

## **Strategy # 13: Conserve Natural Resources**

The conservation of natural resources is fundamental to the MetroFuture scenario. The plan envisions dramatic reductions in the use of energy and water, through conservation and the use of alternative sources. More efficient use of resources is critical to the local and global environment, as well as to the regional economy, and contributes to America's national security by reducing its dependence on foreign oil. The coming decades will bring great changes to the way the nation uses natural resources. Nowhere will these changes be greater than in the field of energy, where rising prices could become a drag on economic growth if the region is not prepared. Meanwhile, unsustainable water use can threaten supplies that support economic growth. Water and energy savings often go hand-in-hand, as more efficient water use means less energy is needed for pumping, treating, and heating potable water. Reducing water use also reduces the considerable amount of energy needed for treating wastewater. Conversely, reducing energy use reduces the need for coolant water at power plants, which represents a significant consumptive use of water in Massachusetts.

By accomplishing MetroFuture's ambitious goals for energy conservation and reduction of greenhouse gas emissions, the region will be doing its part to prevent global warming. The impacts of that warming are not remote—they will affect this region directly, within the foreseeable future. A 2004 study of Climate's Long-Term Impacts on Metro Boston (CLIMB) concluded that the MAPC region is facing a future in which temperatures will exceed 90 degrees on 30 days per year, twice the current number; sea levels along the Metro Boston coastline could rise at least 24 inches, increasing storm intensity and causing up to \$94 billion in coastal property damage during this century; and river flooding might impact twice as many properties and cost twice as much in damage. In addition, climate changes induced by global warming will have impacts on the Massachusetts' agriculture, tourism, and fishing industries as well as impacting water supplies, human health and comfort.

Massachusetts has committed itself to taking action on global warming by recommitting itself to New England Governors/Eastern Canadian Premiers Climate Change Action Plan, the 2004 Massachusetts Climate Protection Plan, and most recently, the Green Communities Act. Many cities and towns in the region have become proactive, working on their own or with national and international programs. This strategy recommends a variety of state, regional, and local actions to implement (or surpass) these policies through technical assistance, regulation, financing, and incentives.

This strategy also addresses the efficient use of water resources, a critical part of the natural "green infrastructure" that supports existing communities and new development as well as the natural heritage and ecology of aquatic habitats and watersheds. Historic patterns of water use, water quality, and stormwater management have often resulted in resource depletion, stress on watersheds, degraded water quality, and loss or impairment of habitats and watershed ecology. However, most of these negative impacts can be significantly reduced or mitigated with sustainable water resources management techniques that include innovative approaches to water supply, wastewater treatment, and stormwater management.

Because these key infrastructure systems are administered at the local and regional level, sustainable water management measures must largely be implemented locally, although the

state needs to play a critical role in revising regulations and providing technical assistance and funding to support local efforts. Municipal water committees can provide an official platform for advocates to promote water use efficiency. There is also an important role to be played by businesses, industries, and homeowners in adopting sustainable resource management measures.

## **A. Plan for sustainability**

Efforts to increase energy sustainability must be well-planned and coordinated if they are to succeed. The Commonwealth has established and growing programs for energy conservation, renewable energy; the challenge is to translate those policies and programs to the regional and local level. Just as the MetroFuture plan is a regional expression of the Commonwealth's Sustainable Development Principles, a regional clean energy plan could define how state energy policies could be applied in Metro Boston. Similarly, municipalities must take up the call to incorporate considerations of sustainability in all their planning efforts. As in many areas, regional collaboration may yield more effective and cost-efficient solutions.

### **1) Coordinate state and regional efforts**

In order to be effective, state and regional efforts must be coordinated. Regional policies and plans can be critical for promoting clean energy and for regulating renewable energy development. While this strategy provides numerous recommendations for advancing energy conservation and renewable sources, it is not an energy plan, per se. A more in-depth regional clean energy plan could pinpoint opportunities for clean energy production, capital investments, and interlocal collaboration.

Many actions to increase sustainability require municipal action; in particular, the Commonwealth's new Green Communities Program provides direct financial assistance to municipalities that have met certain criteria. Many communities have the motivation to participate in this program but need assistance to implement the program's recommendations. The state should find resources to support the technical assistance necessary to help municipalities make progress.

#### **1.a Develop a regional clean energy plan**

#### **1.b The Commonwealth should support technical assistance for all municipalities to meet the eligibility criteria for the Green Communities Program**

### **2) Incorporate sustainability practices into municipal planning and operations**

The dramatic changes in energy costs expected over the coming decades demand new practices for both the public and private sector. The faster these sustainable practices are incorporated into municipal operation, the better equipped the region will be to remain successful and competitive through changing times. More immediately, efforts to advance sustainability will help municipalities to save money on energy, thereby providing some relief to municipal finance.

There are a variety of structures that can support and guide municipal efforts to increase sustainability. Municipal energy committees provide an official platform for advocates to help steer municipal operations. The International Council on Local Environmental Initiatives is a membership organization that provides tools and resources to support local efforts. The EPA-sponsored Community Energy Challenge provides technical assistance to help municipalities reach self-defined goals for energy conservation.

- 2.a Residents should create municipal energy committees, with the support of MAPC and advocacy organizations**
- 2.b Municipalities should join ICLEI, either individually or through an MAPC “group membership.”**
- 2.c More municipalities should participate in the Community Energy Challenge**

**3) Pursue regional collaboration for energy services and technical assistance**

As municipalities throughout the region work to make their operations and policies more sustainable, most are likely to need technical assistance (such as energy audits) and policy advice from external experts. Regional purchasing and assistance programs can help cities and towns to access needed support more cost effectively. A coordinated regional technical assistance program can also help to disseminate best practices and lessons learned.

MAPC already has considerable experience with implementing collective procurement programs that provide considerable advantages to municipalities: more competitive costs, with less municipal staff time spent on procurement activities and contract oversight. Regional procurement of energy services (such as performance contracting, energy audits, or even energy service) would allow municipalities to realize similar benefits.

While energy and water sustainability is a rapidly changing field, few municipalities will have the resources to provide staff dedicated to sustainability. A regional energy circuit rider or staff member shared among multiple municipalities could provide “in house” support for sustainability efforts without the cost of adding another municipal staff member or paying for professional development of existing staff. Such a position could be an MAPC staff member or a consultant contracted through regional procurement conducted by MAPC.

