly all of the wholesale generation and transmission facilities in New England. Some of these roles are now under the responsibility of ISO-NE, under contract to NEPOOL. The NEPOOL members include the investor-owned utilities, municipal and consumer-owned utilities, generation companies, retail electricity suppliers, and representatives of end use customers.

NEPOOL Generation Information System (GIS). An electricity generation accounting and verification system for the generation attributes of electricity produced and consumed within New England. The GIS establishes a market for these generation attributes based on "certificates" that may be traded independently from undifferentiated, or "commodity", electricity, and tracks title to these attributes through registration of certificates in the accounts of market participants. This system is designed to provide information necessary to support several policies, including environmental disclosure and the RPS. The GIS is due to become fully operational in the second quarter of 2002. For more information see www.nepoolgis.com

NEPOOL GIS Certificates. Records created by the NEPOOL GIS administrator which represent title to generation attributes associated with energy from power plants in New England. Certificates establish clear and specific property rights to all attributes of generation to support compliance with renewable portfolio standards, emission performance standards, disclosure requirements, and verification of marketing claims for electricity sold within New England. A certificate will be created for every MWh generated by power plants within New England. All retail electricity suppliers must generate or purchase GIS certificates in sufficient quantity to equal their retail sales and meet their RPS requirement. These certificates can be traded among many parties, independently of the sales and transmission of the electricity.

Renewable portfolio standard (RPS). A provision of the Restructuring Act requiring all retail electricity suppliers to include a certain portion of renewable resources in their electricity products. The following types of renewable resources are eligible for the RPS: solar photovoltaics and solar thermal; wind energy; fuel cells using an eligible renewable fuel; qualifying landfill methane gas and anaerobic digester gas; qualifying low-emission, advanced biomass technologies; and ocean thermal, wave or tidal energy. In order to be eligible for the RPS, these renewable resources must be "new," i.e., they must have begun commercial operation sometime after December 31, 1997. The standards take

effect on January 1, 2003, and require that renewables represent one percent of sales in 2003, increasing by 0.5 percent each year thereafter until 2009 when it reaches four percent, and then increasing at one percent per year after that. DOER will determine the extent to which the RPS percentage should increase after 2009. Retail electricity suppliers will be required to use renewable GIS certificates to demonstrate compliance with the RPS.

Retail electricity supplier. An entity that sells generation services to retail electricity customers in Massachusetts. This includes all the distribution companies providing standard offer and default services, as well as all the entities that sell retail electricity on a competitive basis. The Restructuring Act requires that retail electricity suppliers must be licensed by the Massachusetts Department of Telecommunications and Energy. The DTE has established licensing regulations that require applicants to demonstrate evidence of financial viability, including being a member of the New England Power Pool or having a contractual relationship with a member of NEPOOL to meet the supplier's electricity obligations.

Standard Offer services. Customers that did not choose competitive generation companies when retail competition began were automatically provided standard offer service from their local distribution company instead. The standard offer price is regulated by the DTE, and is meant to protect customers from potential price increases in the early years of competition in Massachusetts. The standard offer service is due to expire after seven years of retail competition in Massachusetts, which will be at the end of February 2005. At this time, customers that have not switched to alternative retail electricity suppliers will be switched to the default service provided by the local distribution company.

System benefits charge (SBC). A small charge applied to all electricity customers to raise funds for public polices that result in benefits for the entire electricity system. In Massachusetts there is currently a system benefits charge of 0.25 ¢/kWh to raise funds for the energy efficiency programs that are operated by the distribution companies and the municipal aggregator. This efficiency charge was reauthorized in 2002, and is place for the next five years, at which time the DOER will review whether to extend it further. There is also a small system benefits charge to support the Massachusetts Renewable Energy Trust.

Undifferentiated power. Electric generation that is not distinguished from average system power in any way. It includes all power that is not sold as green power or as meeting an RPS. This power could come from a specific power plant or contract, from a generation company with many different power plants, or from the mix of all the power plants that sell into the New England spot market. Before retail competition was introduced and green power became an option, all electricity sold in Massachusetts and New England was undifferentiated power.

2.2 Defining Green Power – It's Not a Simple Task

The term green power typically refers to electricity generation that is more environmentally benign than undifferentiated power or the average power on the market.

However, there are many ways to define green power, and different people will define green power differently. Some of the more contentious questions pertain to whether green power should include existing renewables or only new renewables; whether green power should be 100 percent renewable or only partially renewable; what type of hydro generation should qualify; what type of biomass generation should qualify; whether landfill gas should qualify; and even whether new, efficient gas generators should qualify.

For the purposes of this report, we define green power generally as any environmental improvement beyond undifferentiated power. We use the term light green power to refer to a modest improvement. Light green power may be a product that is 50 percent renewable and 50 percent undifferentiated power. We use the term dark green power to refer to an aggressive improvement over undifferentiated power. This may include, for example, 100 percent new renewables with an emphasis on wind and solar technologies.

In many cases, defining the degree or level of green power that should be purchased or sold will be a strategic decision. There is likely to be a trade-off between (a) dark green power with greater environmental benefits per kWh, but greater costs and thus less customer participation and less kWh sold; and (b) light green power with less environmental benefits per kWh, but lower costs and thus greater participation and greater kWh sold. (These trade-offs are addressed briefly in Section 6.)

It is not the purpose of this report to define what types of resources should be included in green power purchases or sales. That is a decision to be made by the municipal governments and their representatives and constituents

2.3 Renewable Generation Attributes

There are many different ways for a municipality in Massachusetts to purchase green power, including:

1) to construct, own and operate renewable generators or clean distributed generation;

2) to own or purchase a portion of a jointly-owned renewable generator or clean DG;

3) to purchase green power from a competitive electricity supplier;

4) to purchase green power through a green power aggregator; and

5) to purchase renewable generation certificates created by the NEPOOL Generation Information System *independent* of the purchase of electricity.

The NEPOOL Generation Information System requires that each sale of electricity have a generation attribute associated with it. Thus, with each of these options, the municipality will purchase both electricity generation and generation certificates. For every MWh of electricity purchased, there must also be a MWh worth of generation certificates.

The latter option, however, appears to be different from the others because the generation certificate will be purchased independently of the purchase of electricity. The electricity purchased could be from undifferentiated power, but the generation certificates would be from a renewable generator. Consequently, the latter option sometimes raises questions as to whether it should really qualify as green power. Certificate-only purchases may be more confusing than purchases of green power directly from a power plant.

The GIS was established for several reasons. First, it is not possible to physically track where electrons flow through the transmission system in New England.[2] Without such a system, compliance with different policies in different states might rely on different, conflicting methods of verification, and might allow for intentional or inadvertent fraud or double counting of attributes. The GIS creates a way to account uniquely for the various characteristics of electricity generation within the New England electricity pool with a high degree of credibility. Second, the GIS creates a more liquid and flexible market for buying and selling generation attributes, thereby lowering transaction costs and making it much easier for generation companies and retail electricity suppliers to comply with environmental regulations and to sell green power. Finally, the GIS will create a transparent market and price for renewable generation – and mechanisms like the RPS and green power products will create a demand for that market.

When a customer purchases a new renewable generation certificate, he or she will increase the demand for those certificates, which will in theory increase the price for those certificates. As the price for new renewable generation certificates increases, generation companies will be more able to finance and develop new renewable generators, because they will be able to count on higher revenues from the sale of their certificates in the future. Thus, the purchase of new renewable generation certificates should, in theory, lead to an increase in new renewable generation in New England.[3]

In sum, municipalities and others interested in purchasing green power should investigate the opportunities available from new renewable generation certificates, because they may result in much more flexible and affordable green power products. However, municipalities should also be cautious that renewable certificates might create customer confusion, and they should be prepared to provide clear marketing materials to ensure that customers are comfortable with the products that they purchase.

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[2] It is, however, possible to track financial electricity transactions.

[3] While this is true for the purchase of "new" renewable generation, it is not necessarily true for the purchase of existing renewable generation because the supply of existing renewable generation is currently much greater than the demand for it. Because of this "over supply," purchasing power from existing renewable generators is unlikely to have much impact on the electricity generation in New England, and its associated air emissions – regardless of whether that purchase is through a direct bi-lateral contract or through renewable generation certificates.

3. Municipalities as Power Consumers

Municipal governments tend to use electricity for a variety of purposes. Most towns and cities require electricity to run their schools, libraries, police departments, fire departments, parks and recreation programs, public works departments, community centers, town halls, city halls, traffic lights, street lights, and more.

While the municipal electricity load tends to be a small portion of the total electricity load within a town or city, it is nonetheless an important part of the electricity market. Municipal governments have the incentive and wherewithal to manage the electricity load in order to reduce costs and environmental impacts – many electricity customers do not have this opportunity. In addition, municipal governments can play an important role in influencing the markets for electricity generation and energy efficiency products and services, as well as acting as a role model for the citizens and businesses within the community.

Chicago, Illinois

Last year the City of Chicago made a commitment to purchase 20% of its electricity from renewable energy resources within the next five years. This is the most significant energy proposal put forth by any municipality in terms of the total amount of energy being purchased. Twenty percent of Chicago's load is equivalent to 80 MW, more than the current level of local renewable energy generation.

Chicago's Mayor Richard Daley, hopes that this will be the incentive that begins to get renewable energy projects online in the area. The initiative was led by Daley, whose emphasis on environmental programs has helped make the initiative possible, and was supported by members of the Local Government Power Alliance and 48 suburban governments. In June, 2001 Chicago signed an agreement with ComEd, who will provide the city with 10% green power in the first year and will gradually increase that amount to 20% within five years. A majority of the power will initially be generated from landfill gas facilities, although as part of the agreement, ComEd will aim to incorporate wind power from proposed facilities in northern Illinois and newly installed solar projects throughout the city.

Although the clean electricity purchases will cost about a quarter of a cent more than the city's previous 6 cent/kWh generation charge, ComEd's profits from the extra charge will enter into a Reinvestment Fund, which will be used to promote the development of new renewables. In addition, the City of Chicago has entered a separate agreement with ComEd, which will include retrofitting 15 million square feet of public building space with energy efficiency upgrades.

The following sections describe the several opportunities that municipal governments have for relying upon cleaner generation sources, and improving the efficiency with which they use electricity.

3.1 Green Power Purchases for Municipal Load

Purchases Directly From the Competitive Electricity Market

The most direct way for a town or city to purchase green power is to negotiate a deal with a power supplier willing to provide the type of power desired. While the electricity market in New England is currently not very robust, and there are not many electricity suppliers willing to sell green power, there may be many more options available when the standard offer rates expire in 2005 and the entire Massachusetts electricity market becomes more competitive.

Santa Monica, California

Santa Monica became the first city in the nation to commit to purchasing 100% of its electricity from renewable energy resources when its City Council voted to approve the decision in February, 1999. The city entered into a contract with Commonwealth Energy, which provides energy for the municipality's entire electric load, including the Santa Monica airport, a figure which totals 5 MW. The premium for the purchase is roughly $140,000 a year, equivalent to a 5% increase on the city's electric bills. The power supplied by Commonwealth Energy will be mainly from geothermal resources, although solar and wind will be in the mix as well.

In purchasing green power from the competitive electricity market, municipalities will want to first identify (a) those suppliers willing to provide green power, (b) what types of green power products those suppliers can offer, and (c) how much the various green power products will cost relative to undifferentiated power. Municipalities can obtain this information by issuing a request for proposals (RFP) to competitive electricity suppliers.

Green power RFPs should explicitly request proposals for a variety of different green power options, in order to assist the municipality in deciding how clean its electricity purchases should be and how much it is willing to pay for different types of green power. For example, RFPs could request proposals for the following types of green power options: (a) packages that somehow improve upon undifferentiated power (e.g., no nuclear or coal generation), (b) packages that rely heavily upon new gas generation, (c) packages that include a certain portion (e.g., 50 percent) of renewable generation, (d) packages that include 100 percent renewable generation, or (e) support for a certain capacity amount from specific new renewable generation. Alternatively, an RFP could use an environmental indicator to differentiate among various green power options – e.g., CO_2 emissions rates in lbs/MWh.

Oakland, California

In June, 2000 the Oakland City Council voted to purchase 100% of the power for its municipal load from renewable electricity resources. Oakland has entered a contract with ABAG Power to provide energy for Oakland's City Hall, administration buildings and all of the street and traffic lights, a figure totaling 9 MW. The purchase, which totals $4 million annually, will come at a $70,000 premium the first year, rising to 2.5%, or $100,000, and 3%, or $125,000, the two following years. In addition, ABAG Power has committed to incorporate an increasing amount of "new" renewables into the energy mix, which should reach 20% by 2004.

Purchases Through Green Power Aggregators

Under current conditions in the New England market, municipalities might find that responses to green power RFPs either do not offer many desirable products, or offer products that are too expensive. Consequently, communities may wish to purchase their power from existing green power aggregators, where they might find increased choices and lower costs.

Aggregators may be able to increase green power opportunities for municipalities in several ways. By combining a number of customers into a single load, aggregators make the load more appealing to power suppliers, thereby increasing the buying power and negotiating power of all the participating customers. In addition, aggregators can undertake the many tasks necessary for soliciting, selecting and negotiating among different green power providers, thereby reducing the administrative and transaction costs associated with green power purchases. Furthermore, aggregators can maintain a portfolio of different products, available under different terms, conditions, and timeframes, allowing municipalities much greater flexibility regarding their green power purchases.

Westport, Connecticut

In January, 2002 the Town of Westport, Connecticut became the first municipality in the Northeast to purchase green power for part of its municipal load. The Westport Board of Selectmen voted to purchase the energy from the Connecticut Energy Cooperative. The Town of Westport has agreed to purchase the Co-op's EcoWatt product, a 100% renewable electricity blend consisting of 65% hydro, 29% landfill gas and 6% wind. Power purchased from the Co-op is enough to power Westport's Town Hall as well as most of its recreation buildings. The premium for the EcoWatt offering is equivalent to an extra 25-30 cents a day for the average household.

Municipalities in Massachusetts may have several options for purchasing green power through an aggregator. The following initiatives may provide opportunities for municipalities in the near-term future:

- The Massachusetts Energy Consumers Alliance (Mass Energy) was awarded a $120,000 grant from MRET, and a matching $50,000 grant from the John Merck fund, to investigate the possibilities of establishing a green power aggregation program for electricity customers in eastern Massachusetts.[4] Mass Energy has partnered with 15 other energy and environmental organizations and municipalities for this investigation, with the goal of offering a green power product to interested customers by the end of 2002. (The partners of this effort are: Boston Public Health Commission, City of Cambridge, Town of Brookline's Moderators Committee, City of Newton, Clean Water Action, Coalition on the Environment and Jewish Life, Environmental League of Massachusetts, Green Decade Coalition of Newton, Mass. Audubon, MASSPIRG, Mass. Climate Action Network, Sierra Club – Mass. Chapter, Somerville Climate Action, Tufts Climate Initiative (let's double check to make sure we're not missing anyone). Mass Energy is explicitly designing its green power aggregation to meet the needs

[4] This study was funded by a portion of these grants.

of municipal governments and other environmentally conscious organizations, and intends to encourage participation by such customers.

- Currently, Mass Energy offers *ReGen*, a renewable electricity product that enables customers to support the generation of electricity from recovered landfill methane (99.9% of product) and solar panels (0.1% of product). ReGen is purchased completely separately from, and in addition to, one's standard electric bill. ReGen can be purchased in blocks, each equal to 2,000 kWh of electricity annually. Each ReGen block costs $72 per year ($6 per month). ReGen is a product of Sun Power Electric, and Mass Energy functions as a reseller. ReGen can also be purchased directly from Sun Power Electric.
- The Massachusetts Municipal Association (MMA) was awarded a $75,000 grant from MRET, to educate MMA members about renewable energy, and to research the interest level of MMA members in joining a green power aggregation initiative. MMA is a non-profit organization that provides advocacy, training, publications, research and other services to Massachusetts cities and towns.
- The Massachusetts Health and Education Facilities Authority was awarded a $120,000 grant from MRET to aggregate health and educational facilities for the purchase of green power. In the past, HEFA has marketed power to municipal agencies.

Installation of Green Power Generators at Municipal Facilities

Municipal governments can also advance the market for green power by installing clean distributed generation (DG) units at municipal buildings and facilities. School rooftops might provide ideal locations for photovoltaic installations. Parks and recreation facilities might provide suitable site for photovoltaics or small wind generators. Public housing facilities might offer opportunities for combined heat and power technologies. Municipal office buildings might be suitable for fuel cells or microturbines. Each community can investigate different DG opportunities based on their own facilities and energy needs.

Several steps are necessary to install green power generators at municipal facilities. One of the most important steps is financing the up-front capital costs of installation. For many types of clean DG resources, the up-front costs are relatively high, while the on-going fuel or maintenance costs are quite low. Municipal governments are in a good position to provide this up-front capital by issuing relatively low-interest bonds. They also tend to have a longer perspective than private developers, and may be willing to accept longer payback periods for their investments.

Municipal governments will also need to identify appropriate sites for the installation of DG resources, and conduct all the necessary economic analyses and feasibility studies for each site. They should also issue RFPs to identify the most appropriate type of generator, as well as the best company to install and maintain the unit. The host of the DG facility will have to comply with interconnection agreements of the local distribution company, to ensure that the safety and operation of the transmission and distribution system is not jeopardized.