- 3.a **MAPC should develop a program for regional procurement of energy services, including municipal energy audits**
- 3.b **MAPC should work with municipalities to develop a pilot program for an energy circuit rider or shared staff.**

## **B. Conserve Energy**

Electrical power generation is the second largest producer of greenhouse gas emissions in Metro Boston. Massachusetts has committed to a carbon cap and trade program, which attaches a price to carbon emissions and makes cleaner, more efficient fuels financially competitive with oil and coal burning plants. This transition can be supported by technologies, programs and policies that help to reduce demand for electricity and establish saving energy as an equal partner with new power generation. Electrical efficiency programs operated by the state's electric utilities between 2003 - 2005 cost \$504 million and yielded \$1,227 billion in lifetime savings on electric bills. Cost effective investment in energy efficiency in the New England states could offset eight years worth of projected growth in energy demand. Barriers to implementation often include lack of information about efficient technology options, too much emphasis on up-front versus long-term energy cost planning, and incentives that are split between building owners and tenants.

Massachusetts has begun to lead the way in the application of conservation measures. Governor Patrick signed Executive Order 484, "Leading by Example- Clean Energy and Efficient Buildings" in April of 2007. Through various initiatives, the program works to reduce the overall environmental impacts of state government operations, particularly climate and energy impacts. Executive Order 484 establishes higher energy efficiency standards in the operation of state buildings, setting short- and long-term targets and goals to advance clean energy and efficiency, and reduce greenhouse gas emissions that contribute to global warming. The order required all state agencies involved in the construction of and major renovation of over 20,000 square feet to meet LEED certification as well as energy performance standards 20% better than the Massachusetts Energy Code.

Included in the Green Communities Act of 2008, least cost energy planning requires distribution companies to look at all energy sources when they purchase power, requiring them to purchase the most long-term cost-effective and stable sources available versus traditional fossil fuel supplies. Under the legislation, each distribution company must create a procurement plan that identifies and prioritizes all cost-effective efficiency measures. A new oversight Council, made up of a diverse range of stakeholders including low-income, commercial and industrial, manufacturing, environmental and efficiency experts, is established to ensure that demand resource plans maximize economic benefits to consumers. The administration is in the process of implementing this process.

### **4) Implement stronger energy efficiency and green building standards**

Updating both residential and commercial building codes offers one of the most straightforward ways to reduce greenhouse gas emissions and the use of fossil fuels as much of the region's commercial, industrial and residential building stock is relatively old and energy inefficient

State building codes should be updated at least every three years to reflect state-of-the-art technology and building techniques. This frequent updating will also require more frequent training and recertification for building inspectors in order to ensure effective enforcement. Municipalities can require even more ambitious efficiency and environmentally friendly construction through zoning codes that require certain developments to meet US Green Building Council standards. This approach has already been applied in Boston and could be transferred to other municipalities with appropriate technical assistance and local support. However, some municipalities may be wary of establishing high standards for energy efficiency out of concern that they will create a local disadvantage for economic development as compared to other municipalities. For this reason, the Commonwealth should consider establishing LEED standards as a statewide requirement, in order to create a level playing field across municipalities.

The efficiency of appliances and lighting is rapidly evolving, but updating the state's standards currently requires a legislative change. The state should authorize the Department of Energy Resources to update the standards through the regulatory process, which would allow them to be updated regularly.

Because of the rapidly changing nature of sustainable building practices, many municipalities cannot access or interpret available information about emerging techniques. A central clearinghouse of information on sustainable building techniques—vetted by experts in the industry and public agencies— would provide municipalities with a resource for evaluating local proposals.

- 4.a **Massachusetts Board of Building Regulations and Standards should regularly update energy codes and ensure enforcement**
- 4.b **The Division of Energy Resources should be authorized to continuously update appliance and lighting fixture standards**
- 4.c **The Green Building Commission should disseminate best practices for zoning codes that include green building requirements**
- 4.d **The Executive Office of Energy and Environmental Affairs, should lead an effort to create a clearinghouse of verified information about sustainable building products and methods**
- 4.e **The Legislature should create tax incentives to promote the use of sustainable building products and techniques**
- 4.f **The Massachusetts School Building Authority should require evaluation of energy use and life cycle costs during the planning phase for new schools**

**5) Promote distributed generation and combined heat & power at compact growth locations**

“Distributed generation” describes an energy production system that includes a mix of larger and small generation facilities, including many on-site or small-scale solar, geothermal, biomass or other renewable facilities. Combined heat and power units use waste heat from electricity generation to produce heating or cooling. District energy systems can provide local sources of electricity, heating, and/or cooling to clustered residential, mixed use developments and industrial parks.

Distributed energy and combined heat and power units make better use of the existing grid system and can offset investments in the grid by reducing the need to build new transmission lines. For consumers, this translates into lower energy costs, greater choice, and quicker response to increased demand due to an enhanced ability to make incremental capacity additions.

A new generation of smaller energy districts organized around distributed generation facilities could draw from both local and grid supplies, and would have strong incentives for conservation and opportunities for savings. Municipalities might use District Improvement Financing (described in Strategy 12) to generate short-term financing for the construction of distributed energy facilities and associated districts; and might operate such facilities or districts through contracting or partnerships with the private sector.

**5.a The Department of Energy Resources should recommend regulatory and legislative revisions to facilitate distributed generation**

**6) Give consumers more information about energy use, cost, and efficiency**

Consumers need transparent information about energy costs and efficiency in order to make informed decisions about consumption and efficiency investments. The Commonwealth has already begun taking some steps to implement this recommendation. For example, the Green Communities Act requires each electric utility to propose smart grid pilot programs, with the objective to reduce peak and average loads by a minimum of 5%. The Smart Grid program requires energy distribution companies to file a plan establishing a “smart grid” program that would send automated information to customers showing how much energy they use and when, including the installation of “smart meters,” allowing them to make more informed consumer decisions. The State should ensure that this program is implemented and expanded based on initial findings from the pilot study.

The “smart grid” and “smart meter” programs are designed to help customers adjust their behavior to reduce energy consumption. Audit programs can provide information about efficiency improvement (generally capital improvements) that will increase efficiency over the long-term. Energy companies currently offer relatively simple audit programs to customers that yield considerable savings; an expansion of these programs, funded through an increase to the Systems Benefit Charge, would yield even greater benefits.