Newton SUNERGY

In the spring of 2000, the City of Newton, Massachusetts joined the U.S. Department of Energy's Million Solar Roofs Partnership. Through strong encouragement from the Mayor and the Board of Aldermen, the city created the partnership, now called Newton SUNERGY, to help promote the use of solar energy in the area. Newton SUNERGY has pledged to create 500 new solar projects, by installing solar systems at public buildings and promoting the use of solar energy by private organizations and citizens. SUNERGY partners include the City of Newton Planning & Development Department, the City of Newton Public Buildings Department, Newton Public Schools, Green Decade Coalition of Newton, and the Newton/Needham Chamber of Commerce.

In addition to outreach and technical assistance to Newton's citizens, Newton SUNERGY has succeeded in securing further funding for the promotion of solar energy. In 2001 Newton was awarded funding by the Massachusetts Technology Collaborative's Renewable Energy Trust. Early in 2002, Newton also received funding from the Renewable Energy Trust for the green design of Newton South High School which will likely include more than 50 kW of photovoltaics. At least two other schools in Newton are planning to incorporate solar energy into their renovations as well.

The Restructuring Act includes a "net metering" provision, which allows customers who install on-site generation facilities of 60 kW or less (including renewable resources and clean distributed generation) to be compensated for any electricity that is generated beyond the amount required by the host customer. In any month where there is a positive difference between energy generated and energy consumed, the local distribution company is required to pay the customer the average monthly market price for generation times the difference in kWhs. At the end of each month if the customer is a net producer of energy, the distribution company will issue the customer a credit on his or her next bill.

This means that electricity customers, including municipal facilities, can install renewable and clean DG resources that might be larger than what is needed for their own load, and essentially sell the excess generation back to the local distribution company. The restructuring Act also prohibits the local distribution company from requiring net metering customers to comply with onerous ratemaking provisions such as exit fees, backup charges, demand charges, additional controls, or liability insurance (DTE 1998).

The Massachusetts RPS regulations allow on-site renewable generators to qualify for the renewable portfolio standard.[5] This means that customers who host renewable facilities can sell the Renewable Generation Attributes associated with the renewable generation.

Clean DG resources can also assist in alleviating transmission and distribution (T&D) loads in local neighborhoods. Small generation units that are strategically located near heavily loaded substations or distribution systems can reduce the demand on the nearby circuits and either improve the reliability of the local distribution system or potentially defer the need for new T&D lines or substations. NSTAR is currently investing millions of dollars for T&D upgrades in the metropolitan Boston area as a result of electricity outages in the summer of 2001. Some municipalities may wish to work with NSTAR to

[5] However, small generation units whose metered data is not provided to the ISO-NE Monthly Settlement System must be able to verify its electricity output in a manner that is satisfactory to the DOER.

include clean DG installations as part of the overall approach to improving T&D reliability in the Boston region.

San Francisco, California

In November 2001, two voter approved bond measures were passed that will help make San Francisco one of the country's leaders in renewable energy production. The two measures, Propositions B and H will generate $100 million for the installation of solar, wind and energy efficiency technologies throughout the city. Proposition B, the Solar Revenue Bond, will be used to fund the installation of 10-12 MW of solar power along with 30 MW of wind. San Francisco's current electricity usage for its municipal load is 160 MW. The solar installations will be placed on municipal buildings throughout the city, while the wind facilities will likely be built on city owned property in Almeda and San Mateo counties.

The sale of the bonds will be repaid through the energy savings produced from the installations and energy efficiency improvements. As a result, no tax increases will to be necessary to repay the bonds measure. Proposition H permits the city to use general revenue bonds for future projects without continuing to seek voter approval. While the legislation has been approved, it will be about four years before the all the planned installations will be complete.

Opportunities from the Massachusetts Technology Collaborative's Renewable Energy Trust

There are three new programs from the Massachusetts Technology Collaborative's Renewable Energy Trust that municipalities can participate in. They are described briefly below. The RET will be developing additional programs over time that may also be of interest to municipalities.

Green Buildings Initiative

The Green Buildings Initiative (GBI) is intended to assist project owners and developers with the costs associated with including renewable energy technologies and enhanced energy efficiency measures in green building projects. Municipalities should consider the GBI for any non-school municipal buildings that are undergoing construction or major renovation or for other public buildings associated with the state government, federal government, MBTA, etc. Grants will be awarded in cycles over the next two years.

There are two main programs within the GBI:

1. "Early Stage and Feasibility Study Assistance Grant," Solicitation No. 2002-GB-01.

   Twenty-six grants of up to $20,000 will be awarded to support the costs of early stage feasibility studies to evaluate and assess the inclusion of eligible renewable energy technologies and related renewable energy and energy efficiency features in new green building construction or major renovation or rehabilitation projects.

2. "Green Buildings Design and Construction Assistance", Solicitation # 2002-GB-02.

   Grants of up to $500,000 are available over the next three years to support the design and construction costs associated with the inclusion of eligible renewable energy technologies and related features in selected green building projects that are engaged

in design development or construction. Seventy percent of the grant must be used for eligible renewable energy technologies that actively generate electricity.

Green Schools Initiative

Municipalities that have schools undergoing construction or major renovation that are in the early stages of planning and design and that intend to begin construction between 2003 and 2005 should consider the Green Schools Initiative (GSI) Track II program. This program is intended to provide technical and financial assistance to schools that incorporate renewable energy technologies, environmental quality, and efficient resource use. RET is awarding grants of $20,000 to support feasibility studies of high performance green design and building options. After performing the feasibility study, schools may apply for $130,000 to assist with incremental costs associated with green design and $500,000 for the incremental costs of incorporating and commissioning eligible renewable energy technologies into a green school.

Solar-to-Market Initiative

The Renewable Energy Trust recently issued solicitations for the Solar to Market Initiative (SMI). RET has committed $10 million to the SMI with the goal of increasing the use of solar energy in MA and strengthening the solar industry. Over four million dollars have been allocated for an installation program that will offer rebates to consumers who purchase photovoltaic systems. The installation portion of the SMI will likely be separated into two categories:

1. Cluster Program:

   The cluster program will provide rebates of $4 to $5 per watt for installations within a defined geographic area. This would cover approximately forty percent of the cost of installing a PV system.

2. Open Installations:

   Installations that are not within a cluster are expected to be eligible for rebates under the open installation program. This program will focus primarily on larger installations.

For more information about these programs see the Massachusetts Technology Collaborative's Renewable Energy Trust web site at www.mtpc.org; or contact Leslie Grossman at Mass Energy at 617-524-3950.

Challenges and Limitations of Municipal Green Power Purchases

One of the greatest challenges facing municipal governments in pursuing green power options will be in obtaining the political support for any additional costs associated with green power. While polls consistently indicate that people are willing to pay considerably higher electric bills in order to support renewable energy, this sentiment is not often reflected by the government representatives who make the decisions about municipal energy budgets.

Municipal governments may wish to develop a strategy for gaining political support for any additional costs associated with green power. The strategy could include presenting the green power as a part of an overall portfolio of energy initiatives, which in total is designed to meet the dual goals of reducing the cost of electricity services and reducing the environmental impacts of electricity. These dual goals can best be met with a combination of (a) the procurement of low-cost electricity from the competitive market, (b) the procurement of green power resources, and (c) the implementation of aggressive, cost-effective energy efficiency programs.

Municipal governments may be able to gain political support for green power by including it as a key option in meeting the environmental goals of the community. For example, towns with climate change action plans can point to green power as potentially one of the most cost-effective means of reducing the community's CO_2 emissions. [6]

On the other hand, it is important to recognize that the municipal electric load is only a small portion of the total electric load for all of the citizens and businesses in the municipality. For example, Boston's municipal electric load is only roughly four percent of the entire electricity load of all customers within Boston. Thus, in order to significantly reduce the CO_2 emissions from a community, municipal governments will have to look beyond their own energy use and seek opportunities to improve the way that their citizens and businesses use energy. Municipal aggregation and municipalization might help in seizing such opportunities.

3.2 Energy Efficiency Initiatives for Municipal Facilities

There are myriad opportunities for improving the end-use efficiency of municipal facilities. A recent study estimated that as much as 21 percent of the commercial and industrial electricity demand in Massachusetts could be reduced through cost-effective efficiency measures (RLW 2001). It is safe to assume that a similar percentage is available from municipal facilities.[7] This estimate only includes those efficiency measures that will result in net reductions in electricity costs – it does not account for the fact that energy efficiency also offers environmental benefits.

Distribution Company Efficiency Programs

The most effective and low-cost way to improve the efficiency of municipal facilities is to take full advantage of the energy efficiency programs currently being offered by the

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[6] Brookline (Brookline 2002) and Medford (Medford 2001) have recently prepared climate change action plans for their communities, and Cambridge is currently in the process of developing such a plan. Each of these action plans relies heavily upon the adoption of energy efficiency measures and renewable resources, as some of the most cost-effective means of reducing CO_2 emissions. These cities are part of the Cities for Climate Protection CCP campaign, which in turn is part of the International Council for Local Environmental Initiatives (ICLEI) campaign. Arlington, Boston and Somerville are also part of the CCP/ICLEI campaigns, and may soon develop their own climate change action plans.

[7] The same study found that even greater efficiency savings (31 percent) are available from the residential customers (RLW 2001).

local distribution company. All electric customers, including municipal electric accounts, are currently paying a system benefits charge that is used to fund energy efficiency programs delivered by each distribution company. Municipal governments should make the most of their contributions by actively participating in the relevant efficiency programs offered by their local distribution company.

These efficiency programs offer several features that will facilitate the implementation of energy efficiency measures for municipal facilities, including financial incentives that cover from 50 to 80 or even 100 percent of the costs of the efficiency measures, technical assessments of the energy efficiency potential and payback periods for specific facilities, training and education on efficiency opportunities, and greater access to efficiency measures and contractors.

Some of the key NSTAR programs that are available to municipal customers include:

- The New Construction Program, which offers rebates and technical assistance for high-efficiency equipment at the time of new construction projects, remodeling, renovations or replacement of failed electrical or mechanical equipment.
- The Medium and Large C/I Retrofit Program, which offers rebates and technical assistance when retrofitting existing electrical or mechanical equipment, including lighting, motor controls, and heating, ventilation and air conditioning (HVAC) equipment.
- The Small C/I Retrofit Program, which offers rebates when replacing existing electrical and mechanical equipment, including lighting, lighting controls, economizer free cooling, weather-stripping, motors, HVAC systems, and motor controls. NSTAR also offers substantial incentives for installing high-efficiency street lights and traffic lights.
- Products and Services Programs, which offer information and incentives for various efficiency measures, such as efficient motors, HVAC equipment, lighting remodeling and redesign, the commercial and industrial building energy code.

These efficiency programs are currently available to all municipal electricity customers, and only require that municipal governments dedicate sufficient staff resources to (a) contact NSTAR, (b) investigate the opportunities, and (c) work with NSTAR over time to implement those programs that are found to be appropriate.[8] While the latter effort may require some municipal staff time, the payback to the municipality could be enormous, with significant reductions in electricity costs for very little investment, as well as substantial environmental benefits due to reduced electricity usage.

However, it is important to recognize that the distribution company energy efficiency programs have limited budgets that must be shared among all customers that seek access to the programs. Also, the amount of funding provided by the system benefits charge in

[8] For information on how to contact NSTAR to participate in these programs, see the NSTAR web site at www.nstaronline.com, and follow the links to "your business" and "energy efficiency." Or contact your NSTAR Account Executive.

Massachusetts is not sufficient to capture all of the cost-effective efficiency savings available in the commercial and industrial sector. So there will be many opportunities for cost-effective efficiency improvements at municipal facilities beyond those that can be supported by the distribution company programs.

Municipal Investments In Energy Efficiency

While energy efficiency can reduce electricity costs by much more than the cost of the efficiency measures, most electricity customers do not implement much efficiency on their own. This is because of the many market barriers that they face, including lack of information about efficiency benefits; lack of access to efficiency measures; lack of funds to cover up-front costs necessary to install efficiency measures; lack of understanding of the environmental benefits of efficiency; and more. The primary rationale for distribution company efficiency programs is to help customers overcome these market barriers to energy efficiency.

Municipal governments, on the other hand, are in a good position to overcome these market barriers on their own. With relatively modest contributions from existing or new staff dedicated to energy management, municipal governments can investigate energy efficiency opportunities and invest their own funds in efficiency resources in order to obtain the future benefits of reduced electricity costs – as well as the additional benefits of reduced environmental impacts, local economic development, and increased energy security.

Brookline and Medford Climate Change Plans

Both the Brookline and Medford Climate Change Action Plans include proposals to hire an energy efficiency manager. In Brookline, the Energy Efficiency/Environmental Coordinator would be responsible for maintaining the CO_2 emissions inventory and measuring progress towards CO_2 goals. The Coordinator's general role is to "protect and improve environmental quality in Brookline through programs and projects that prevent pollution, encourage environmentally friendly alternatives and promote energy conservation" (Brookline 2002).

Municipal governments can take advantage of distribution company efficiency programs to the extent they are available, but can then use that experience and knowledge to go further to get as much of the cost-effective efficiency potential as possible. Some of the key opportunities include the following:

- Hire a full-time municipal energy manager or work with an energy consultant to investigate and implement energy efficiency opportunities. The energy manager would work with municipal department directors, finance committee members and others responsible for energy budgets, NSTAR representatives, the department of public works, energy service companies, and others to identify and develop as many cost-effective efficiency improvements in municipal facilities as possible.
- Implement some of the energy efficiency measures that NSTAR (or the local distribution company) offers, even if incentives from NSTAR are no longer available. The NSTAR efficiency programs provide a useful blueprint for

identifying efficiency opportunities at municipal facilities. If NSTAR does not have sufficient funds to address all the efficiency measures, the city or town can pitch in their own funds to make sure the efficiency measures are implemented. These investments would be more than paid back over time in the form of lower electric bills for the municipal accounts. Some of the obvious measures to address would include efficient lighting and HVAC in municipal buildings and schools, efficient motors in municipal facilities that use motors, and efficient street lights and traffic lights.

- Work with energy service companies (ESCOs) to implement efficiency measures at municipal facilities. Many ESCOs will offer "shared savings" packages, where they will implement a host of energy efficiency measures at no cost to the customer, and the ESCO is paid through a portion of the energy savings over time. In this way, the customer takes no risk in implementing efficiency measures, but has technical and financial assistance to put the measures in place. These types of services are typically only available for facilities with relatively high energy demands.
- Meet and enforce existing building codes. Many new and existing buildings do not meet the efficiency standards embodied in current building codes. At a minimum, municipalities should ensure that their own facilities are in compliance with existing building codes. Municipal governments are also in a good position – through their building inspectors – to ensure that the homes and businesses within the community also comply with the existing building code.
- Purchase ENERGY STAR equipment for municipal facilities. The US Department of Energy's ENERGY STAR program offers a wealth of information and resources for municipal governments seeking to improve energy efficiency. The ENERGY STAR label identifies those products and measures that are energy efficient. At a minimum, municipal governments should purchase ENERGY STAR equipment for their offices and other facilities whenever such equipment is available. Such labels are available for lighting, air conditioning, windows, roof products, water coolers, traffic lights, refrigerators, and many more.
- Take advantage of other ENERGY STAR resources, including energy management tools, such as the Portfolio Manager; technical support regarding the costs and benefits of efficiency measures; and information on finding and purchasing energy efficiency products and services. [9]

[9] See the ENERGY STAR web site at www.energystar.gov.

4. Municipalities as Aggregators of Other Customers

4.1 Background on Municipal Aggregation in Massachusetts

Section 134a of the Restructuring Act allows any city, town or county (or groups of cities, towns or counties) to act as a power supply aggregator for all of the electricity customers within their geographic boundaries. In this role, a municipal aggregator can shop around for and negotiate the best deal for power supply for all the participating customers in the town or city. This would allow towns and cities to potentially reduce not only their own electricity costs, but also the electricity costs for all of their citizens and businesses.

Several steps are necessary for a community to become a municipal aggregator. First, a municipality must get local approval and authorization through a majority vote at town meeting, town council or city council. A community-wide referendum is not necessary to become a municipal aggregator.

The municipality must then develop an aggregation plan for review by its citizens, and for review and approval by the DTE. According to the Act, the aggregation plan should be developed in consultation with the DOER. The aggregation plan should describe the process and consequences of aggregation, and should provide for universal access, reliability, and equitable treatment of all classes of customers. The aggregation plan should include at least the following elements: (a) an organization structure of the program, its operation and its funding; (b) identification of rate setting practices and other costs to participants; (c) the methods for entering and terminating agreements with other entities; (d) the rights and responsibilities of program participants; and (e) the process for termination of the program.

The municipal aggregation plan must be filed with the DTE for review and approval. The DTE is required to hold a public hearing on the plan before making its decision. The DTE is not allowed to approve a municipal aggregation plan if the price for power would initially exceed the standard offer price for power – unless the price will be lower than the standard offer in later years, or the excess price is due to the purchase of renewable energy.[10]

All customers within the municipality will automatically be served by the aggregator; customers do not have to make an affirmative decision to participate. This provision is one of the great advantages of municipal aggregation – it provides all customers with access to competitive power services, without requiring that they incur the many transaction costs that are necessary for active participation in the market. It also provides the municipal aggregator with a means of obtaining a large and diverse customer base without incurring many marketing costs.

[10] For this purpose, renewable resources are defined in the same way that they are defined for the Massachusetts renewable portfolio standard.

At the same time, customer participation in a municipal aggregation program will be voluntary in that any customer will be able to "opt-out" by selecting an alternative supplier of power. Participants in the municipal aggregation can opt-out at any time, and any participant that chooses to opt-out within 180 days of the commencement of the program will be entitled to return to the standard offer service provided by their local distribution company. Each municipal aggregator has the responsibility to inform all customers of the automatic enrollment well in advance of the commencement of the program.

At the current time it is difficult for even a municipal aggregator to find and negotiate a favorable power supply deal. The Compact has not been able to secure a power supply contract to serve all of its customers, despite several years of effort. Much of the reason for this is that the standard offer rates in Massachusetts are still much lower than the wholesale electricity prices in the region, so suppliers are unable to beat the standard offer. As described in Appendix B, the Compact has been able to secure power supply for the customers on default service. This suggests that, in general, the New England electricity market can provide competitive power at or below the default service price, but not below the standard offer price.

In the future there should be much greater opportunity for municipal aggregators to negotiate favorable power supply deals as the standard offer prices increase over time, and especially when the standard offer prices are eliminated in March of 2005. Most of the discussions below assume that municipal aggregation efforts take place when the standard offer has been eliminated, or when the standard offer price has become very close to the default price. While these conditions may not occur for several years, municipalities may want to begin the process of establishing a municipal aggregator soon, so that the aggregator will be operational by the time the markets are ready.

4.2 Reducing Power Costs Through Municipal Aggregation

One of the primary advantages of a town or city becoming a municipal aggregator is the ability to reduce electricity costs for all customers in the community through negotiations with competitive power suppliers. Municipal aggregation may be the only way that many customers get access to the competitive electricity market in Massachusetts, at least for undifferentiated power. (Prospects for the competitive green power market are a bit more hopeful, but challenges remain in that area as well.)

Since electricity competition was introduced in Massachusetts in March 1998, very few customers have switched to competitive power suppliers. As indicated in Table 4.1, only one percent of Massachusetts electricity customers are currently purchasing from a competitive power supplier. The vast majority of these are large customers that have greater buying power and fewer transaction costs than smaller customers.

Small commercial, residential and low-income customers are always likely to be at a disadvantage in a competitive power market – unless some entity is willing and able to aggregate them. Small customers are much less likely to be offered competitive power supplies, because the costs of marketing to and serving them are high relative to the potential profits that can be made off of each individual customer. Small customers also

face significant barriers to competitive shopping as a result of lack of information, confusion about options, small motivation to reduce bills, lack of experience in shopping for power, and distaste and distrust for marketing campaigns. These barriers and problems are often worse for low-income electricity customers. After the standard offer is eliminated in March 2005, small customers will be subjected to greater risks and higher electricity prices than today, creating an even greater need for municipal aggregators.

Table 4.1 Sources of Power Supplies in Massachusetts, as of January 2002

Customer Class	Percent of Customers in Class			Percent of Sales in Class		
	Standard Offer	Default	Comp-etitive	Standard Offer	Default	Comp-etitive
Residential Non-Low Income	70	29	0	76	24	0
Residential Low-Income	99	1	0	99	1	0
Residential Time-of-Use	83	16	1	90	9	1
Small Commercial & Industrial	66	32	3	69	27	4
Medium Commercial & Industrial	69	24	7	69	20	11
Large Commercial & Industrial	59	21	20	53	15	32
Farms	93	7	0	83	3	14
Street Lights	83	12	5	75	5	19
Total	72	28	1	66	19	14

Source: DOER website: www.state.ma.us.doer.

In addition, power suppliers have a strong preference for serving electricity customers that have a high "load factor" – i.e., a high demand for baseload power, and relatively low demand for peaking power.[11] This is because baseload power is significantly less expensive than peaking power, and poses less risk to the power supplier. Large industrial customers and some municipal loads (e.g., streetlights) tend to have high load factors, while smaller customers tend to have lower load factors, and are thus much less desirable to power suppliers. However, when the small customers' loads are combined with the large customers' loads, and the entire community's load is served as a whole, then the load is much more desirable to power suppliers and there are greater opportunities for negotiating more favorable power supply deals.

Municipal aggregators can also act as a general consumer advocate for all the electricity customers within their communities. Such advocacy may take the form of educating customers about various opportunities and risks. It may include negotiating customer service, billing, reliability or transmission and distribution related issues with the local distribution company. Advocacy may also include addressing rate-setting or other regulatory policy issues with the DTE or the DOER.

For example, in addition to its other activities, the Cape Light Compact has: purchased streetlights for a number of Cape and Vineyard communities, producing thousands of

[11] The term baseload power refers to energy that is generated through most hours of the day at a relatively constant level. Peaking power refers to energy that is generated only during those few hours of the day when electricity demand is at its highest, and consequently the cost of electricity generation is at its highest.

dollars of savings each year; helped produce millions of dollars of savings for Cape and Vineyard customers through a DTE proceeding pertaining to the Canal Electric plant; and negotiated a natural gas contract that can save schools in the region an estimated $165,000 (Compact 1/2002). The Compact has also audited electric bills to ensure that town accounts were not incorrectly switched from standard offer to default service. This effort has saved towns thousands of dollars on their electric bills, including $10,000 for Yarmouth alone.

Cape Light Compact Default Pilot Project

The Cape Light Compact was recently successful in establishing a Default Pilot Project, which will provide discounted power to all Compact members that have been shifted to default services – including 45,000 customers, representing 23 percent of the Compact's members. The Compact secured a contract with Mirant Corporation to provide default service power at a price of 4.9¢/kWh for May through December 2002, and a price of 4.8 ¢/kWh for all of 2003. The NSTAR default rates for Compact residential and commercial customers are currently 6.3 and 6.5 ¢/kWh, respectively, and are both dropping to 5.5 ¢/kWh in July 2002. The Compact's default prices will result in nearly $2 million in electricity cost savings in 2002, with additional savings anticipated for 2003. This contract is the first of its kind in New England, and will more than double the total number of customers that are now receiving competitive supply in Massachusetts (Compact 3/2002). See Appendix B for additional details.

4.3 Providing Green Power Through Municipal Aggregation

There are several different ways that municipal aggregators can facilitate the purchase of green power. They can purchase green power on behalf of all customers, they can offer green power products for only those customers that are interested in them, and they can assist with the development of new renewable resources within the community. These opportunities are described in turn below.

Green Power for All Customers Within the Municipal Aggregation Program

Municipal aggregators have the opportunity to solicit and negotiate for power supplies that contain a desired level of green power. The advantage of this approach is that all customers participating in the municipal aggregation program would receive equal amounts of the green power, thereby creating an equitable way to support green power, and potentially creating a large customer base to support green power.

One of the critical issues that municipal aggregators will have to wrestle with is how much green power to include in the power supply mix, and how much above market prices they should pay for that green power. Municipal aggregators will most likely need to obtain local approval for additional costs associated with green power purchases. Such approval could be obtained at the time the municipal aggregation plan is approved by the town or city government, but more likely would have to occur much later, after the aggregator has had a chance to solicit power supply bids and gain information on how much green power is available and at what costs.

Municipal aggregators, like municipal governments, may wish to develop a strategy for how to gain political support for any additional costs associated with green power. The

strategy could include presenting the green power as a part of an overall portfolio of energy initiatives, which in total is designed to meet the dual goals of reducing the cost of electricity services and reducing the environmental impacts of electricity. These dual goals can best be met with a combination of (a) the procurement of low-cost electricity from the competitive market, (b) the procurement of green power resources, and (c) the implementation of aggressive energy efficiency programs.

A municipal aggregator may be able to gain political support for green power by including it as a key option in meeting the environmental goals of the community or the aggregator. Those towns with climate change action plans can point to green power as potentially one of the most cost-effective means of reducing the community's CO_2 emissions.

It may be possible for municipal aggregators to improve the environmental profile of the entire community without causing a significant increase in electricity prices. Through creative solicitations and negotiations, aggregators may be able to purchase light green power that, for example, excludes power from coal or nuclear power plants, or includes only generation from new, efficient gas power plants.

Northeast Ohio Public Energy Council

The Northeast Ohio Public Energy Council (NOPEC), an aggregation of 95 Northeast Ohio communities, has signed a six year contract with Green Mountain Energy that will provide lower electric rates to more than 400,000 residential customers. The aggregation was formed as a result of Ohio's recent deregulation legislation, which took place in January, 2001. Ohio is the only state other than Massachusetts which has a "Community Choice" provision in their restructuring legislation, allowing municipalities to become aggregators on behalf of their residents.

As part of the deal, Green Mountain has agreed to sell its environmentally friendly electricity product to these consumers at a discounted price. The first five years of the contract, the price is guaranteed to be 1% below the local utility's (FirstEnergy Corp.'s) standard offer price, and 1.5 % below during the final year. Green Mountain has also agreed to develop solar and wind generating facilities in the area within the next two years. Until the new resources are developed, Green Mountain Energy will be providing a mix of 98% natural gas and 2% from sources such as hydro, landfill gas, wind and solar to the NOPEC customers. Green Mountain Energy has also agreed to install solar panels on at least one school in each of the eight NOPEC counties. NOPEC is also planning to pursue a similar contract for the purchase of natural gas, with Green Mountain Energy being one of the potential suppliers.

According to the Restructuring Act, if the price of the green power purchased by a municipal aggregator exceeds the standard offer rate of the local distribution company, then those green power resources must conform to the definition of renewable resources used for the Massachusetts RPS requirements. This means that the green power could only come from the following types of renewable resources: solar photovoltaics and solar thermal; wind energy; fuel cells using an eligible renewable fuel; qualifying landfill methane gas and anaerobic digester gas; qualifying low-emission, advanced biomass technologies; and ocean thermal, wave or tidal energy. In addition, these resources would have to have begun commercial operation sometime after December 31, 1997.

It is important to note that all retail electricity suppliers – including municipal aggregators – will be required to comply with the Massachusetts RPS beginning in 2003. Thus, if a municipal aggregator wishes to purchase more green power than that which would be provided under the status quo, it should purchase a portion above and beyond the portion dictated by the RPS.

Separate Green Power Products for Some Interested Customers

Municipal aggregators can also offer green power products as an option for interested customers who are willing to pay the higher prices. Unlike the approach described above, this would be an "opt-in" program where customers would have to make an affirmative decision to select a green power product over the typical electricity service. Municipal aggregators can offer a variety of different green power products for customers to choose from, in order to accommodate customers' willingness to pay different amounts for different levels of green power.

The primary advantage of this approach – relative to providing green power to all customers – is that there is no need to obtain approval from town or city government to incur the additional costs necessary to buy the green power. Each customer makes the cost decision, based upon his or her own environmental values and willingness to pay.

Municipal aggregators could also offer both green power to all customers as a portion of the total load, and green power products to those who are willing to pay more for even greater levels of environmental benefits. This approach might result in the best balance between obtaining political support for increased costs and maximizing the environmental philanthropy of the individual members of the community.

The primary disadvantage of this approach is that it requires customers to make a conscious effort to switch to the green product. Many customers who are willing to support the environmental goals of the product might not participate for all of the reasons that customers are generally uninterested in, or unwilling to, switch electricity suppliers. Thus, the green product might be able to influence only a small portion of the total electricity supply. Nonetheless, this concern applies to all sellers of green power products, and municipal aggregators might be in the best position to develop customer interest and participation.

Offering separate green power products would require a more flexible, dynamic relationship with the municipal aggregator's power supplier. It would probably not be possible for the aggregator to determine in advance the amount of green power needed for its community and the additional cost required. Thus the negotiations with power suppliers would have to include provisions for responding to customer demand for green power as it develops over time. Municipal aggregators should consider whether it makes sense to contract with one power supplier to provide several products, or with several suppliers each with their own product.

It may be difficult for municipal aggregators to find power suppliers that are willing to provide power exclusively for a green power product. The Restructuring Act requires that only licensed power suppliers can provide power to retail customers. However, there are substantial costs associated with being a licensed power supplier, mostly due to the

many requirements of being a member of NEPOOL, including scheduling requirements, reserve requirements, installed capacity requirements and membership dues. While there may be several renewable *generation companies* willing to provide green power to Massachusetts customers, these companies are usually not willing to incur the costs to become *licensed suppliers*, and thus cannot provide their power directly to retail customers (or aggregators acting on behalf of retail customers). For their green power products, municipal aggregators must find licensed power suppliers that are willing and able to purchase green power from renewable generation companies. In its on-going research into green power aggregation opportunities, the Massachusetts Energy Consumers Alliance has had difficulty finding power suppliers that are readily willing to provide an exclusively green power product.

Cape Light Compact Default Pilot Project and Green Power Options

The Compact's new Default Pilot Project (described in Appendix B) includes two voluntary green power products: one option including 50 percent renewable power at a price of 7.2 ¢/kWh, and one including 100 percent renewable power at a price of 9.9 ¢/kWh. The generation will initially be provided by hydroelectric plants. These prices represent increases of 47 percent and 100 percent, respectively, above the price offered other customers within the Default Pilot Project. The 50 percent renewable product would cost a residential customer using 7,000 kWh per year roughly $13 additional per month, and the 100 percent renewable product would cost that customer roughly $29 additional per month. These relatively large price premiums are an indication of the difficulty in finding power suppliers willing to provide green products in the current electricity market in New England. The Compact is also offering a third voluntary green power product, where customers contribute one ¢/kWh to a fund that will be used to develop new renewable generators on Cape Cod and Martha's Vineyard.

Utilities that have offered green power products in the past have found that it is difficult to obtain high customer participation rates.[12] While opinion surveys frequently find that 50 to 90 percent of Americans are willing to pay more for renewable power, much smaller percentages tend to actually sign up for renewable power when offered (NREL 10/2001). Some successful utilities have achieved participation rates of three to four percent, with a seven percent rate being the highest achieved to date (NREL 9/2001). However, among the 40 million American households that have had access to green power in recent years, only one percent have chosen to purchase it. Non-residential customers are even less likely to purchase green power, with a green power demand that is roughly one-fifth of the residential green power demand (NREL 10/2001).

There are many factors that lead to this disparity between customer interest in renewables and customer participation in green power programs – including low standard offer rates, the lack of customer understanding of green power products, the types of green power products that have been offered to date, and more. A recent study identifies several best practices that can be used to increase customer participation, including: supporting the best, locally available renewable resources; keeping the product simple and making participation easy; working with environmental and community groups; seeking out business and civic champions; and including non-residential customers (NREL 9/2001).

[12] Green power products are often referred to as "green pricing" when offered by a utility in a non-competitive electricity market.

It is important to note that all retail electricity products must comply with the Massachusetts RPS beginning in 2003. Thus, if a municipal aggregator wishes to offer a green power product to some of its customers, the product should offer green power above and beyond the renewables requirement of the RPS.

Development of New Renewable Resources

There are several ways that municipal aggregators can facilitate the installation and operation of new renewable resources, particularly within their geographic boundaries. In general, a municipal aggregator can assist project developers with overcoming the many barriers – legal, financial, institutional, regulatory barriers – that tend to inhibit the development of renewable facilities and clean distributed generation.

Some examples of the project development support that municipal aggregators could provide to renewable developers are summarized below.

- Assist with the development of potential sites. With its knowledge of local businesses, industries, institutions and facilities, municipal aggregators are in a good position to identify host sites for development of renewable resources and distributed generation – including the use of municipal facilities as host sites. Municipal aggregators might also be able to assist with feasibility studies and other research needed to support specific projects. They might also be able to assist project developers in gaining local support for projects, and presenting all of the various costs and benefits of a project, to help address local concerns about potential negative impacts of the project.

- Energy and environmental planning. As described in Section 4.5, municipal aggregators can play a key role in short- and long-term energy and environmental planning for the community. These plans could help identify the various costs and benefits of different renewable and distributed generation projects, and demonstrate the importance of such projects in the electricity resource mix of the community. These planning efforts could also identify constraints and weak spots on the local distribution system, and identify distributed generation options that would be able to address distribution problems and improve reliability of service.

- Use green power programs to provide financial support. By promoting green power to customers, either to all customers or through a voluntary program, municipal aggregators can help provide financial support to potential renewable and distributed generation developers. Aggregators might even tie the green power programs to the development of local renewable options, and provide local developers with a power contract that they can use to obtain the necessary financing for their project. Electricity customers might be more willing to support green power programs if they knew that the programs were supporting projects within their community.

- Address institutional and regulatory barriers. One of the greatest challenges in developing renewable and distributed generation projects is overcoming the various technical, institutional, and regulatory barriers that exist today. Technical barriers arise from distribution utility requirements to ensure engineering

compatibility of interconnected generators with the existing grid. Institutional barriers arise from burdensome utility business practices relating to contracting for power, approving interconnections, interconnection applications and fees, insurance requirements, and operational requirements. Regulatory barriers arise from tariff structures that are unfavorable to project developers, such as back-up charges and unfavorable by-back rates.(NREL 2000) Municipal aggregators can help address these barriers by working with the project developers, the local distribution utility, the DTE and other relevant agencies to educate all parties and establish more streamlined procedures for project development.