Consumers should also have access to information about energy consumption for properties they are looking to purchase, so that potential homeowners could factor energy costs into their budget and purchase price. To the extent that such information affects value of less-efficient homes, it could also allow purchasers to invest the ‘saved’ money into energy conservation measures. The state should promote such audits on a voluntary basis, with the ultimate goal of making them a mandatory part of the home inspection process.

**6.a The Legislature should expand energy audit and rebate programs by increasing the Systems Benefit Charge and extending it to oil customers.**

**6.b The Department of Energy Resources should establish a program to encourage voluntary home energy audits at time of time of purchase.**

**7) Create new funding mechanisms for energy efficiency improvements**

Finding opportunities for conservation improvements is easier than finding the money to make those improvements. While many efficiencies yield a positive payoff after a certain amount of time, some property owners may not have access to the necessary capital, or may not expect to own the property long enough to recoup their costs. Even if a buyer can negotiate a lower price based

on an energy audit, the savings gained through that negotiation are not available as capital to make improvements.

New funding mechanisms are needed that can convert the energy and financial savings in “out years” into capital for making the improvements. New requirements for least cost procurement will create a market for the energy savings from conservation improvements. Energy service contractors will seek to tap this market by making conservation improvements for public, corporate, and institutional consumers, and then selling those energy savings on the least cost procurement market. However, it is not likely that this model will trickle down to individual property owners for some time, despite the potential savings that might be gained from large numbers of modest improvements.

**7.a The Division of Energy Efficiency should convene a working group to investigate financing tools to for energy efficiency improvements**

**8) Increase efficiency of transportation system**

The transportation sector represents the largest source of carbon dioxide emissions in the region. MetroFuture seeks to reduce these emissions through compact growth patterns and investments in transit, so that residents have less distance to travel, and more alternatives to driving. A reduction in vehicle miles traveled per person can be compounded with increasing fuel efficiency to yield dramatic reductions in overall emissions.

Although federal policy establishes national mileage standards, there are many potential state, regional, and local policies to mandate or promote more efficient vehicles. Tax incentives for low-emission vehicles can help to stimulate demand, especially if they are applied across New England and are applied proportionally based on the fuel efficiency of the vehicle. Fleet operators, both public and private, should make greater efforts to evaluate life cycle costs and purchase high-efficiency vehicles whenever possible. The Green Communities Program is now developing fuel efficiency standards for a variety of vehicle types, including heavy-duty vehicles. Standards for the increased use of alternative fuels should adopt a similar focus on life cycle greenhouse gas reductions, rather than seeking to promote one particular technology. Finally, all vehicles can use less fuel through the application of best practices, such as reduced idling and the use of low-resistance tires.

- 8.a The legislature should adopt state tax incentives for purchase of low-emission vehicles**
- 8.b All public and private fleet owners should purchase vehicles that meet the Green Communities Program's fuel efficient standards**
- 8.c The Biofuels Task Force should scrutinize low carbon fuel standards for environmental benefits**
- 8.d The Commonwealth should establish standards requiring low rolling resistance replacement tires**
- 8.e The Department of Environmental Protection should establish a task force to increase enforcement of anti-idling statutes.**

### **C. Promote the use of renewable resources**

Massachusetts is one of several states that require that a certain percentage of the power sold by utilities be generated from renewable sources. In 1997, the state adopted a Renewable Portfolio Standard that sets a goal of generating 4% of the state's power from new renewable sources by 2009 with a 1% rise each year thereafter. The recently adopted Green Communities Act also sets targets for the Renewable Portfolio Standard, establishes a new Alternative Energy Portfolio Standard, and requires utilities to secure long term contracts (10-15 years) for renewable sources constituting 3% of their total load. These long-term contracts will help to spur construction and financing of new renewables.

Additionally, the Massachusetts Technology Collaborative, through the Renewable Energy Trust, currently offers incentives for the installation of renewable energy devices such as wind turbines and solar panels. The Commonwealth Solar program was recently established to help homeowners install solar power, and this program might be applied to a wider range of property types.

#### **9) Reduce regulatory and financial barriers to local renewable energy production**

As of 2008, there are approximately 27 megawatts of renewable energy installed in the MAPC region with about 33 megawatts in development. Continued growth of renewable power in the region can be fostered through regulatory reform and technical assistance to allow more uniform and streamlined permitting processes for renewable energy installations. Regional planning agencies, state agencies and business representatives should coordinate to develop outreach and education programs to promote siting of renewable energy installations.

In the past, smaller scale generators of renewable power were limited by net metering rules that severely limited the amount of power they could sell back into the electric grid, at 60 kilowatts. The recently passed Green Communities Act increased the amount of power allowed to be sold back into the grid up to 2 megawatts. This change will allow the owners of land with good wind resources

but no facility nearby to provide power to an opportunity to develop independent, small scale energy installations that could sell their power directly to utilities.

- 9.a Municipalities should adopt renewable energy siting bylaws and streamlined permitting processes**
- 9.b MAPC should work with the Division of Green Communities to assist cities and towns in drafting and implementing new siting bylaws and streamlined permitting changes**
- 9.c The Department of Energy Resources, together with Massachusetts Technology Collaborative, should expand Commonwealth Solar**
- 9.d The Ocean Management Advisory Commission should encourage offshore wind energy facilities while ensuring appropriate siting of such facilities**

#### **10) Increase market demand for renewable energy**

The Renewable Portfolio Standard (RPS) establishes targets for the use of renewable sources. The Green Communities Act divides RPS into two classes. Class I includes new solar, wind, new and incremental hydro, and low-emission advanced biomass technologies. The bill sets a target that Class I resources should account for 15% of Massachusetts energy sales by 2020. Class II eligible technologies include existing low-emission biomass and existing hydropower; targets for Class II RPS requirements will be set by Division of Energy Resources.

The next step in establishing markets for renewable energy is to establish a carbon dioxide emissions registry, a precursor to a carbon banking and trading program that will fully monetize the costs of pollution.