- Provide education, training and political support. Municipal aggregators can also assist in the educating and training that can be useful in supporting renewable and distributed generation projects. The education can be directed to government representatives whose approval may be necessary for political support, as well as training for town and city employees who may play important roles in site selection, assessment, development and operation. Also, it may be important to educate the community's citizens and business leaders about the implications of certain projects. The energy and environmental plan described above can play a key role in the education process, but additional, more focused efforts may be needed as well.

In addition, the Restructuring Act allows municipal aggregators to apply for funds from the Renewable Energy Trust to support renewable electricity initiatives. The Cape Light Compact has received such a grant from MRET, and is in the process of implementing various renewable generation and DG initiatives (Compact 2001).

Much of this support could also be offered by a municipal agency, regardless of whether the community has formed a municipal aggregator. However, a municipal aggregator is likely to be in a better position to assist with project development because: (a) it may have the staff resources and expertise necessary to support project development, (b) it may have a more clearly defined mandate to promote renewable development, (c) it may be in a better position to develop energy plans and investigate the costs and benefits of various options, and (d) it may have better connections with the regulatory agencies, utilities and market actors that are involved in the project development process.

4.4 Providing Energy Efficiency Programs Through Municipal Aggregation

Background on Municipal Aggregation and Efficiency Programs

Section 134b of the Restructuring Act allows municipal aggregators to obtain the energy efficiency funds raised through the system benefits charge, and to implement efficiency programs in place of those currently provided by the electric distribution companies. As an energy efficiency program administrator, municipal aggregators can assert greater local control over the efficiency programs and seek opportunities for improving upon the programs currently offered by the distribution company.

The Massachusetts legislature recently re-authorized the efficiency system benefits charge to run from 2003 through 2007, at a rate of 0.25 ¢/kWh. This charge will raise a total of roughly $122 million throughout the state of Massachusetts. Table 4.2 presents the amount of efficiency revenues that would be created for each of the municipalities participating in this study. It also presents the amount of efficiency revenues that will be generated for the Cape Light Compact, for comparison purposes.

Table 4.2 Efficiency Revenues Generated by the System Benefits Charge in Massachusetts

	2000 Electricity Sales (GWh)	Efficiency Revenues ($1,000)	Percent of Total (%)
Boston	6,150	15,376	12.6
Brookline	336	841	0.7
Cambridge	1,495	3,738	3.1
Newton	586	1,465	1.2
Somerville	348	869	0.7
Cape Light Compact	1,834	4,585	3.8
Massachusetts Total	48,861	122,152	100.0

The 2000 electricity sales were provided by NSTAR. The 2000 electricity sales were the most recent available. In 2003 and later years the sales will be higher than in 2000 due to load growth, and the efficiency revenues will be higher proportionately.

Summary of Requirements that Must be Fulfilled for a Municipal Aggregator to Implement Energy Efficiency Programs

In order to become an efficiency program administrator, a municipal aggregator must first develop an energy efficiency plan that describes the manner in which the energy efficiency programs will be implemented. This energy efficiency plan should be developed in consultation with DOER. The plan must be approved by town meeting or other legislative body.

The Restructuring Act specifies that in order for a municipal aggregator to obtain energy efficiency funding, the DTE must first certify that the energy efficiency plan is consistent with state energy efficiency goals. These energy efficiency goals are presented in Table 4.3 below. This provision of the Act prohibits municipal aggregators from spending the efficiency funds in just any way that they want. In general, the state energy efficiency goals require: that the benefits of the programs outweigh the costs; that programs are offered to all customer types consistent with their contributions to the efficiency funds; that low-income customers receive a prescribed amount of efficiency programs; that programs address both immediate savings and savings available over the long-term through transformation of the efficiency market in the region; and that programs utilize the various competitive actors in the energy efficiency market where appropriate.

However, the Restructuring Act also includes a provision that allows municipal aggregators greater discretion than electric utilities in designing their efficiency programs. According to the Act:

> The municipality or group of municipalities shall not be prohibited from proposing for certification an energy plan which is more specific, detailed, or comprehensive, or which covers additional subject areas than any such state-wide conservation goals (Restructuring Act, Section 134b).

It is not clear just how much additional discretion this language provides. Deviations from the state energy efficiency goals would have to be approved by the DTE when the municipal aggregator applies for certification of the energy efficiency plan.

Table 4.3 Massachusetts State Energy Efficiency Goals.

Overall Statewide Energy Efficiency Goal:
1. To protect the environment and strengthen the economy by increasing the efficiency of energy use.
Energy Efficiency Operational Objectives:
2. To reduce the use of electricity cost-effectively (as defined by the DTE).
3. To ensure that energy efficiency funds are allocated to low-income customers consistent with requirements of the Act, and allocated equitably to other customers.
Energy Efficiency Programmatic Objectives:
4. To reduce customer energy costs by balancing short- and long-run savings from energy efficiency programs.
5. To support the development of competitive markets for energy efficiency products and services.

Source: DOER 1999.

The DOER requires that all program administrator's energy efficiency plans follow a certain format and contain specific information, in order to promote consistency across different plans and ensure that sufficient information is provided for regulatory review. It requires that each plan contain: a description of each efficiency program; a detailed budget broken out by program and by type of expense; a demonstration that the programs are cost-effective; a demonstration that the programs are consistent with state energy efficiency goals; and a discussion of how the programs will be monitored and evaluated over time. (DOER 1999)

The DOER also requires that all efficiency program administrators provide an Annual Report on Energy Efficiency Activities that describes the programs' historical experience over the preceding year.[13] These reports must contain detailed data describing the program expenditures, participation and savings. These data are used by the DOER to compile a state-wide report on the progress made each year by energy efficiency program administrators. (DOER 1999)

In addition, the Restructuring Act requires that, within two years of DTE approval of the energy efficiency plan, municipal aggregators must provide the DTE with written notice that its plan is implemented. Although not required by the Act, it would be appropriate for each municipal aggregator to also produce periodic "monitoring and evaluation"

[13] These *historic* annual reports should not be confused with the periodic energy efficiency plans, which provide projections of *future* program activities.

reports, similar to the reports that the electric distribution companies prepare. Such reports would be useful for the municipal aggregator in modifying and improving program designs over time, verifying compliance with the municipality's goals, and would provide assurance to the DTE, the DOER and others that the efficiency programs were being run properly.

Advantages to Becoming an Energy Efficiency Program Administrator

It is important to note that the Massachusetts legislature, the DTE and the DOER have a long history of support of utility-run energy efficiency programs, especially relative to most other states. Massachusetts utilities have had many years of experience in designing and implementing efficiency programs. Most of these programs have also benefited from collaborative processes, where interested stakeholders work with the utilities to design programs that will be successful in achieving the state energy efficiency goals.[14] Consequently, the efficiency programs currently operated by the distribution companies in Massachusetts are relatively mature and well-designed compared to those of most other electric companies in the US.

However, the relative success of Massachusetts electric utility programs does not mean that there is no room for improvement. There are several reasons why municipal aggregators can improve upon the way efficiency programs are delivered in Massachusetts today.

- Proper incentives. Electric distribution companies have a powerful financial incentive to increase electricity sales in order to increase company profits. This incentive works directly against the primary goals of energy efficiency and creates an inherent tension within electric companies and a significant barrier to energy efficiency programs. The DTE allows electric companies to earn shareholder rewards in order to counteract their incentive to promote sales. However, such rewards are only partially effective, they use up some of the efficiency funds that could otherwise be spent on efficiency measures, and frequently encourage too much attention on the rewarded activities and not enough attention on other important initiatives. Municipal aggregators have no such financial disincentive to energy efficiency programs. In fact, reducing costs to consumers through improved efficiency is one of the core objectives of municipal aggregators. This means that municipal aggregators are much more likely to design and implement aggressive, successful energy efficiency programs that maximize the benefits available from the energy efficiency funds.
- Environmental and economic development goals. In addition to their core mission of reducing electricity costs, many municipal governments are also interested in environmental protection and local economic development – both of which are promoted through energy efficiency. Thus, municipal aggregators have

[14] Some of the key players in the collaborative processes include the DOER, the Massachusetts Attorney General, Associated Industries of Massachusetts, the Low-Income Energy Assistance Network, and the Northeast Energy Efficiency Council.

even more incentives to design and implement aggressive, successful efficiency programs relative to electric companies.

- Local connections. Energy efficiency programs are essentially a decentralized initiative – requiring the active involvement of many parties, including customers, distributors of efficiency products, efficiency vendors, builders, architects, and other trade allies. Municipal aggregators can use their extensive local networks to educate these actors about the importance of energy efficiency and the opportunities available from the energy efficiency programs. For example, municipal aggregators can work with local government departments; schools and educational facilities; social service agencies; social, civic and religious organizations; business and trade associations; and local media (Compact 11/2000).

- Innovative initiatives. Municipal aggregators might be in a better position than electric distribution companies to implement innovative efficiency programs. For example, the Compact is offering programs that enable customers to switch from inefficient, expensive electric space heating systems to high-efficiency gas space-heating systems (Compact 11/2000). While such programs offer significant benefits to customers and society in general, electric companies will not offer them because they result in significantly lower electricity sales and thus lower profits.

- Comprehensive planning. As described in Section 4.5, municipal aggregators can undertake more comprehensive long-term planning than distribution utilities tend to undertake in the restructured electricity industry. Such planning can help communities minimize the various impacts of the electricity industry and strike the appropriate balance between electricity costs and environmental protection.

- Local benefits. Municipal aggregators can ensure that the efficiency funds raised from customers within their community will be spent on efficiency programs and measures in their community. Electric utilities have no such incentive, and will sometimes focus their activities on those towns where it is easiest to achieve efficiency savings.

- Community involvement. Because they must submit the energy efficiency plan for public review, and they will most likely be governed by local representatives, municipal aggregators, can respond to local concerns and priorities better than electric distribution companies.

- Maximize funds for efficiency. Since they do not require shareholder incentives in order to implement efficiency programs, municipal aggregators can use the shareholder incentives to deliver efficiency savings instead. The distribution utilities in Massachusetts can receive as much as five to ten percent of the total efficiency funds in the form of shareholder incentives, depending upon how the programs perform and other factors.

Important Concerns About Municipal Aggregators Implementing Efficiency Programs

Before embarking on a course to become an energy efficiency program administrator, municipal aggregators should carefully consider whether a single town or city will have the resources necessary to implement energy efficiency more effectively than the local distribution company. It is important to ensure that a municipal aggregator has the necessary staff, experience, budgets, political mandate and willingness to *improve* upon utility-run efficiency programs, and to *not undermine* the progress that Massachusetts utilities and other efficiency stakeholders have achieved to date.

Efficiency programs require many administrative expenses that are essentially fixed, regardless of the number of customers served. For example, extensive data collection and processing is an important aspect of well-run efficiency programs, and the costs of these tasks will not scale down much with the size of the customer base being served.

In addition, most utilities hire several outside vendors to deliver efficiency programs and measures to customers. These vendors play a key role in marketing programs, auditing homes, selling and installing efficiency measures, processing rebates, developing catalogs of efficiency measures, working with trade allies to stock stores with efficiency products, and more. These vendors are all hired through a competitive bidding process, and each one enters into a contract with each efficiency program administrator. Soliciting, contracting with, and managing these vendors requires a significant amount of administrative support.

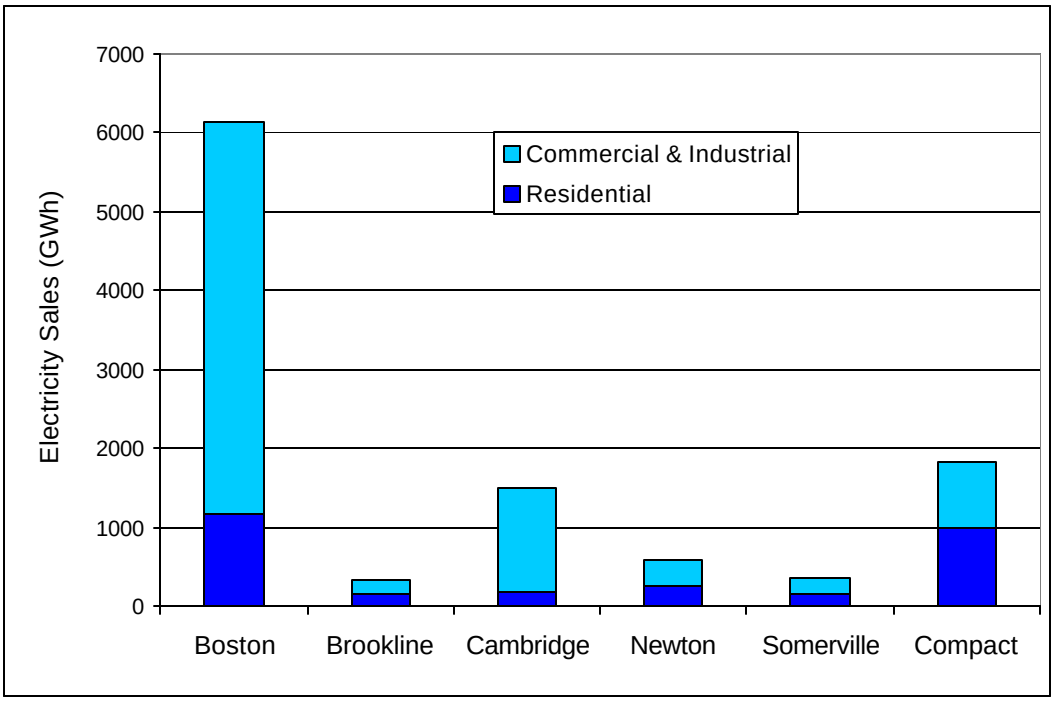
The Compact has addressed this issue by hiring Honeywell DMC as a "management contractor," who will in turn manage the work of roughly 14 different contractors and vendors who will deliver the efficiency measures to customers. Nonetheless, there is still significant administrative work required of the Compact to manage the management contract and oversee the operation of the entire efficiency program.

In sum, there is a risk – a significant risk – that municipal aggregators who independently implement energy efficiency programs might find that their high administrative costs outweigh the benefits to be gained from replacing the distribution company's programs. Each municipality should seriously consider whether it has a sufficient customer base (and therefore efficiency budget), and administrative capacity to support a successful, effective efficiency program.

While it is difficult to estimate how large a municipal aggregator needs to be to support the administration costs, the experience of the Compact provides a useful guideline. Although the Compact currently has less than one year's experience, it appears that its efficiency budgets and programs are large enough to support the necessary administrative efforts and to significantly improve upon the efficiency programs offered by the local electric company. Thus, other municipal aggregators whose customer base is at least as large as the Compact's should also be able to support a successful efficiency program, while those with fewer customers may be at risk of introducing administrative inefficiencies into the current program delivery system.

Figure 4.1 presents a graph of the electricity sales of the towns and cities participating in this study, as well as the electricity sales to the Cape Light Compact's territory for comparison purposes. Boston would clearly have a large enough customer base to support the administrative expenses associated with energy efficiency programs, and Cambridge might have enough. However, Brookline, Newton and Somerville are at risk of introducing administrative inefficiency into the current efficiency programs.

Figure 4.1 2000 Electricity Sales to Customers in Participating Cites and Towns



Furthermore, in recent years there has been a trend toward developing regional programs that can be delivered across several electric utility territories, and even across several state boundaries. Such regional programs can result in more effective design and implementation of programs, greater participation of the various trade allies, less customer confusion, and greater opportunities to transform the regional market for energy efficiency products and services. In Massachusetts, there currently are three types of programs have been developed and implemented on a regional basis:

- The Northeast Energy Efficiency Partnership (NEEP) is a non-profit organization dedicated to designing and organizing energy efficiency programs that can be delivered consistently across a large geographic area. NEEP has initiatives and members in all six New England states, as well as Maryland, Delaware, New York, New Jersey, and the District of Columbia. Some of the key programs offered by members in Massachusetts include those that address residential lighting, residential appliances, commercial lighting, commercial/industrial motors, and commercial/industrial heating ventilation and air conditioners.

- Energy efficiency initiatives addressing new construction in the residential sector require the involvement of many different actors, including home builders, architects, developers, building inspectors, and home buyers. Often these actors work in several different electric utility territories. Thus, new construction programs can be more effective if they are coordinated across many utility service territories. For the past several years Massachusetts electric utilities have promoted the same efficiency activities through their residential new construction programs, and have coordinated their efforts through a Joint Management Committee.
- The Restructuring Act requires all efficiency program administrators to dedicate a prescribed portion of their efforts to serving low-income customers. The Act also requires that these programs be implemented through the existing weatherization and fuel assistance network, and that they be coordinated across all gas and electric companies in the state with the goal of standardizing implementation (Section 19). The Low-Income Energy Advocates Network (LEAN) has developed a set of comprehensive programs that utilities are using to deliver energy efficiency services to low-income customers.

Municipal aggregators may create a risk of undermining some of these regional efforts by not participating and leaving gaps in the geographic coverage, or by introducing inefficiencies by increasing the number of program administrators that need to be coordinated. However, such a risk could be addressed by municipal aggregators that are conscientious of the benefits associated with the regional programs, and take efforts to either actively participate in the programs or offer comparable services in order to improve upon the programs. Municipal aggregators might improve upon the regional programs by introducing ideas, policies and initiatives that better reflect community interests or higher standards for saving energy and reducing environmental impacts.

Finally, it is important to note that when a municipal aggregator takes over the energy efficiency programs for its community, it does not create any new funds to support efficiency initiatives. The amount of efficiency funds that can be raised through the system benefits charge is set by legislation, and is the same for distribution companies and municipal aggregators. The municipal aggregator, however, can make the most of those funds by (a) ensuring that the funds raised in the community are spent in the community, and (b) ensuring that the funds are spent as effectively as possible. If they wish, municipal aggregators can increase the amount of energy efficiency funds, by establishing their own system benefits charge to supplement the existing state-wide charge. But this latter approach requires political support for increased prices.

4.5 Advantages and Disadvantages of Municipal Aggregation

This section provides a brief summary of the various advantages and disadvantages of becoming a municipal aggregator. They are discussed relative to the three broad areas addressed by municipal aggregators: power supply, green power and energy efficiency.

Power Supply

Advantages of Offering Power Supply Services:

- Municipal aggregation provides the best opportunity to reduce electricity supply costs to all customers within the community.
- Municipal aggregation may be the only way that small commercial, residential and low-income customers gain access to the competitive electricity market, for many years to come.[15]
- Municipal aggregation can significantly improve the competitive opportunities available to small customers, by eliminating the marketing costs, eliminating the transaction barriers, and improving their load factor by combining their loads with others in the community.
- Municipal aggregators can act as consumer advocate for all electricity customers in the community, on many energy and environmental issues. They could create a new political block that reflects local priorities and issues before the legislature, the DTE, the DOER and other forums.

Disadvantages and Risks of Offering Power Supply Services:

- Municipal governments may have to incur considerable costs in order to develop an aggregation plan, have the aggregation plan approved by the DTE, and negotiate favorable contracts with power suppliers. In approving the Compact's aggregation plan, the DTE made it clear that a municipal aggregator must have a power supply contract in place in order to obtain approval for a plan. The municipal government must be fully committed to dedicating the time, resources, and political capital to develop a successful plan. While the Compact has created precedents that should speed up the aggregation plan approval process considerably, municipalities should expect to spend as much as two to three years to have an aggregation plan developed and approved.
- The competitive wholesale electricity market in New England is still evolving, and there currently are very few power suppliers that are willing to offer power supply deals. Based on the experience of the Compact, there are no suppliers that are able to provide power at less than the local utility's standard offer rates. There is a risk that municipal aggregators incur considerable costs only to find that the power supply benefits are not yet available from the electricity marketplace. This risk is likely to diminish significantly with time, and may be insignificant when the standard offer is eliminated in March 2005.

[15] Except for perhaps through the market for green power.

Green Power

Advantages of Offering Green Power Services:

- Municipal aggregators can buy green power on behalf of all electricity customers within the community, thereby significantly expanding the customer base supporting clean power generation.
- Municipal aggregators can get community input and involve local representatives in the decision-making process regarding green power. This level of decision making might result in higher environmental priorities than decision making at the utility, state or national level.
- Municipal aggregators can combine higher-priced green power programs with cost reductions from favorable power supply deals or aggressive efficiency programs, in order to create a package that is more economically and politically acceptable in total.
- Municipal aggregators can offer customers a broad range of green power products that reflects local environmental priorities. This can include light green power with little or no extra cost for all customers, more aggressive green power for all customers, and distinct green power products that customers can choose to purchase for themselves.
- Municipal aggregators can promote the development of local renewable and distributed generation resources by assisting with the development of potential sites; planning for energy and environmental needs; using green power programs to leverage financial support for local projects; helping to overcome institutional and regulatory barriers; and providing education, training and political support.
- Municipal aggregators can apply for grants from the Renewable Energy Trust to support renewable electricity initiatives.
- Municipal aggregators can seek opportunities for using clean distributed generation projects to alleviate local distribution problems, thereby improving reliability of service in the community and the resilience of the regional electricity supply.

Disadvantages and Risks of Offering Green Power Services:

- In order to provide green power to all customers within the community, municipal aggregators must obtain political support for associated increase in costs, if there are any. This may limit the amount of green power that can be provided to all customers, and may jeopardize the political support for the overall municipal aggregation initiative.
- In order to provide green power to all customers within the community, municipal aggregators are likely going to have to increase electricity costs above what they would be otherwise. This increase in costs might result in some customers (particularly large industrial customers) opting out of the municipal aggregation

program altogether. This result would undermine one of the key goals of municipal aggregation.[16]

Energy Efficiency

Advantages of Offering Efficiency Programs:

- Municipal aggregators are likely to design and implement much more aggressive and successful efficiency programs than electric companies, because they are not driven by powerful incentives to increase electricity sales and profits.
- Municipal governments are interested in the environmental protection and local economic development benefits that are offered by energy efficiency.
- Municipal aggregators can use their extensive local networks to educate customers and trade allies; to market efficiency programs, and to promote community involvement in the transformation of the local efficiency market.
- Municipal aggregators can pursue innovative initiatives, such as fuel-switching programs, that electric companies might not be able to identify or be willing to pursue.
- Municipal aggregators can ensure that the efficiency funds raised from customers within their community will be spent on efficiency programs in their community
- Municipal aggregators are in a better position to respond to local concerns and priorities than electric distribution companies.

Disadvantages and Risks of Offering Efficiency Programs:

- Municipalities may have to incur considerable costs in order to develop an efficiency plan, have the plan approved by the appropriate government process, and have the efficiency plan approved by the DTE. This process could take as long as one to three years, and DTE approval depends upon an aggregation plan obtaining DTE approval first.
- Municipal aggregators face the risk that their administrative costs outweigh the benefits that might be gained from replacing the distribution company's efficiency programs. This risk increases as the size of the municipality decreases, because many administrative costs are essentially fixed.
- Municipal aggregators create a risk of undermining the regional energy efficiency initiatives by not participating and leaving gaps in the geographic coverage, or by introducing inefficiencies by increasing the number of program administrators that need to be coordinated.

[16] These two risks do not apply to light green power products, which may require little or no increase in electricity costs.

Comprehensive Energy and Environmental Planning

Municipal aggregators can play an instrumental role in developing short- and long-term plans for addressing the energy and environmental needs of a community. In the past, electric utilities were required to develop and implement "integrated resource plans," which evaluated the various electricity resource options, and identified that combination of energy efficiency, conventional generation sources and renewable resources that would best meet the broad goals of providing low-cost, safe, and reliable electricity services.

Since the electricity industry in Massachusetts was restructured, utilities no longer play this important role of long-term planning. Instead, the decisions about how to meet electricity needs are essentially left up to the individual consumers and the combined efforts of the power supply companies.[17] To date, there is no evidence that the combined effect of individuals' and companies' decisions in the electricity markets are consistent with sound long-term planning that meets a variety of policy goals.

Municipal aggregators could be in a great position to take on the role of energy and environmental planning for both the short- and long-term future. They have an influence over the types of power supplies to purchase, they are in a position to purchase green power for all customers or to offer green power products to some customers, they are in a position to assist with the development of local renewable and distributed generation projects, and they can plan for and implement energy efficiency programs.

One of the goals of a municipal aggregator may be environmental stewardship, putting them in a better position than electric companies to make the sometimes necessary tradeoffs between the goals of environmental protection and low-cost power. They can also combine several components of their program (e.g., green power and efficiency) to provide a package that addresses both of these goals.

Furthermore, some communities might have clearly defined environmental goals, such as those outlined in community climate change action plans. A municipal aggregator would provide a vehicle for that community to implement many of the components of such plans. Similarly, for those communities that do not have climate change action plans, a municipal aggregator could play an instrumental role in preparing such a plan.

Risks Associated With Long-Term Governmental and Political Support

A successful municipal aggregator requires sufficient staff, resources, legal support, technical support, and political mandate to make the most of the opportunities available for power supply, green power and energy efficiency programs. Any municipality that has the resources to prepare an aggregation plan and an efficiency plan, and obtain DTE

[17] ISO-NE and other Regional Transmission Organizations are currently debating options for how to plan for new generation and transmission facilities in a regional context. However, these processes are currently not well defined, are not likely to give much consideration to environmental concerns, and provide for very little public input – especially at the level of community involvement.

approval for those plans, is likely to be in a good position to follow-through with the necessary support for implementing the plans successfully.

However, over time municipal governments can change, key representatives and local officials may move on to other initiatives, and political priorities can shift to different directions. Consequently, municipal aggregators face the risk of losing the support they need to run the aggregation initiatives successfully. Communities need to establish clear financial, political, and governance systems that ensure that municipal aggregators are provided with the necessary support over the long-term.

4.6 Aggregation of Multiple Municipalities

One of the greatest risks of municipal aggregation occurs as a result of the administrative costs necessary to ensure successful initiatives. This is especially true for energy efficiency programs (as discussed above), but might apply to all the initiatives that a municipal aggregator could undertake.

One way to both reduce this risk and make the most of municipal aggregation opportunities, is for several towns to join together as a single aggregator – as the Compact has done. By combining several towns into a single municipal aggregator it may be possible to reduce the administration and organizational costs (as a percentage of total costs); increase the amount of technical and legal support available; increase the buying power among generation companies; have a larger impact on the green power market; and provide energy efficiency services more effectively.

For example, if the five municipalities participating in this study were able to join together as a single aggregator, there would clearly be enough of a customer base to warrant and support a successful aggregation initiative. Even if the four smaller municipalities – Brookline, Cambridge, Newton, and Somerville – were to join together as a single aggregator, they would have a considerable customer base to work with, as indicated in Table 4.2 and Figure 4.1. These towns combined could raise roughly $6.9 million per year, which is larger than the funds raised by the Compact. Furthermore, there are several other communities in the metropolitan Boston area that are active in energy and environmental issues and might be interested in joining a combined aggregation initiative, including Arlington, Medford and Watertown.

However, this approach raises several other important issues. The most important one being whether and how these towns would coordinate their activities and share in the costs and benefits of the effort. This approach may require considerable cooperation among municipalities with very different priorities, decision-making approaches and political challenges. The Compact has a significant advantage over other groups of municipalities because it has the benefit of the Barnstable and Duke's county governments (which are among the few remaining effectively operating counties in Massachusetts), and the Cape and Vineyard towns have a relatively cohesive identity created by their geographic makeup and similar interests.

One option that may be more politically feasible is for each of several towns to establish their own independent municipal aggregator, but for them to form a centralized system

for implementing the energy efficiency programs. This would significantly reduce the topics and issues that would have to be agreed to among the participating communities, but would provide for a more effective way of delivering energy efficiency programs. Energy efficiency would be singled out for joint delivery because, among all of the municipal aggregator initiatives, it requires the greatest amount of administrative support and because communities have more to lose if existing utility programs are undermined by ineffective energy efficiency programs.

The central system or agency for delivering energy efficiency programs could be designed in several different ways. One option is for one of the larger municipal aggregators (e.g., Boston) to establish an energy efficiency program, and then allow other municipal aggregators to participate in that program. Ideally, this approach would allow the newly-participating municipalities some governance role for contributing to the design of the efficiency programs. Another option would be several municipal aggregators to hire an independent agent to implement their energy efficiency programs on their behalf. This independent agent could be a non-profit organization, or it could be a for-profit energy service company. The participating communities could establish a governance system whereby local control and input to the process is maintained, but the administrative efforts are centralized through one organization with the necessary resources and skills to operate efficiency programs as effectively as possible.

5. Municipalities as Municipal Electric Utilities

5.1 Background on Municipal Electric Utilities

There currently are 40 municipal electric utilities (MEUs) serving 350,000 customers in all or parts of 58 Massachusetts cities and towns. All together they deliver roughly 13 percent of the electricity used in Massachusetts. These utilities were established between 1889 and 1926, by vote of the citizens in each city or town.[18]

One of the primary differences between municipal electric utilities and investor owned utilities (IOUs) is that the former are owned and operated by the people in the communities that they serve. MEUs are managed and run by a municipal utility board that is either elected locally or appointed by local officials.

Another key difference is that municipal electric utilities set the electricity prices for all of the customers within their community. The electricity rates and terms are typically set by the municipal utility board.

Municipal electric utilities do not earn profits, so they potentially operate with a different mission and a different set of goals than IOUs. Because of their non-profit status, and the fact that they are subject to public control at the local level, MEUs are not subject to regulation by the DTE and operate under different Massachusetts statutes than the IOUs.[19]

All municipal electric utilities own the distribution system within their geographic borders. In some cases MEUs also own and operate their own power plants, while in many cases they purchase generation from others on behalf of their retail customers.

Many of the MEUs in Massachusetts are members of the Massachusetts Municipal Wholesale Electric Company (MMWEC), a non-profit public corporation and political subdivision of the Commonwealth of Massachusetts. MMWEC was established by Massachusetts legislation in 1975, in order to make the municipal electric utilities more competitive with the state's IOUs. MMWEC acts as a cooperative, providing its members with a variety of power supply, financial and other services. Figure 5.1 presents a map of the MEUs in Massachusetts, including the members of MMWEC.

As a member of MMWEC, municipal electric utilities can increase their buying power in the electricity market, and reduce the administration and management required of local officials. MMWEC currently has partial ownership of several power plants in the region, including three oil plants, the Millstone nuclear unit #3, and the Seabrook nuclear station. MMWEC also has power supply contracts, including power from New York Power Authority hydro projects, Hydro-Québec, and a gas/oil plant. These power plants and supply contracts provide much of the power to the member MEUs.

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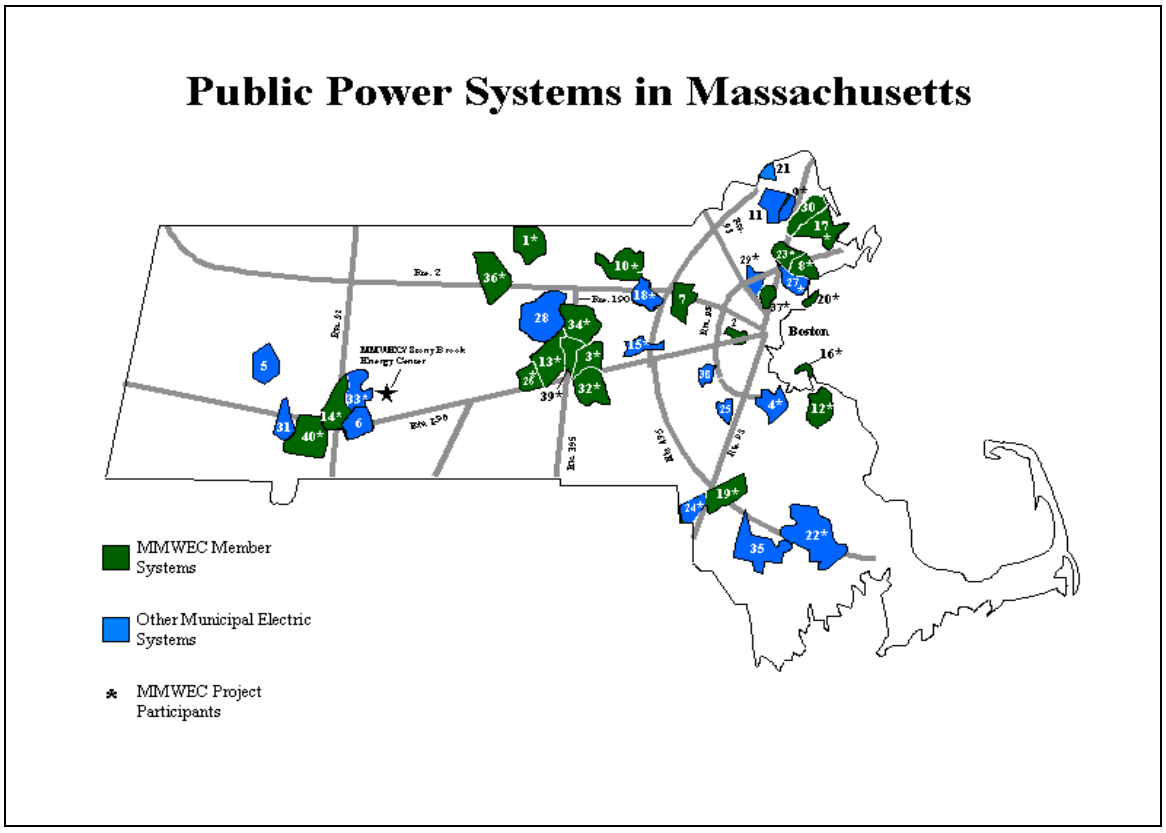
[18] Much of this subsection is based on information from the MMWEC website: www.MMWEC.org.

[19] In particular, see Massachusetts General Laws, Chapter 164, Section 34 through 69.

Under the Restructuring Act, municipal electric utilities are not required to open up their territories to competitive electricity suppliers, or to provide customers with a choice of generation company. Thus, they are not required to comply with many other provisions of the Act, such as the RPS or the system benefits charge.

Figure 5.1 Municipal Electric Utilities in Massachusetts



Source: www.mmwec.org

Municipal electric utilities can decide to allow competition within their territories, if they believe it will provide net benefits to their customers. If an MEU wishes to compete for new customers outside of its service territory, then it must open its own system to competition and comply with the other provisions of the Restructuring Act. Municipal electric utilities that have not introduced competition by March 1, 2003 are required by the Act to conduct a study and hold public hearings regarding the potential benefits of customer choice, and may conduct a referendum on whether to introduce customer choice. To date no MEUs have chosen to introduce retail competition in their service territories.