- 10.a The state should create a carbon dioxide registry as an interim step to a carbon trading program**

#### **D. Manage water demand through education, pricing, technical assistance, and regulation**

While Metro Boston is blessed with relatively abundant water supplies (averaging 44 inches of rain per year), there is often a mismatch between supply and demand. Water suppliers are increasingly finding that their wells produce less water, and a lower quality of water, during summer months, or have seen their reservoirs drop dangerously low. Even when water is physically available for human uses, its withdrawal from surface or groundwater resources may impact the local environment, native flora and fauna, scenic beauty, and recreation opportunities. In some cases, municipal well pumping causes the desiccation and degradation of nearby wetlands that purify and store water. Municipalities seeking additional water to support new growth over the coming decades will find fewer opportunities for new source development, and may find permitting new sources to be time consuming, expensive,

and uncertain due to the growing understanding of how water withdrawals affect environmental resources.

Our current water situation is partly due to local water policies that tend to promise abundance and promote consumption, effectively treating municipal water supply enterprise as if it were a private sector business. In the face of increasing scarcity and growing understanding of environmental costs, we can no longer think of water as a limitless commodity that should be sold as cheaply as possible. Water suppliers, municipal officials, and customers must move together toward greater sustainability in our finite water resources. The solutions may not be easy or immediate, but together the region can reduce water demand so there is sufficient supply for both humans and wildlife.

There are many strategies that communities can use to reduce water use demand. Public education is a fundamental prerequisite for the success of water conservation programs, and should be the first strategy implemented. However, outreach and education are only one component of a comprehensive water demand management program. Conservation pricing, landscaping irrigation controls, better metering and water accounting, upgrading inefficient plumbing fixtures, and direct water use regulation all require more time, investment, and political commitment than public outreach, but they are essential to success.

Municipal officials and water suppliers need to adopt a sustainability model similar to those emerging in the energy field, where conservation is seen as an alternative to system expansion. Because conservation is equivalent to a new source of supply, water suppliers should fund and support conservation programs just as they would a pay for new source engineering services—as part of the cost of doing business, paid for through full-cost water pricing, accounting for both environmental costs and investments in demand management. Full-cost pricing also requires the establishment of enterprise accounts so that water system revenues are kept separate from general municipal revenues, to avoid cross-subsidies that obscure the true costs of supplying water to the community.

Peak demand drives the cost of water supply, since water supply systems must be capable of meeting maximum demand under the most extreme circumstances. Dealing with Reducing peak demand also requires participation from all sectors. Property owners need to curb their summertime demand through low-water landscaping. Developers and engineers must become skilled in water efficient site design, and advanced irrigation systems.

### **11) Increase public awareness regarding water conservation**

In order to achieve fundamental changes in patterns of water use in the region, residents and businesses must have a greater awareness about the region's water resources, the impacts of excessive water use, and the need for conservation. Customers must understand how their actions affect the natural environment and how conservation measures can save them money. Pricing structures, technology, outdoor use restrictions, and development standards all depend on the water user for their effectiveness. Without an educated consumer who is aware of cause, effect, and solution, efforts to change behavior will be ill-received and ineffective.

- 11.a Water utilities should establish a water conservation coordinator position, funded by water system revenues**
- 11.b The Executive Office of Energy and Environmental Affairs should establish a State Water Conservation Coordination Coordinator**
- 11.c Public water suppliers should implement public education and outreach campaigns regarding water conservation**
- 11.d Public water suppliers and municipalities should pursue opportunities for regional water conservation education campaigns**
- 11.e Public agencies and private landowners should establish low-water demonstration gardens and pilot projects for alternative turf athletic fields**
- 11.f Water suppliers should establish funding programs to support demonstration gardens and pilot programs**
- 11.g Water suppliers and municipalities should collaborate to establish water education programs in public schools**

**12) Adopt water pricing structures as a primary mechanism to manage water demand**

Water is both a necessity and a scarce commodity. This makes it important that water pricing discourages unnecessary and wasteful use while maintaining affordability for essential uses. Because a significant portion of water use is non-essential, there is considerable elasticity in demand with respect to price, meaning that if the price of a given quantity of water increases, consumers are encouraged to reduce their costs through reduced discretionary use and more efficient technology. In the short term, a 10% increase in the cost of water for single family residential customers can result in roughly a 1% to 2% decrease in summer water consumption. In the long run, the same price increase can reduce summer water use by approximately 2% to 5%.

Conservation-oriented pricing structures can be designed to be revenue neutral. As the rate burden is shifted to customers who use the most water or who use it most wastefully, rates decrease for customers using less water. Rates can also be structured to recover the full cost of delivering water, even as overall consumption decreases.

Many water systems in Massachusetts use a uniform rate structure in which customers pay the same rate for each gallon of water. This type of rate does not distinguish between essential and non-essential uses, between efficient and wasteful use, or between usage when supplies are high and usage when supplies are low. By structuring rates so that the price increases above certain usage levels

or during certain time periods, customers will be encouraged to reduce water consumption, and/or to reduce peak use.

Most rate structures contain both an upfront fixed charge and per unit commodity charges covering the water used. There are a number of different ways to structure the commodity rates to discourage wasteful use. These include:

- Increasing block pricing, in which the price per gallon of water increases with the amount of water consumed;
- Seasonal rates, which charge more for each gallon of water in the summer when demand is greater and supplies are lower (and can be superimposed on block water rates);
- Other strategies to quantify the discretionary use of each customer and to charge higher rates for the water used for discretionary purposes. These strategies include targeted use rates based on projected essential household demand; separate outdoor meters; and fees or discounts based on the use of water efficient technologies.

Regardless of the rate structure, universal metering is a prerequisite for the success of conservation-oriented rates. Also, water systems must read meters and bill customers frequently to give feedback in time to influence customer behavior.

The New England Water Works Association Conservation Committee is developing a Best Management Practice document regarding pricing structures.

- 12.a Water utilities should ensure 100% metering of all public sector and private users with meters of proper size and accuracy**
- 12.b Water utilities should bill all customers at least quarterly, preferably monthly, and should use water bills to educate consumers about consumption and conservation opportunities**
- 12.c Water utilities in the region should adopt increasing block rate structures**
- 12.d Water utilities should adopt seasonal rate structures that charge higher unit costs during peak demand periods**
- 12.e Water utilities that permit outdoor meters should enact higher water rates for outdoor meters to send an appropriate conservation signal to consumers**

### **13) Use full cost pricing and use water revenues to fund conservation programs**

All water utilities should establish a water pricing structure that includes the full cost of operating, maintaining, and protecting the water supply system. Water revenues should be kept separate from the municipality's general fund, in order to prevent cross-subsidies.

A full cost water pricing structure includes, but is not limited to the following:

- A comprehensive water conservation program, including retrofits, rebates, audits, education, leak detection, and advanced metering technology;
- Staff costs, including training and professional development;
- Pumping, maintenance, electricity, and fuel;
- Treatment plant costs;
- Distribution system operation, repair, and maintenance;
- Purchase or protection costs for watershed lands, well sites, aquifer recharge areas, or recharge sites; and
- A capital replacement fund, capital depreciation account, and debt service.

Full cost pricing can take the form of any rate structure so long as all costs are recovered through prices. Water systems should perform a rate evaluation at least once every two years to adjust rates to cover the cost of unanticipated capital needs, inflation and changing demand as needed.

**13.a All municipal water utilities should utilize enterprise accounts**

**13.b EOEEA should develop a methodology for assessing environmental costs of water withdrawals**

**14) Increase the use of low-water landscaping**

Municipalities can help to reduce water demand for irrigation by integrating landscaping best practices into existing site plan guidelines, zoning bylaws, and subdivision rules and regulations.

Since irrigation demand is directly correlated with lawn size, local bylaws limiting the extent of turf (either in terms of square footage or as a percentage of the total lot) have had considerable success in reducing irrigation demand in development subject to the limitations. By-laws may also encourage the use of native plants, require the preservation of existing plant communities, and/or require a certain depth of soil and percentage of organic content to ensure adequate moisture retention.

Locally, there are a few examples of landscape requirements. The Town of Falmouth enacted by-laws requiring Xeriscape (“a landscape designed with native, drought-tolerant species which require little fertilizer”) for all applicable projects (“all development projects other than single- or two-family dwellings that require a special permit or review”), unless a drip/mist irrigation system or a private well irrigation source is used (of course, private wells still have hydrologic impacts and result in a net loss of water from the watershed to the atmosphere, and therefore should be subject to the same irrigation restrictions and reporting requirements as municipal water).

The Town of Sharon also has a provision requiring development in “Rural and Suburban 2” districts to retain at least 50% of the lot in natural vegetation, and requiring building lots in Conservation Subdivision Design developments to have at least 15% of the lot in natural vegetation. Experience in Sharon suggests that enforcement is problematic. Some observers have reported that developers

simply leave “natural areas” bare, and homeowners seed them with lawn grass immediately after purchasing their new home from the developer.

While Sharon and Falmouth created new by-laws, other communities may instead opt to include similar provisions in zoning by-laws, subdivision rules and regulations, or site plan review standards.

- 14.a Municipalities should adopt landscaping regulations or incorporate landscaping best practices into existing land use controls**
- 14.b Property owners should amend their soil with organic content to reduce or eliminate the need for irrigation**
- 14.c Water utilities should consider rebate programs for landscape conversion**

**15) Provide technical assistance to residents and businesses**

Water audits offer detailed information to targeted classes of users. An audit includes a customer-specific on-site survey of water usage patterns and specific recommendations for increasing water efficiency. It may also involve distributing and/or installing water-saving devices. Audits can be conducted for both indoor and outdoor use for residential and nonresidential customers.

Some utilities offer audits to all residential customers; others target a subset of residences based on water use or on housing type (for example, age of housing stock, or single family houses only, or high water use households only). Residential audits can include indoor, outdoor, or both. Non-residential audits may also include both indoor and outdoor evaluations. Some commercial and institutional customers with large landscapes may be good targets for outdoor water use audits, similar to those described in the residential outdoor audits section.

Indoor water use audits for large commercial, industrial, and/or institutional users can be highly site-specific and require specialized knowledge of the systems and processes involved. Industrial users may be hesitant to allow auditors access to systems for confidentiality reasons, and may be unwilling to commit the time required for a complex audit.<sup>iv</sup> In communities where industrial users are a large source of year-round water demand, improving process water efficiency with these users may substantially reduce year-round water use

In order to improve the likelihood that the recommended measures will be implemented and the potential water savings will be realized, audit programs might require participants to implement some of the measures recommended by the audit (e.g. those with no more than a specified payback period) or be charged the price of the audit.<sup>v</sup>

- 15.a The Commonwealth should establish a funding program and guidance to support water audit programs**
- 15.b MAPC should explore opportunities for joint purchasing of water audit services**
- 15.c Water suppliers in stressed watersheds should require mandatory water audits, at the time of sale or when existing residences connect to the public water supply**
- 15.d Watershed organizations should expand educational landscaping and water conservation workshops for customers**
- 15.e Nurseries and community organizations should collaborate to make native, low-water plants a staple of fundraising plant sales**

#### **16) Establish and enforce standards and restrictions for outdoor irrigation systems**

The intensity of peak demands has grown in recent years due in part to the proliferation of automatic irrigation systems. These systems generally involve a series of sprinkler heads connected by piping or hoses, controlled by a central automatic timing device so that they operate on a regular schedule without requiring any human intervention.

Although irrigation systems can be designed to apply water precisely and efficiently, in practice they often irrigate more frequently and more heavily than necessary because of their automated nature. As they have spread from professionally managed and carefully monitored applications at golf courses and agricultural operations, to residential and commercial developments where they receive less oversight, they have become more and more wasteful of water. While the most sophisticated irrigation systems can distribute water where and when it is needed based on plant types, site and soil conditions, and recent weather patterns, the more basic systems have the potential to waste enormous quantities of water, running longer than necessary, spraying water onto paved areas, springing leaks, and even running during rainstorms. The Franklin Water Department estimated that homes with automatic systems consumed an average of five times the water than the typical household. The excessive irrigation, ironically, makes outdoor watering bans more likely by draining supplies, and also weakens plants through overwatering.<sup>xiv</sup>

Recent improvements in technology have made it possible to increase the efficiency of irrigation systems (through local real-time or daily evapotranspiration rates). There are many alternative landscaping choices (including native lawns) that do not require irrigation, and higher standards or restrictions for irrigation systems may encourage many property owners to adopt such landscaping.

**16.a Municipalities should establish restrictions on the use of automatic irrigation systems**

**16.b Property owners should increase the use of “smart” irrigation systems**

**17) Establish comprehensive programs to directly regulate water usage during peak periods**

Until a municipality or water district establishes by-laws or other regulations authorizing officials to restrict water usage, the options available in a time of water shortage are only extremes: on one end of the spectrum, officials can request voluntary reduction of water use, and on the other, they can petition for the declaration of a state of emergency by Massachusetts Department of Environmental Protection.