In theory, municipal electric utilities can be much more responsive to local needs and interests, because of the control by town officials and locally elected officials, and because of the focus on local needs and issues. However, in practice many of the policy decisions regarding electricity supply and demand are rarely presented to the general public. Most citizens know very little about their municipal electric utility, and rarely have any direct input to the decision-making process.

A community that is currently served by an IOU may wish to establish a municipal electric utility, in order to gain community control over the generation, transmission and distribution of electricity within its borders. This process would entail purchasing the transmission and distribution equipment from the local distribution company, and becoming the sole provider of electricity for all the customers within the city or town. This approach would be much more aggressive than establishing a municipal aggregator, because it would require the municipality to purchase, own, operate and maintain the distribution and transmission system.

Community members in Brookline and Arlington have recently been investigating the advantages and disadvantages of becoming a municipal electric utility. This interest has been driven, in part, by the municipalities' dissatisfaction with the summer 2001 power outages and NSTAR's response to those outages.

5.2 Steps Required to Create a Municipal Electric Utility

The Massachusetts General Laws contain provisions that allow towns or cites to create a municipal electric utility. The first step required is for the town or city to vote on whether to purchase the T&D and other facilities associated with the operation of the system. The process is slightly different for towns and cities:

- A town must authorize the purchase of the plant from the local distribution company "by a two-thirds vote, taken by ballot with the use of the voting list, at each of two town meetings called therefore and held at intervals of not less than two nor more than thirteen months" (MGL Chapter 164, Section 36).
- A city must authorize the purchase of the plant from the local distribution company "by a two-thirds vote of its city council, or of a majority of the commissioners if the city government consists of a commission, passed in each of two consecutive municipal years and thereafter ratified by a majority of voters as an annual or special city election" (MGL Chapter 164, Section 35).

The next step is for the municipality to negotiate with the local distribution company the price and terms for purchasing the transmission and distribution facilities. The price and terms must be agreed upon by both parties for the sale to go through.

If both parties cannot agree to the price and terms of the purchase within 150 days of the vote to make the purchase, then the municipality may apply to the DTE within 30 days for a determination of the price and terms of the purchase. In making this determination, the DTE must consider the "cost of the property less a reasonable allowance for depreciation and obsolescence, and any other element which may enter into a determination of a fair value." The value of the property, however, shall not be enhanced "on account of future earning capacity or good will, or of exclusive privileges derived from rights in the public ways" (MGL Chapter 164, Section 43).

If the local distribution company or the municipality does not agree with the price and terms set by the DTE for the purchase of T&D facilities, then either party may appeal the decision to the supreme judicial court (SJC) (MGL Chapter 164, Section 69). It is safe to

assume that a local distribution company that does not wish to sell its T&D facilities would appeal the DTE's decision to the SJC.

In addition, the language of the law governing the sale of assets to a municipality is not entirely clear as to the obligation of the distribution company to sell its assets once a price has been determined. (See MGL Chapter 164, Section 43). Consequently, a reluctant distribution company could attempt to refuse to sell its T&D assets to a municipality. The municipality would then have to take the distribution company to court to attempt to force the sale.

In sum, any attempt to become a municipal electric company would probably have to be resolved by the supreme judicial court. The SJC may have to resolve two key issues: (a) the purchase price of the assets, and (b) whether a distribution company is obligated to sell its assets at any price. The first issue might be relatively straightforward for the SJC to resolve, because of the precedent in Massachusetts for the valuation of utility assets. The second issue, however, may be much more difficult to resolve because of the lack of precedent, making the outcome of a legal battle at the SJC highly uncertain.

Once the purchase price and obligation to sell issues are resolved, then the town or city must raise the necessary funds to execute the purchase. This would most likely be done through the issuance of municipal bonds.

The next step for the town or city would be to set up the infrastructure to manage and run the municipal electric utility. Massachusetts law states that "a town which has established or votes to establish a gas or electric plant may elect a municipal light board consisting of either three or five citizens of the town, each for a term of three years" (MGL Chapter 64, Section 55). In addition, the municipality would have to hire and organize the staff necessary to operate the system, including managers, engineers, power planners, T&D planners, financial analysts, and billing and account managers. As an illustration of the type of staff resources that might be required, the Reading Municipal Light Department has a staff of over 90 utility professionals.

Creating a municipal electric utility would be an extremely difficult undertaking under current conditions. It is safe to assume that any local distribution company would oppose such an effort with all of its financial, political, regulatory and public relations resources. With the passage of the Restructuring Act, distribution companies' markets have been reduced to the transmission and distribution of electricity, and all of the related services. They could be expected to aggressively resist a further reduction of their businesses and an erosion of their customer base. A recent attempt by the city of San Francisco was heartily opposed by the local distribution company (see box).

San Francisco's Attempt to Create a Municipal Electric Utility

In addition to Propositions B and H (see above), two other energy related measures were put to vote in 2001 that were aimed at creating public power in the San Francisco area. Measure I, which was defeated by a narrow margin of 51% would have made San Francisco and the neighboring community of Brisbane into a state-owned Municipal Utility District (MUD). The passing of this measure would have given San Francisco the opportunity to take control of the local utility's, PG&E's, ownership of transmission and distribution services. A companion initiative, Proposition F, was defeated by a slim margin of only 0.42 percent. Proposition F would have mandated the creation of a new city power agency with authority to oversee all of San Francisco's power related decision making.

Both measures were strongly opposed by PG&E and several other corporations, including AT&T, Bank of America, Wells Fargo Bank and various others who spent a combined total of over $2 million campaigning against the initiatives. The campaign against public power outspent the policies advocates by a ratio of 10 to 1. If public power had been approved, it would have meant the loss of over 360,000 customers for PG&E, who had threatened to pursue legal action if such an initiative was attempted. Over 50 years ago, when Sacramento was undertaking its own battle to become a MUD, PG&E took the issue to court where it stayed for 23 years until finally losing in 1946. However, the creators of Proposition F had the foresight to design the legislation to withstand legal challenges by making it an amendment to the city charter, an action much harder to overrule in court.

Thus, municipalities considering the creation of a municipal electric utility should expect a long, expensive and challenging battle with an uncertain outcome. A reluctant local distribution company could be expected to (a) wage a campaign against the town or city vote, (b) refuse to negotiate a reasonable price for the T&D and related assets, (c) argue for a high price before the DTE, (d) appeal any DTE decision to the SJC, and (e) fight a lengthy battle before the SJC regarding the distribution company's obligation to sell its assets.

While it is difficult to estimate the time that would be required to go through the process of creating an MEU because nobody has done it since 1926, the entire process could easily require five years or more. And it is not clear that the end result would be a victory for the municipality.

5.3 Providing Green Power

A municipal electric utility, once established, has a great deal of discretion regarding the purchase of generation assets or power supply contracts. Thus, all of the options described above for municipalities as consumers and municipal aggregators are available to municipal electric utilities.

There are some important differences, however. Municipals as consumers can only affect the municipal electricity load, while MEUs can affect all of the electricity load within the community. Municipal aggregators run the risk of customers opting out of the program if electricity prices get too high, while MEUs do not run that risk.

Hull, Massachusetts

In 1984, the Town of Hull, Massachusetts received a grant from the MA Division of Energy Resources to install a 40 kW wind turbine behind the town's high school. In 1998 a citizen group called CARE (Citizens for Alternative Renewable Energy) began petitioning the Hull Municipal Light Plant to replace the original turbine with an upgraded model. The Hull Light Plant was supportive of the idea, and together with help from various town officials and citizens, including the town's Light Board, Town Manager, Town Historian and representatives from CARE, the Light Plant formally presented the idea to the public in the summer of 2000. Led by the Light Plant's Operations Manager, John MacLeod, the presentation received strong public support, encouraging the Light Plant to continue with its planning efforts.

In April 2001, the selection for the new turbine was made, and by the end of the year, the installation was complete. The newly installed system is a Vestas 660 kW, which is expected to generate 1.6 GWh per year, the equivalent of providing power to 200-250 homes. The total project cost was about $700,000, which was paid for from accrued ratepayer funds, avoiding the need for increased taxes or fundraising. Electricity generated from the turbine will be used to power the town's street lights and traffic signals, thus lowering the town's overall power costs. As of January 2002, the Light Department notified the Town Hall that it was suspending all billing for the town's street lights, flood lights and traffic signals, an arrangement which the Light Plant plans to continue throughout the turbine's expected life span, a period of at least twenty years.

Municipal electric utilities have the choice of obtaining green power (a) on behalf of all their customers, (b) on behalf of just the municipal load, or (c) on behalf of those customers that choose to pay a higher price for green power products. In fact, they could choose to do all of the above. For example, the standard power sold to all customers could be designed to exclude coal and nuclear power (with a modest premium above the market price); the power sold to municipal accounts could be designed to include only new natural gas plants and renewable resources (with a slightly higher premium); and customers could be given the option to buy a green power product with 100 percent of the power from new renewable generators (with an even higher premium).

Like any municipality, municipal electric utilities can obtain green power directly from the competitive market, through purchases from green power aggregators, or by installing clean DG units on municipal facilities, as described above in Section 3.1. However, they have more flexibility in developing green power generators at other sites – beyond municipally-owned facilities, and even beyond their geographic boundaries. This gives municipal electric utilities more opportunities to site renewable generators, such as wind turbines, where the resource potential is greatest and most cost-effective. Municipal electric utilities can also purchase shares in green power generators that are jointly owned by several parties, in order to gain economies of scale, increase the diversity of their resources, and minimize their risk.

5.4 Providing Energy Efficiency Programs

Municipal electric utilities also have a great deal of discretion in implementing energy efficiency programs on behalf of their customers. They can establish their own system benefits charge to fund efficiency initiatives. Unlike distribution companies or municipal

aggregators, they can set their system benefits charge as high as they like – as long as the efficiency budgets and programs are politically acceptable within the community.

MEUs are also not necessarily required to meet the state energy efficiency goals (as described in Section 4.4), and thus have more flexibility in what types of efficiency programs are delivered to whom. While MEUs should make a point of complying with the intent of the state goals because they represent sound public policy, there may be instances where a little flexibility is warranted. For example, a community may choose to focus all of its efficiency initiatives on the low-income customers for several years, before moving on to address the other residential customers, and then moving on to the commercial and industrial customers in later years.

A community that creates a municipal electric utility could potentially jeopardize the programs currently being run by the Massachusetts distribution companies (as described in Section 4.4). However, municipal electric utilities that exist today do not have this risk because those communities are not currently being served by the distribution company efficiency programs.

Municipal electric utilities are required to provide the Residential Conservation Service (RCS) program to all residential customers. This program was established by statute and requires all distribution companies and municipal electric utilities to offer all interested customers energy efficiency advice and, where appropriate, a home energy efficiency audit. Financial incentives of up to $500 are available for those efficiency measures that are found to be cost-effective, regardless of whether they affect electric, oil or gas end-uses.

While these RCS programs may be worthwhile for some customers, they do not address a large portion of the electricity load within a community. As is evidenced by the distribution companies efficiency programs, there are many other cost-effective opportunities for improving energy efficiency. A municipal electric utility with the proper political mandate has the potential to implement efficiency programs well beyond those currently offered through the RCS program.

5.5 Advantages and Disadvantages of Creating a Municipal Electric Utility

Creating a municipal electric company means a lot more than just increasing opportunities to promote green power and energy efficiency. It requires a very large commitment from the municipality to purchase the distribution system, establish the staff and infrastructure necessary to operate the utility, and manage all the power supply issues for the community.

Creating a municipal electric utility is also a much greater commitment than becoming a municipal aggregator – both in terms of making it happen and following through with the implementation. In fact, the municipal aggregation provisions of the Restructuring Act can be seen as providing a means of achieving many of the same benefits as creating a municipal electric utility but with much less cost, commitment and risk.

Cities and towns considering the option of creating a municipal electric utility must investigate the issue in depth and carefully consider the various ramifications. The following is a summary of the advantages and disadvantages of creating a municipal electric utility, particularly with regard to the focus of this report.

Advantages of Creating a Municipal Electric Utility:

- Once the municipal electric utility is established, the town or city will have control over all aspects of electricity supply to the community, including generation, transmission, distribution, metering, billing, green power development and energy efficiency. In theory, this could lead to greater public input regarding the entire operation of the community's electricity system.
- Municipalities will have greater control over setting the electricity rates for the citizens and businesses in the community. This enables the municipality to promote just and reasonable rates among customers, and provides opportunities to encourage efficiency practices through rate design.
- Municipalities will have greater control over the maintenance and upgrading of transmission and distribution systems within their service territories. Communities that are especially concerned about power outages can make the necessary investments to obtain the level of reliability that suits their needs.
- A municipal electric utility will have much greater opportunities than municipalities or municipal aggregators to build power plants, or to purchase shares in power plants. Such opportunity might increase the potential for lower-cost power and the potential to develop renewable generation facilities.
- Customers cannot opt out of a municipal electric utility the way that they can opt out of a municipal aggregation program. This may create greater flexibility to increase electricity prices in order to pay for green power options. Electricity price increases are limited only by the political support that exists, or that can be created, within the community.
- A municipal electric utility can increase the SBC to whatever is necessary to implement the desired level of energy efficiency programs. In addition, MEUs are not subject to the DTE's cost-effectiveness standards for energy efficiency programs. Some communities may, for example, wish to account for the environmental or economic development benefits in defining the types and amount of energy efficiency that is cost-effective.
- A municipal electric utility will no longer have to negotiate with the local distribution company on issues that may be of importance to it. For example, a community can make its own decisions regarding whether to put distribution lines underground. A community can set up its own customer service systems, billing procedures and metering practices. A community can establish and maintain its own data base to keep track of load profiles, customer types, electric end-uses, efficiency activities, and more.

Disadvantages and Risks of Creating a Municipal Electric Utility:

- The costs of creating a municipal electric utility – in terms of municipal staff time, legal fees, consulting fees, and community initiatives – will be substantial. The local distribution company can be expected to oppose the process every step of the way. The outcome of the process is likely to be decided eventually by the SJC. The entire initiative could take five years or more.
- There is a significant risk that the municipality will not win the legal battle to create a municipal electric utility. The outcome of an SJC proceeding is highly uncertain, due to a lack of clarity in the relevant statute and the lack of precedence on this issue.
- The recent restructuring of the electricity industry in Massachusetts introduces uncertainties in the process of creating a municipal electric utility. For example, if a town or city has already been served by a competitive electricity market, and some customers are buying from competitive suppliers, what happens when it converts to a municipal electric utility? Does that municipal electric utility have to continue to allow competition within its borders? If so, does that change the advantages and disadvantages of creating a municipal electric utility?
- A municipal electric utility, a community will be exposed to many more of the risks associated with the electricity industry, including volatile fuel prices, volatile wholesale market prices, market power in the wholesale electricity market, or just poor planning decisions regarding power supply options. For example, MMWEC's purchase of shares of the Seabrook power plant resulted in financial problems and high electricity costs for many of its members. This risk is the inverse of the potential rewards of managing the electricity system.
- There is a risk that a municipal electric utility does not take advantage of the many opportunities for green power and energy efficiency outlined in this report. The real impact of a municipal electric utility will depend upon political sentiment, public input, and the people that are put in charge of decision-making for the MEU. To date, MMWEC has not done much to pursue green power options – most of their power comes from oil and nuclear plants in the region. The municipal utilities in Massachusetts offer very few, if any, energy efficiency programs – despite the fact the DTE, the DOER and the IOUs have years of energy efficiency experience that MEUs could draw upon.

In sum, the advantages and disadvantages of creating a municipal electric utility will depend upon the way the utility is managed, and the types of policies and decisions that are promoted by the community members involved.

Municipal Electric Companies That Already Exist

For those municipal electric utilities that already exist in Massachusetts, the choices before them are more straightforward. They should investigate and pursue all of the green power options that are available and are consistent with the wishes of their community. They should also investigate and pursue all of the cost-effective efficiency opportunities that are available. The latter option should be relatively easy because

investments in energy efficiency will result in net of electricity costs, as well as environmental benefits.

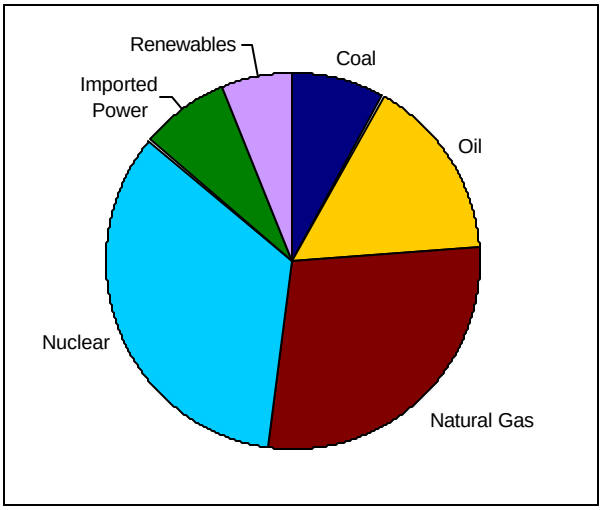
More importantly, existing municipal electric utilities should ensure that their actions do indeed reflect the wishes of the community. Now that citizens are becoming more aware of and concerned about electricity and environmental issues, it is important that they have input to the policy-making and decision-making processes of their municipal electric utility. For most existing MEUs, obtaining adequate public input may require a public education campaign as well as modifications to the existing systems, forums and media for public participation.