A preferable, proactive approach involves multiple techniques that can be tied to local conditions and phased in as necessary to prevent a crisis and minimize environmental impact of peak season withdrawals. Generally, such an approach is built on a legal framework that involves four components: indicators, triggers, restriction measures, and enforcement. The importance of the last component—enforcement—must not be underestimated. Too many Massachusetts communities have water use restrictions on the books that are either not enforced, or not effective due to jurisdictional uncertainty, lack of political will, or lack of significant penalties.

State entities also need to implement more aggressive drought response policies. In 2007 the Massachusetts Drought Management Task Force waited to declare a drought until after many perennial streams had already dried up. The U.S. Drought Monitor (<http://drought.unl.edu/dm/monitor.html>), updated weekly, indicated a “moderate drought” in Massachusetts in late August, long before the Drought Management Task Force finally issued a Drought Advisory on October 10, long after withdrawals in July, August and September had already depleted groundwater reserves that provide base flow to streams.

As a condition of their modified water withdrawal permit from the Massachusetts Department of Environmental Protection, both Danvers and Middleton have implemented a water use restriction system tied to streamflows in the Ipswich River.

**17.a Each water utility should define Peak Water Demand Indicators and associated conservation measures**

**18) Increase incentives for installing water-efficient products**

Even if water users understand the need for water conservation and know that they should be using more efficient technology inside, more water-conserving landscaping, and fewer, more efficient irrigation systems, the cost and/or the effort associated with obtaining replacements for their existing materials may be enough to prevent or delay them from doing so. To reduce the burden on the

consumer, municipalities or water utilities can offer rebates, vouchers, or can provide the materials themselves. This reduces the customer's investment by paying all or some of the costs of the products, and can make the products easier to acquire, either by providing them directly or by increasing the demand and giving vendors more cause to sell those products. Because these programs require active participation by customers, advertising and public education are critical to their success. The US EPA has a new "WaterSense" labeling program for water-efficient products, similar to the Energy Star program.

- 18.a Massachusetts Board of Building Regulations and Standards should regularly update the State Plumbing Code to account for efficiency advances**
- 18.b Water utilities should implement and expand rebate and voucher programs**
- 18.c Water utilities should explore the use of fees & discount systems**

## **E. Implement water/wastewater/stormwater utility "best practices" across the region**

If a utility does what it can to conserve water, customers will tend to be more cooperative in other water conservation programs, many of which hinge on individual efforts.

### **19) Conduct integrated water management planning**

An integrated approach is needed to keep water local and to begin to address and mitigate hydrological imbalances. While water conservation is a major component of this approach and is often the most economical and least damaging tactic for meeting human needs, capturing stormwater and recycling wastewater can also play important roles. Planning for future upgrades, development or expansion of water infrastructure within a community must take into consideration the interdependence of these three components.

Infrastructure planning evaluations within communities should include water supply, wastewater and stormwater with greater emphasis on the issue that is most problematic. Planning should follow available guidance from MassDEP or the Water Resources Commission. The plans should be updated periodically.

### **20) Reduce inflow and infiltration**

Infiltration is defined as groundwater that enters the wastewater collection system through physical defects such as cracked pipes/manholes or deteriorated joints. Typically, many sewer pipes are below the surrounding groundwater table, therefore leakage of clean groundwater into the sewer (infiltration) is a widespread problem. Where sewer pipes run through Zone II areas or other land areas contributing flow to water supply withdrawal points, infiltration into those pipes can significantly reduce the yield of the affected water supply.

Inflow is extraneous flow entering the collection system through point sources such as drainage pipes connected to sewer lines. Inflow may be directly related to stormwater runoff from sources such as roof leaders, yard and area drains, sump pumps, manhole covers, or cross-connections from storm drains or catch basins. Inflow may also be contributed from non-storm related point sources, such as leaking tide gates, cooling-water discharges, or drains from springs and swampy areas. I/I removal plays an important role in balancing the water budget by minimizing the amount of groundwater and stormwater lost into wastewater systems.

**20.a Wastewater utilities should implement the seven overall goals approved by the I/I Task Force.**

**21) Water utilities should conduct comprehensive water system audits and assessments on a regular basis**

Water utilities should conduct a comprehensive audit every 5 to 10 years depending on the findings of the Annual Statistical Report audit. A comprehensive audit is strongly recommended for communities/systems showing significant and unexplainable increases in unaccounted-for water (UAW) from one year to the next, and for communities/systems that are consistently unable to meet regulatory standards for UAW.

Water suppliers should perform assessments of their systems on a regular basis to determine where capital improvements are appropriate and incorporate the recommendations into a long-term capital improvement program. Specifically, aged and undersized or deteriorated pipe should be replaced, and sound pipe should be cleaned and lined to ensure long term structural integrity.

**21.a Every municipality should have up-to-date water system audits and assessments**

**22) Conduct frequent systemwide leak detection and prevent water theft**

Old and poorly constructed pipelines, inadequate corrosion protection, poorly maintained valves and mechanical damage are some of the factors contributing to leakage. One effect of water leakage, besides the loss of water resources, is reduced pressure in the supply system. Raising pressures to make up for leakage losses increases energy consumption, makes leaking worse, and adversely impacts the environment. Of the many options available for conserving water, leak detection is a logical first step.

Communities can accomplish the survey using their own contractor or municipal crews; or alternatively, using regional leak detection contracts available through MAPC or the Massachusetts Water Resources Authority. These task-order contracts provide high quality leak detection services at a reduced cost resulting from the large volume of work anticipated throughout the regional system.

New technology such as acoustic leak location systems, in conjunction with radio meter reading systems, can continuously monitor water supply systems for leaks, and identify the locations of leaks, so repair crews can be dispatched efficiently.

**22.a Water utilities should conduct lead detection every two years or should implement acoustic leak location systems**

**22.b Water utilities should participate in the MAPC or MWRA regional leak detection procurement programs**

**22.c Municipalities should establish penalties for water theft**

**23) Ensure compliance with pressure reduction regulations**

Excessive pressure in water service connections can waste considerable amounts of water. The Massachusetts plumbing code (248 CMR 10.14(g) Excessive Water Pressure) requires that a pressure reducing valve be installed on the water service connection to a building when the pressure is eighty (80) pounds per square inch (psi) or greater. Maintaining water pressure within the regulatory limit conserves water.

Water utilities should evaluate existing water system regulations in order to ensure compliance with this regulatory requirement. This evaluation could include the establishment of maximum pressures for users as a conservation measure. Water suppliers should map their jurisdictions to show areas in which water pressure may exceed the limit in the absence of pressure-reducing valves. They should recommend to and assist the plumbing inspector in conducting periodic surveys to determine whether the pressure reducing valves are functioning properly, and take remedial action as needed.

**23.a The Department of Environmental Protection should require pressure mapping and compliance with the pressure limits as a requirement for Water Management Act withdrawal permits**

**24) Establish fee-based stormwater utilities**

Municipal stormwater systems epitomize the concept of “stranded infrastructure.” Unlike water and sewer systems, there is no dedicated funding stream to ensure adequate maintenance of stormwater systems. Capital funding (grants, bonds, or developer mitigation) pays for new infrastructure, but constrained tax revenues and competing priorities mean that public works departments are under resourced. Municipal staff are unable to conduct routine maintenance such as cleaning catch basins, repairing pipe, or removing blockages, resulting in lower pollutant removal and increased flooding. As years of deferred maintenance result in deterioration requiring complete reconstruction; the shortage of operating funds eventually results in higher capital costs.

A stormwater utility provides user fee funding similar to water and sewer utilities, but creates an enterprise fund with revenue to pay for operating and

maintenance expenses, project or capital-related expenditures, staffing, engineering, permitting, inspection, and program management costs. A stormwater utility is leveraged as a fee charged in exchange for a service, such as stormwater management system operation and maintenance, or construction of new infrastructure. This charge is a consistent, dedicated, and equitable source of funding. Stormwater utilities are based on factors that influence stormwater runoff, such as impervious area or land use, which can be used in the rate setting methodology. Property owners can receive abatements from the fees by implementing best management practices that reduce stormwater runoff.

Higher-density development may have more significant stormwater impacts, however, in order to encourage appropriate density in urban and town center locations, any stormwater fees should be structured so they do not discourage redevelopment or high-density growth.

- 24.a Municipalities should establish stormwater utilities**
- 24.b MAPC and allied organizations should disseminate models and provide technical assistance to communities for developing dedicated stormwater utilities**
- 24.c The Commonwealth should provide technical assistance and/or capacity building for Regional Planning Agencies to assist communities in developing stormwater utilities**
- 24.d MAPC should evaluate the potential use of Environmental Joint Powers Agreement for the creation of multi-municipal stormwater districts**

## **F. Expand the use of reclaimed water and alternative supplies**

Water suppliers can look many places for water to serve new growth. They can look at existing aquifers or reservoirs, which may be expensive and time consuming to develop as water supplies. Alternatively, they can use reclaimed water and rainwater harvesting to create an increment of supply. Reclaimed water, defined as domestic wastewater that is treated to a level such that it is suitable for beneficial reuse, can provide a significant increment of supply for use in nonpotable applications such as irrigation, industrial uses, power plant cooling water or toilet flushing. This treated wastewater, also known as recycled or reused water, can also be discharged to leaching fields to help replenish local aquifers. With adequate treatment, reused water can satisfy many water demands. Where there is a greater chance of human exposure, more treatment is required.

The use of reclaimed water or alternative sources can provide many advantages to communities and businesses. Large-scale water reuse will reduce the need for expanding water supplies, so communities can avoid the process of permitting new supplies. Cost effective water reuse systems will allow business and industry to operate and expand at lower cost. Wastewater treatment facilities will discharge less wastewater and may be able to sell some wastewater back to recycled water users, increasing cost efficiencies. Reduced water demand will result in healthier rivers, streams, and lakes for recreation and wildlife.

Rainwater harvesting can provide another alternative water supply source for many nonpotable uses, especially irrigation and outdoor uses. Rainwater harvesting techniques range from simple rain barrels to modular vault systems that can be scaled up to hold 40,000 gallons or more.

## **25) Establish state policies supportive of water reuse**

In 2008, MassDEP proposed a new set of regulations governing the permitting and operation of reclaimed water in Massachusetts, 314 CMR 20.00, entitled “Reclaimed Water Permit Program and Standards Regulations.” These regulations reflect national experience in reclaimed water, MassDEP’s experience since the implementation of its Interim Guidelines on Reclaimed Water in 2000, as well as research and input from a MassDEP’s Water Reuse Task Force.

The draft regulations establish a system of classifications and standards specific to the proposed use. The highest standards apply to those proposed uses with greatest potential for exposure to the public. These regulations expand the allowable uses in Massachusetts and include:

- Landscape irrigation for golf courses, parks, playgrounds, athletic fields, and nurseries
- Toilet flushing
- Cooling water and industrial process water
- Agricultural use such as pasture land irrigation, silviculture irrigation, and food crop irrigation (where there is no contact with the edible portion of the crop and reclaimed water use)
- Recharging of aquifers in basins, sub-basins and watersheds acknowledged to be stressed water resource areas, where it is necessary to replenish streamflow, enhance the productivity capacity of an aquifer , and/or improve or mitigate water quality problems (proposed under revisions to 314 CMR 5.00, Groundwater Discharge Permitting Program Regulations)

Under the current policy, water reuse options can be seen as a constraint by limiting uses to only four practices: irrigation of golf courses, irrigation of landscaping at nurseries, toilet flushing for commercial uses, and recharging of aquifers. The proposed regulations encourage water reuse in Massachusetts by expanding the set of permissible uses, while continuing to protect public health.

**25.a MA DEP should adopt the proposed Reclaimed Water Regulations and the proposed revisions to the Groundwater Discharge Regulations**

**25.b Municipalities and water suppliers should require new golf courses to use treated wastewater for irrigation wherever possible**

**26) Provide technical assistance and training to promote water reuse**

MAPC and state agencies can help to identify water reuse pilot projects and provide technical assistance to developers, municipalities, and water utilities. EOEEA should work proactively with communities, businesses and institutions to promote reclaimed water use projects by helping communities to identify specific water reuse sites such as ballparks, golf courses, malls, and other commercial developments.