6. Emission Reductions Under Different Approaches

NSTAR Fuel Mix

Figure 6.1 presents the different sources of generation that NSTAR currently uses to provide standard offer services. This is the fuel mix that is used to provide electricity to the majority of customers in the communities participating in this study: Boston, Brookline, Cambridge, Newton and Somerville.[20]

Figure 6.1 Generation Sources for NSTAR's Standard Offer Service



The fuel mix is predominately made up of nuclear generation (33%) and natural gas generation (27%), with modest contributions from oil (15%) and coal (8%). Imported power refers to power imported into New England, and could include a variety of different fuel sources. The renewables contribution is made up of municipal trash (2%), small hydro (2%), large hydro (1%) and biomass (1%).

This fuel mix cannot be considered environmentally sustainable. The heavy reliance upon nuclear and fossil fuel generation contributes to many public health and environmental problems, and imposes substantial long-term risks on society.

Potential Reductions in CO_2 Emissions

The various approaches to green power discussed in this report will result in different fuel mixes and thus different environmental impacts. The amount of CO_2 emissions from the different green power options provides one indication of the environmental impacts of the different approaches.

[20] This fuel mix is taken from NSTAR's first quarter 2002 disclosure label, and may change over time. The fuel mix is based on the Boston Edison portion of NSTAR's standard offer service. The fuel mix for Cambridge may be slightly different from the mix presented here.

CO_2 emissions are *not*, however, the only indication of environmental impacts of electricity generation. It is also important to consider the impacts of SO_2 emissions, NO_X emissions, particulate emissions, mercury and other toxic wastes, the risk of nuclear accidents, nuclear waste, solid waste from coal generation, land use, and water use. The CO_2 emissions are presented here for analytical simplicity, and because they are of interest in developing climate change action plans.

Several scenarios are used to investigate the emission impacts of different approaches to promoting green power. These scenarios are designed only for the purpose of presenting some illustrative examples – they are not meant to be estimates or predictions of how different types of green power products will be accepted by customers. It is important to recognize that the CO_2 emission impacts presented below will only be relevant if the scenarios occur and the assumptions turn out to be accurate.

The scenarios are all based on the NSTAR fuel mix presented above, with adjustments to reflect the introduction of new generation. The scenarios include:

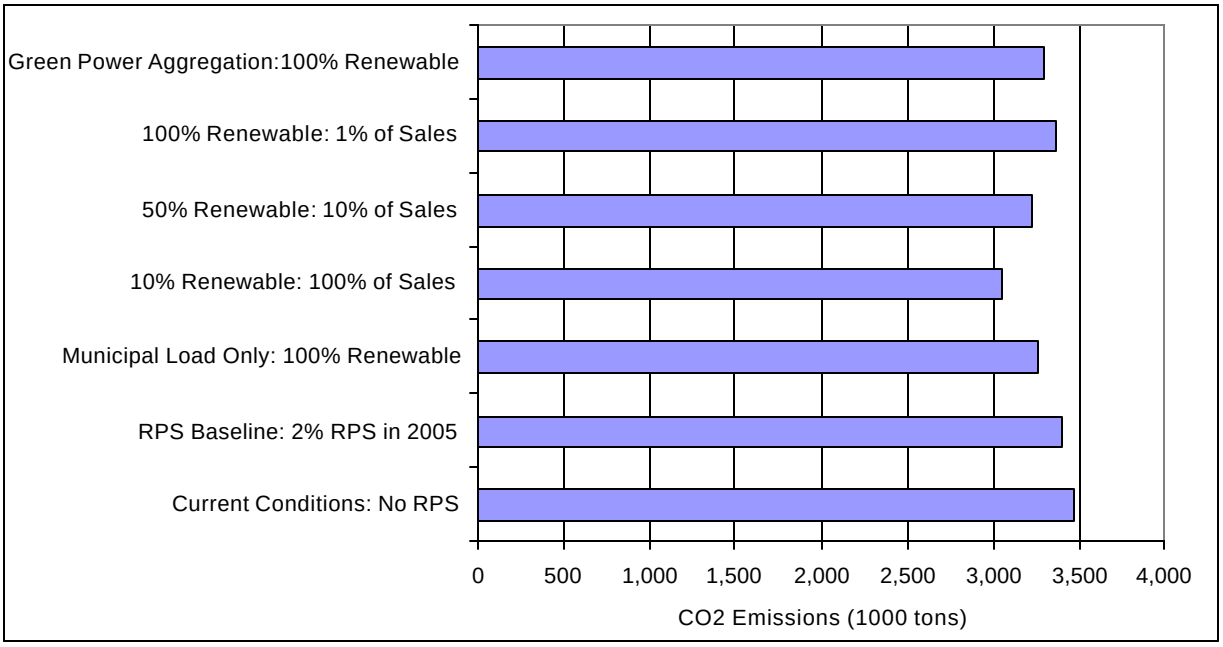
- Current conditions. NSTAR's current fuel mix, with no RPS.
- RPS Baseline. Conditions in 2005, with an RPS of 2%. All of the following scenarios also assume that an RPS requirement of 2% is in place.
- Municipal green power. Green power that serves an entire municipal load, but no other customers within the community, including 100% new renewable generation. For this purpose, the municipal load is assumed to be 4% of the load in the community. Some municipalities' loads may be higher or lower than this.
- Municipal aggregation – light green. Green power that serves all customers within a community, but includes only 10% new renewable generation.
- Municipal aggregation – choice, light green. Green power that customers choose to purchase for themselves, including 50% new renewable generation, but serving only 10% of customers.
- Municipal aggregation – choice, dark green. Green power that customers choose to purchase for themselves, including 100% new renewable generation, but serving only 1% of customers.
- Green power aggregation. An opt-in green power aggregation product, that serves 35,000 customers, each of which uses an average of 7,000 kWh per year, with 100% new renewable generation. (This would include roughly 3% of the sales within the communities participating in this study). This scenario represents the type of green power activities that the Massachusetts Energy Consumers Alliance is currently investigating.

In each scenario it is assumed that the remaining mix of generation sources (i.e., that which is unaffected by the green power) includes the same portions of generation that are in NSTAR's current mix. The CO_2 emission rates are for all of New England, and are

based on recent production cost model runs conducted by Synapse Energy Economics for another study.[21]

Figure 6.2 presents the CO_2 emissions that would result from these various scenarios. Under current conditions there are nearly 3,500 thousand tons of CO_2 emissions from the electricity generation serving the entire load of the five communities participating in this study. In 2005 when the RPS requirement is two percent, the CO_2 emissions will be reduced by approximately two percent. This scenario serves as a baseline for comparing the other scenarios.

Figure 6.2 CO_2 Emissions from Various Green Power Scenarios



If all five municipalities serve their own electricity loads with new renewable resources, then they will be able to reduce CO_2 emissions by roughly four percent. This amount of emission reductions is a direct result of the assumption that the municipalities' load is four percent of the total load of the community, as well as the simplifying assumption that the remainder of the fuel mix will remain unchanged once the new renewable resources are added.

There are three scenarios where it is assumed that the customer participation rate drops as the renewable generation percentage increases. Under the assumptions used here, the scenarios with the higher renewable percentages result in lower CO_2 emission reductions, because of the reduced customer participation. One of the key issues for green power aggregators to consider is this relationship between customer participation and the

[21] Estimating avoided emission rates from new renewable generators is a complex task, that will depend upon many variables that are difficult to predict. The emission rates used here are for illustrative purposes, used simply to make comparisons across different green power options.

renewable percentage. To what extent will customer participation drop off as the renewable percentage (and the price) increases?

Finally, the impacts of the green power aggregation approach will clearly depend upon customer participation. If a green power aggregator can sell 100 percent renewable generation to three percent of the customers, then there will be a corresponding three percent reduction in CO_2 emission, under the assumptions used here.

It is important to reiterate that this analysis is presented here for illustrative purposes. The actual emission reductions will depend upon how the fuel mix changes in response to the addition of new renewable generators. In addition, NSTAR's standard offer fuel mix may change considerably by 2005, leading to different results. Furthermore, the role that nuclear power plays in the fuel mix will have important implications for the CO_2 emissions.

7. Recommendations

Municipalities as Power Consumers

Managing, Planning and Prioritizing

Municipal governments should explicitly determine their goals and priorities for purchasing power and managing the municipal load. The two primary goals to consider are reducing the cost of electricity services, and reducing the environmental impacts of electricity generation and consumption.

Municipal governments should develop strategies for meeting these goals and priorities. These strategies can include a combination of the procurement of low-cost electricity from the competitive market, the procurement of green power resources, and the implementation of aggressive, cost-effective energy efficiency programs.

Municipal governments should establish an energy manager, or an energy management function, to implement the community's energy strategy. The energy manager would investigate, analyze and make the most of the various power supply, green power and energy efficiency opportunities. The energy management function could be fulfilled by (a) training existing municipal staff members, and modifying their mandates and priorities, (b) hiring a full- or part-time professional energy manager on staff, or (c) hiring a professional energy manager in a consulting capacity as needed.

Ideally, the people responsible for the energy management function would be skilled in several related fields, including engineering, finance and accounting, energy markets, and negotiation. The energy manager could also draw upon the many resources provided by the DOE's ENERGY STAR program, in order to quickly get up to speed and obtain access to readily-available technical support.

One of the first tasks of the energy manager would be to gather and analyze data regarding the various electricity accounts held by the municipal government. A single town or city typically has numerous electricity accounts, many of which are paid for by different municipal departments and out of different municipal budgets. Municipal energy mangers should begin collecting data from their local distribution companies regarding electricity rates, patterns of consumption, and overall electricity loads. This information will be very helpful in identifying the potential costs and benefits of different power supply and energy efficiency options.

Green Power Opportunities

- Whenever municipal governments solicit proposals for new power supplies, they should also inquire about green power products. If acceptable green power products are not available in the short-term, municipal governments should avoid long-term contracts (e.g., greater than one year) that would preclude the purchase of green power products that may become available in the future.

- Municipal governments can issue requests for information (RFIs) that solicit green power proposals without obligating the city or town to eventually make any purchase. This offers a low-risk means of identifying the potential costs and benefits available from the green power market.
- In order to fully test the competitive electricity market, municipal governments can issue RFPs for purchasing green power. The RFPs should solicit proposals for various types of green power products, in order to identify the tradeoffs between more stringent environmental goals and higher electricity costs. The RFPs should include several key items to guide the development of proposals, including (a) the total energy load of the municipality, (b) any preferences regarding types of renewables (e.g., new versus existing), (c) the criteria that would be used to select among proposals, (d) threshold requirements that a bidder must meet before even being considered (e.g. financial backing, experience in the market, performance bonding), (e) a timeline for obtaining, reviewing and selecting proposals, and (f) language that gives the municipality the ability to negotiate the prices, terms and conditions of any proposal.
- Municipal governments should communicate periodically with the Massachusetts Energy Consumers Alliance, HEFA, MMA and other similar organizations to inquire about purchases from green power aggregators.
- Municipal governments should investigate the opportunities for installing renewable and other clean distributed generators on municipal facilities and sites. They should issue RFPs to identify the costs, benefits and other implications of installing generators at specific sites.
- Municipal governments should apply for Massachusetts Renewable Energy Trust grants, including grants through the Green Buildings Initiative, the Green Schools Initiative, and the Solar-to-Market initiative.

Energy Efficiency Opportunities

- Municipal governments should work with their local distribution companies to identify all opportunities for participating in energy efficiency programs. The energy manager should develop an on-going relationship with the Account Executive or an efficiency program manager at the distribution company to learn about efficiency opportunities, streamline the application process, and ensure that the distribution company follows through in a timely and effective manner.
- Municipal governments can also consider investing their own funds to implement cost-effective efficiency measures beyond those financed by the distribution company programs.
- For those facilities with the largest electricity consumption, municipal governments can hire ESCOs to perform technical assessments of efficiency potential and to offer financial packages for achieving that potential. Some ESCOs may be willing to work under a "performance contracting" approach, where the municipality does not make any up-front payments, and the ESCO is paid from out of the bill savings that result from the efficiency investments.

- Municipal governments should ensure that all municipal buildings comply with building energy codes, ensure that building inspectors are well-trained, and require building inspectors to enforce the building codes for residential and commercial buildings.
- Municipal governments should establish protocols to investigate and purchase ENERGY STAR equipment whenever new municipal equipment is purchased. They can also utilize the energy management tools available from the ENERGY STAR program.

Municipal Aggregation

The potential benefits of becoming a municipal aggregator are likely to be much greater than the potential costs. This is especially true with regard to reduced power supply costs. Once a community has established a municipal aggregator to take advantage of the competitive power market, then it will be in a good position to investigate the additional benefits available from green power and energy efficiency opportunities.

Communities interested in municipal aggregation should begin investigating municipal aggregation options soon. This will allow enough time to develop and obtain approval of an aggregation plan, so that the community will be poised to take advantage of low-cost power supply options in 2005 when the standard offer is eliminated.

Communities that pursue municipal aggregation should ensure that there is meaningful public input to the decision-making process. This includes input from local representatives, municipal agencies, citizens and businesses.

Municipal aggregators should seek all opportunities to purchase enough green power to meet the community's environmental goals. This includes investigating light green power options that can be purchased on behalf of all customers at very low additional costs, as well as more aggressive green power options that customers can choose from if they are willing to pay more than others for their electricity. While it is difficult to estimate the potential savings available from competitive power purchases, it is likely that a portion of these savings could be used by the municipal aggregator to support any additional costs associated with green power purchases.

Municipal aggregators should also investigate the potential for implementing efficiency programs. They should only undertake efficiency initiatives if they can improve upon the programs that are currently delivered by the distribution companies. Those cities and towns whose electricity demand is relatively small (e.g., less than the Compact's), should be very cautious about implementing efficiency programs because of the high administrative costs. Such relatively small communities should consider joining together to establish a centralized energy efficiency program administrator that could serve several municipal aggregators.

Municipal aggregators should be willing to think creatively about various opportunities that could be fashioned to save customers on their electricity costs. Many of the economic benefits that the Compact has provided to their customers were unanticipated at

the beginning of the aggregation process, and were created by a willingness to think "outside the box."

Municipal Electric Utilities

The creation of a municipal electric utility potentially has the greatest risks and greatest rewards for a community. Municipalities should carefully consider *municipal aggregation* as an option before resorting to the creation of a municipal electric company. Municipal aggregation offers many of the benefits of creating a utility, without most of the costs and risks. Communities should only attempt to create a municipal electric utility if they are willing to incur significant costs and to participate in a lengthy legal process. They should also be aware that the likelihood of eventually purchasing the distribution facilities and creating a municipal utility is highly uncertain.

Those municipal electric utilities that do exist in Massachusetts should investigate and pursue all of the green power opportunities that are available and are consistent with the wishes of their community. This would include all of the opportunities listed above for municipals as power consumers, but would also include additional opportunities for owning all or part of renewable generators in order to meet all of the community's electricity load.

Municipal electric utilities should also develop energy efficiency programs for all customer types, in order to both reduce total electricity costs and reduce the environmental impacts of electricity consumption within the community. This includes raising funds through electricity rates for energy efficiency programs, and coordinating with and building off of the efficiency programs that are currently being offered by the electricity distribution companies in Massachusetts.

Public Input

Regardless of whether a municipality is purchasing power for itself, as an aggregator, or as an electric utility, municipal governments should ensure that their actions do indeed reflect the wishes of the community. Massachusetts citizens and businesses have become increasingly aware of, and interested in, electricity issues as a result of recent power outages, the California electricity crisis, the Enron scandal, and a growing interest in environmental preservation. At the same time, there are now many more opportunities and pitfalls associated with purchasing electricity in Massachusetts, as a result of the Restructuring Act, the evolution of the New England wholesale electricity market, the Renewable Energy Trust, and the systems benefit charge. Municipal agencies have an important role to play in addressing the interests of their citizens in order to make the most of these opportunities.

Many municipalities may need to establish new procedures for obtaining adequate public input. It may require a public education campaign to inform customers of the importance of electricity purchases – in terms of the economic and environmental implications. Meetings of city councils and boards of selectman can be used to solicit input from local citizens and businesses.

Municipalities can also establish a community energy board or commission, composed of public representatives from several perspectives (e.g., low-income, businesses, environment). The role of the community board would be to solicit public views on the various economic and environmental issues associated with electricity, and to represent the public views to the municipal agency, the municipal aggregator or the municipal electric utility. The community board could also play a role in encouraging citizens and businesses to personally participate in electricity-related offerings, such as green power programs and energy efficiency programs.

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Appendix A

Summary of Recent Public Opinion Survey on Renewable Energy[22]

Background

Opinion Dynamics Corporation (Cambridge, MA) was commissioned by the Massachusetts Technology Collaborative to conduct a statewide public opinion research survey. The Collaborative manages the "Renewable Energy Trust" and is working with organizations that are developing "consumer aggregation programs." These programs would pool the collective buying power of consumers interested in purchasing "green power." The primary focus of the survey was to measure public attitudes toward renewable energy as well as Massachusetts consumers' interest in purchasing electricity produced from renewable resources, which includes solar and wind.

Methodology

The statewide survey was conducted by telephone among 650 Massachusetts residents – 500 distributed statewide, with "oversamples" (50 additional respondents) in each of the following areas where there has been significant public discussion of renewable energy issues: Cape Cod, the Berkshires, and the Pioneer Valley. Looking at the total sample, results are reliable to within +/-3.84% at the midrange of the 95% confidence interval. That is, when conducting 100 similar surveys, 95 of them will yield results that fall – *at worst* – 3.84 points on either side of a given percentage.

The Bottom Line

Survey results point to the following major findings:

1) There is a lack of awareness among the general public in Massachusetts regarding renewable energy.
    - Less than one-third were knowledgeable about the terms "renewable energy" or "green power."
2) Despite this lack of awareness, there is overwhelming support (90%) for the concept of increasing the use of renewable energy.
    - 62% "strongly favor" and 28% "somewhat favor" the increased use of solar power systems, wind turbines, and other technologies to produce electricity from renewable resources.
3) More than half of all Massachusetts consumers would be willing to pay extra for renewable energy.

[22] This summary was prepared by Opinion Dynamics Corporation.

- 51% said they would be willing to "pay somewhat more each month" for electricity from renewable resources.
- 57% of those who indicated they would pay more said they would be willing to pay *$10 or more extra* each month if all of their electricity was produced from renewable energy.

4) The "intensity" of consumers' support for renewable energy is susceptible to erosion after they are exposed to potential negative messages – although overall support remains extremely high.
   - The percentage of survey respondents who *"strongly favor"* the increased use of renewable energy dropped from 62 to 47 – a decline of 15% – after hearing potential negative statements about power (e.g., higher cost and impracticality of green power).
   - However, 88% continue to "strongly favor" or "somewhat favor" the increased use of renewable energy.

5) A strong majority (70%) of Massachusetts consumers would be willing to pay more for green power if the extra cost could be deducted as a charitable donation on their income tax.
   - 45% said they would be "much more inclined" and 25% "somewhat more inclined" to pay extra on their monthly electric bills for green power if the added cost could be listed as a tax deduction.

Conclusions

The level of support for renewable energy among Massachusetts residents is extremely high. The lack of knowledge about renewable energy suggests that a broad-based education and communications program is needed to increase public awareness.

Residents' willingness to pay more each month for electricity from renewable resources appears to be very encouraging for the success of "consumer aggregator" programs currently under development in the Commonwealth. However, the drop in consumers' intensity of support (after they hear potential "negative" statements about green power) suggests that effective public education programs will be an important component of efforts to increase consumer demand for electricity generated from wind, solar and other renewable resources. These activities will be necessary to ensure that the *strong* public support reflected in this survey is maintained -- and ultimately translates into favorable purchasing decisions.

Appendix B

Lessons From the Cape Light Compact

Background on the Compact

The Cape Light Compact is an intergovernmental body formed in 1997 following two years of study and discussion. It is a consumer-based organization authorized by votes of town meeting, boards of selectmen, town council, and county commissioners. It consists of 21 towns and two counties, including all of the towns on Cape Cod (Barnstable County) and Martha's Vineyard (Dukes County).

The Compact's articles of organization comprise a formal Intergovernmental Agreement signed by each participating town or county member. Membership provides voting rights and inclusion for planning, analysis, and participation in Compact programs. The organization relies on the existing structure of local and county government, cooperation between government agencies, and the professional expertise provided by contractors.

The general purpose of the organization is to advance the interests of consumers in a competitive electric power supply market. The Compact's Intergovernmental Agreement (Compact 1999) describes the organization's specific goals:

- To provide the basis for aggregation of all consumers on a non-discriminatory basis;
- To acquire the best market rate for electricity supply and transparent pricing;
- To provide equal sharing of economic savings based on current electric rates and/or cost-of-service rate-making approved by the Department of Telecommunications and Energy;
- To provide and enhance consumer protection and options for service under contract provision and to allow those consumers who choose not to participate to opt-out;
- To improve quality of service and reliability;
- To encourage environmental protection through contract provisions;
- To utilize and encourage renewable energy development to the extent practicable through contract provisions, demonstration projects and state mandated system benefit charges for renewable energy;
- To utilize and encourage demand-side management and other forms of energy efficiency through contract provisions and state mandated system benefit charges for energy efficiency;
- To advance specific community goals that may be selected from time to time, such as placing utility wires underground;
- To provide full public accountability to consumers; and

- To utilize municipal and other powers and authorities that constitute basic consumer protection to achieve these goals.

Power Supply

The Restructuring Act requires that a municipal aggregator's price for power be less than the price for standard offer services. The conditions in the New England electricity market in recent years has made it difficult for the Compact to obtain competitive power supply at prices below the standard offer.

Nevertheless, the Compact has made significant progress in obtaining power supply for its members. In 1999 the Compact facilitated a supply contract with HEFA Power Options to serve the municipal accounts in all towns within the Compact's territory. In March 2000 the Compact reached a landmark agreement with Select Energy Inc. on a power supply contract to serve all of the Compact's members. The contract did not call for the immediate provision of power, however, but rather for providing power at a future date once the New England electricity market was able to produce power at prices below the standard offer price. Based on this contract, the DTE approved the Compact's aggregation plan in the summer of 2000. Select Energy has not yet been able to provide power to the Compact due to volatility of the New England electricity market and concerns about the development of market rules (Compact 1/2002).

Because of the difficulty in obtaining power at prices below the standard offer price, and numerous complaints from members about being shifted to default services, the Compact began looking for ways to beat the price for default service. In 2001 the Compact won DTE approval for a Pilot Project to serve all Compact members that have been shifted to default services – including 45,000 local customers, roughly 23 percent of the Compact's members. In March of 2002, the Compact secured a contract with Mirant Corporation to provide power to all default customers from May 2000 through December 2003. The contract includes the following provisions (Compact 3/2002):

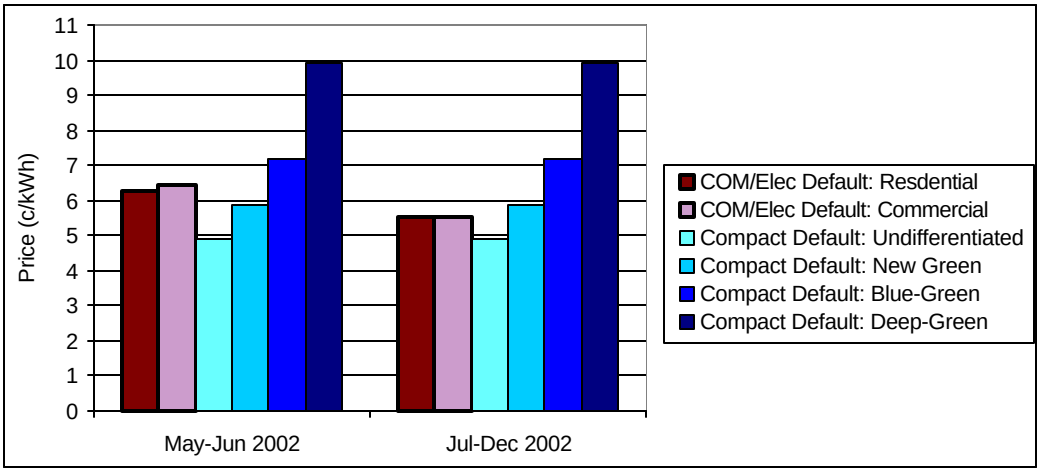
- All Compact members on default service tariffs (including new customers who move into member towns and would otherwise be on default services) will automatically begin receiving the service. All customers will be sent a written notification of the program and have 30 days to opt-out at no cost and remain on default service.
- The price of power will be 4.898 ¢/kWh from May through December 2002, and 4.798 ¢/kWh for all of 2003. In 2002 these prices represent a savings to residential customers of 22 percent from May through June and a savings of 11 percent from July through December. The NSTAR default rates for Compact residential and commercial customers are currently 6.3 and 6.5 ¢/kWh, respectively, and are both dropping to 5.5 ¢/kWh in July 2002. Figure B.1 compares the Compact default service prices to those of NSTAR (Commonwealth Electric) in 2002.
- The default service prices for 2003 have not yet been determined. If NSTAR's 2003 default service prices are above the contract price, then the contract will

terminate on December 31, 2002 and the participating customers will go back to default service from NSTAR at no cost.

- The contract is expected to result in nearly $2 million in electricity cost savings in 2002, with additional savings anticipated in 2003. This service will more than double the total number of customers that are now receiving competitive supply in Massachusetts.
- Through 2002, a portion of the price (0.1 ¢/kWh) will be placed in a reserve fund to secure indemnification and performance, if necessary. If the fund is not needed for indemnification or performance, the Compact can utilize the reserve fund as it sees fit.
- The power will be provided from a variety of sources in the New England power pool, and the power will comply with the Massachusetts RPS requirement for 2003, beginning in May 2002.

The Cape Light Compact sees this Default Pilot Project as a stepping stone toward a service that can provide electricity cost savings for all customers on the Cape and Vineyard in the near future.

Figure B.1 The Compact's Default Service Prices Versus Commonwealth Electric's



Green Power

The Compact's Default Pilot Project includes three voluntary (i.e., opt-in) green power products, including:

- New Green. Customers pay one cent above the normal price (5.898 ¢/kWh) to contribute to a local renewable energy development fund. These customers receive 100 percent undifferentiated power.
- Blue Green. Customers pay 7.185 ¢/kWh for power that includes 50 percent hydro generation and 50 percent undifferentiated power.

- Deep Green. Customers pay 9.935 ¢/kWh for power that includes 100 percent hydro generation.

For both the Blue Green and Deep Green products, customers will sign an individual contract with Mirant, who may offer price reductions during the term of the contract. These two green power products also include a 0.5 ¢/kWh charge that will provide revenues for the local renewable energy development fund. This fund will be maintained and utilized by the Compact to develop new renewable generators on Cape Cod and Martha's Vineyard (Compact 3/2002).

In September 2001 the Compact was awarded a $140,000 grant from the Massachusetts Technology Collaborative's Renewable Energy Trust to support and encourage the installation of distributed generation and renewable generators for its towns and members. The Compact has proposed a comprehensive package of initiatives to pursue this goal, including (a) a project development program to assist in identifying and assessing potential sites for renewable generators, (b) a green marketing program to investigate opportunities for selling green power products on a voluntary basis, (c) an education program to develop a better understanding among the public regarding various aspects of renewable generation, (d) a technical analysis and regional planning program to establish a framework for both short-term and long-term project activities, and (e) a regulatory program to address the various regulatory, legal and institutional barriers that hinder developers of renewable generation projects (Compact 2001).

In 2000 Barnstable County and the Compact received federal funds to examine the potential and challenges for distributed generation in local governments. The Compact organized a national conference on this issue in Chicago in September 2000, with the co-sponsorship of the City of Chicago, Seattle, Portland (Oregon), Austin (Texas), and the American Public Power Association (Compact 1/2002).

Energy Efficiency

In November 2000 the Compact filed its Energy Efficiency Plan with the DTE (Compact 11/2000). This Plan was developed over several years with input from the DOER and other stakeholders, and was approved through town meetings in each of the towns within the Compact. In March 2001 the DTE approved the Compact's Efficiency Plan, and by July 2001 the Compact began providing energy efficiency services to all customers on the Cape and Vineyard. These programs have taken the place of those that had previously been provided by NSTAR (Commonwealth Electric).

The Compact's efficiency programs are currently very similar to those designed by NSTAR and other Massachusetts utilities through collaborative processes. This choice was made in order to avoid disruption in the current efficiency program activities, to maintain continuity for the regional efficiency initiatives, and to ensure consistency with the state energy efficiency goals. However, there are several important differences, such as the fuel-switching program for electric space heat customers, and the fact that the Compact is not using a portion of the efficiency funds for shareholder incentives.

The Compact's Energy Efficiency Plan includes the following programs:

- The Residential New Construction Program, which provides home buyers, home builders, and construction trade allies with incentives to increase the home energy rating of homes that are newly built or undergo major renovations.
- The Residential Products and Services Program, which seeks to increase the availability and use of efficient lighting, clothes washers, air conditioners, and refrigerators. This program is used to implement NEEP and other regional market transformation initiatives.
- The Residential High-Use Customers Program, which provides residential customers using electric space heating with incentives to improve the efficiency of their electric measures or to switch to efficient measures that use alternative fuels.
- The Low-Income Single Family Program, which provides low-income customers in single-family dwellings with assistance in purchasing and installing efficient lighting, appliances, and space heating measures.
- The Low-Income Multi-Family Program, which provides owners and managers of low-income multi-family dwellings with assistance in purchasing and installing efficient lighting, appliances and space heating measures.
- The Low-Income New Construction Program, which provides low-income housing development agencies, weatherization assistance program (WAP) providers, and residential construction trade allies with incentives to increase the home energy rating of new low-income housing.
- The Commercial and Industrial New Construction Program, which provides incentives to increase the efficiency in the construction, renovation, or remodeling of all commercial, industrial, government and multi-family housing facilities.
- The Medium and Large Commercial and Industrial Retrofit Program, which provides technical and financial assistance to medium and large C/I customers seeking to replace existing equipment and processes in their facilities with high-efficiency alternatives.
- The Small Commercial and Industrial Retrofit Program, which provides incentives to C/I customers whose peak demands are less than 100 kW to replace existing equipment with high-efficiency equipment.
- The Commercial and Industrial Products and Services Program, which seeks to increase the availability and use more efficient motors, lighting designs, and HVAC systems. This program is used to implement NEEP and other regional market transformation initiatives.
- The Government Agencies Program, which provides technical and financial energy efficiency assistance to all government facilities, including municipal, state and federal facilities.

The Plan also includes a Public Education and Marketing Program that is designed to utilize the extensive network and opportunities that the Compact has at the community

and local government level. Public education and market support are designed to help overcome common barriers of awareness and knowledge and facilitate program participation. The energy efficiency public education program will be coordinated with a separate, but related education program on distributed generation, in order to assure integration of clear and consistent messages regarding demand-side and supply-side distributed resources.

The Compact has established an organizational structure to ensure for the smooth administration and management of the efficiency programs. Consumers and town governments provide local authority over the program. Policy, contract, budget, and other oversight of the program are provided by town representatives on the Compact Governing Board. Fiscal management and administrative support are provided by Barnstable County. Day-to-day management of the program and vendors are carried out by Honeywell DMC, the Management Contractor. Efficiency vendors hired through competitive bidding processes deliver energy efficiency products and services to customers. Finally, legal and technical consultants are utilized to support the efficiency initiatives as needed.

Beginning in 2003, the Compact will launch Phase II of its energy efficiency effort. This effort will build upon the success of Phase I, and will include even more innovative and aggressive energy efficiency initiatives. Phase II programs will reflect local feedback from customers served in Phase I, and will benefit from a review of the best efficiency programs being offered elsewhere in the country. New programs may include, for example, a peak shaving program that can generate revenues from the ISO-NE load response program, air conditioner retirements, and increased consumer education.

General Advocacy Work

The Compact has also taken on several initiatives to help the electric and gas customers on Cape Cod and Martha's Vineyard. In addition to the activities described above, the Compact has: purchased streetlights for a number of Cape and Vineyard communities producing thousands of dollars of savings each year; helped produce millions of dollars of savings for Cape and Vineyard customers through a DTE proceeding of the Canal Electric plant; and negotiated a natural gas contract that can save schools in the region an estimated $165,000 (Compact 1/2002).

Principal Lessons from the Compact Experience

The principal lessons of the Compact's experience over the past several years are briefly summarized below.

- Municipal aggregators must be willing to think creatively about opportunities to reduce electricity costs. The Compact owes much of its success to finding opportunities that were not anticipated at the beginning of the aggregation process and were created by a willingness to think "outside the box." Examples of this success include the purchase of streetlights; the default pilot; short-term municipal contracts for power supply; a gas contract for schools; interventions at the DTE; getting people in need on the low income discount rate; and auditing municipal

bills to ensure they were not incorrectly placed on default. The principal lesson is to develop a creative and holistic view of the many energy, environmental and consumer issues facing the community.

- Municipal aggregation requires a great deal of political organizing up front. City and town representatives and officials must be fully committed to the process and the end result.
- The process for obtaining regulatory approval for a municipal aggregation plan can be difficult, expensive and time consuming. However, the process for obtaining regulatory approval may be easier for other towns, now that the Compact has paved the way.
- It is currently quite difficult to find competitive power suppliers that are able to beat the standard offer service price. It is less difficult to find suppliers able to beat the default service price.
- The potential electricity cost savings available from the competitive market – if a competitive supplier can be found – are quite large.
- The Compact has benefited significantly from the administrative and fiscal support of Barnstable County.
- The Compact Governing Board has benefited from having members who are very committed to municipal aggregation, including several members who have valuable experience from careers related to the electricity industry.
- As a public agency, the Compact has more stringent standards than electric utilities regarding insurance, indemnification, and other protective measures. This has increased the barriers to contracting with power suppliers and to contracting with energy efficiency vendors.
- Under current market conditions, suppliers are only willing to offer green power products if there is a significant markup on the price.
- Energy efficiency programs require substantial administrative support. A municipal aggregator must be large enough to be able to provide the support necessary to improve upon the programs currently being provided by the local electric company.
- There are many opportunities to act as a consumer advocate on issues that were not even identified at the time of aggregation.