**26.a Massachusetts Office of Technical Assistance or Department of Environmental Protection could develop and implement a water reuse training program**

**26.b MAPC should provide technical assistance to municipal governments to promote water reuse**

**27) Require evaluation of water reuse opportunities as a condition of water service for large developments**

Municipal boards and water suppliers should condition connection permits and development approval on evaluation of the potential for the reuse of treated wastewater in new developments, for toilet flushing, landscape irrigation, or industrial processes.

**27.a The Executive Office of Environmental Affairs should require evaluation of water reuse for large projects through the MEPA process**

**28) Encourage water reuse in state-funded construction projects**

Encourage water reuse through state programs such as Massachusetts School Building Authority, state revolving loan fund (SRF), redevelopment of surplus land, and state building projects.

**29) Increase the use of rainwater harvesting**

As much as 55,000 gallons of precipitation falls on a 2,000 square foot roof in New England each year, approximately the same amount of water that would be used by three people living in a water-efficient home. Rainwater harvesting systems put this water to work, offsetting demands on municipal and private water supplies for outdoor watering. Harvesting systems can be provided ranging from simple modular tanks with manually activated pumps (connected to outdoor spigots) to very large underground vaults with fully automated delivery systems providing non-potable water for outdoor irrigation (or indoor plumbing

subject to applicable regulatory statutes). Collected rainwater is normally suitable without chemical treatment for all non-potable uses. Cost-effective rainwater harvesting technologies exist for both residential and nonresidential applications.

- 29.a Developers should install large-scale rainwater harvesting systems at sites with high irrigation or toilet-flushing needs**

## **G. Use technical analysis to support more flexible regulatory mechanisms for water withdrawal**

### **30) Conduct hydrologic analysis to assess environmentally sustainable yield of water supplies**

The US Geological Survey has completed hydrologic studies of a limited number of watersheds in Eastern Massachusetts, including the Ipswich, Upper Charles, and portions of the SuAsCo. These hydrologic studies provide a platform for analysis of alternative growth and water supply alternatives. Additional funding and support is needed to create more watershed models and to integrate the findings into comprehensive water resource planning at the local/subregional level and into the withdrawal permitting process.

In addition, Massachusetts should require meters on the thousands of private wells across the state, and require annual reporting of water withdrawn from these private wells. Well drilling data is under the purview of DCR's Well Drillers Program. Actual water withdrawals by private wells are currently unknown. Without statistics on aggregate water withdrawals, monitoring and intelligently managing the state's water resources is problematic.

- 30.a The US Geological Survey should complete development of integrated basin assessments**
- 30.b The Department of Environmental Protection and the Department of Conservation and Recreation should develop regulations for the registration, metering, and annual reporting of private wells**

### **31) Implement water banking programs**

A water bank is a system of accounting and paying for measures that offset or mitigate water losses due to water withdrawals, sewerage, and/or increased impervious areas that prevent aquifer recharge. The purpose of a water bank is to provide a water supplier with the resources necessary to mitigate the demands of new development through conservation, leak detection, education, or infrastructure improvements. For example, a water banking program might require that new connections or increased demands be mitigated through payment into a fund, proportional to the amount of water requested (commonly in a 2:1 ratio for drinking water, or up to a 6:1 ratio for wastewater). The cost is based on a capital plan with an average cost per gallon of improvement.

Water banks can be highly effective in accommodating new development while simultaneously driving down aggregate water use. Weymouth's water banking program, whereby developers pay for conservation measures elsewhere in town, reduced the town's water use from about 4.8 MGD down to about 4.2 MGD, a highly significant reduction in view of the 4.5 MGD sustainable yield of their reservoir. Unfortunately, water banking is illegal in Massachusetts without a DEP Administrative Consent Order.

Key organizing principles for water banks include: a dedicated banking mechanism (such as an enterprise fund); a rational relationship between the assessed fee and the cost of implementing the offset and the program's administrative costs; a ratio for the offset versus new demand (at least a 2:1 ratio in medium and high stressed basins); and a mechanism for verification of improvements provided by the proponent.

Local water bank programs are already in place in Metro Boston municipalities. This model might also be scaled up to the watershed level, with water suppliers seeking to increase their supply required to mitigate increased withdrawals elsewhere in the watershed.

**31.a The state should pass legislation specifically legalizing water banking**

**31.b MAPC, state agencies, and watershed organizations should develop a technical assistance program for municipalities interested in local water banking**

**31.c DEP should commission a task force to evaluate the potential application of watershed-level water banks.**

**32) Provide more transparent access to statistical data collected through water permitting**

Currently, water supplier data required by the Water Management Act and reported to the MA DEP through Annual Statistical Reports is available only by visiting a DEP office and photocopying the paper reports. While DEP maintains some usage data in electronic format, these data are not available online, and DEP staff do not maintain historical data.

**32.a DEP should be provided with funding to make all non-restricted statistical data available on line**

**H. Promote local treatment and recharge of stormwater and wastewater**

**33) Establish land use controls and stormwater regulation to promote stormwater best practices and Low Impact Development**

Stormwater bylaws and ordinances grant a municipality the authority to establish standards for discharge of stormwater runoff. These controls can be structured to promote Low Impact Development, minimizing site alteration and

stormwater pollution. Numerous municipalities in the region have already adopted stormwater regulation; there are numerous models available and lessons learned regarding adoption and implementation. It is necessary to catalog the bylaws that have been adopted and to develop a next generation of model bylaws.

Municipalities should also adopt stormwater bylaws as part of a comprehensive review of existing development controls, in order to reduce barriers to application of low impact techniques, such as excessive roadway width requirements, parking requirements, dimensional standards, or landscaping requirements. MAPC has prepared a development controls checklist that municipalities can use to assess their existing regulations. It is available on the Massachusetts Low Impact Development Toolkit: [www.mapc.org/lid](http://www.mapc.org/lid).

**33.a MAPC should summarize lessons learned and recommendations for expanded adoption of stormwater bylaws**

**34) Expand septic system management programs**

Septic management programs involve monitoring, testing, and required maintenance of private septic systems in order to improve performance and extend life span. These programs help to protect water quality and prevent widespread system failure, deferring or eliminating the need to extend sewer to neighborhoods with failing septic systems.

All municipalities where landowners use private septic systems should establish a septic management utility. These utilities would conduct regular mandatory inspection and maintenance of private systems. Such a system could be funded through assessments on owners of the systems.

Since few municipalities have the staff capacity to manage the technical aspects of such a program, a regional program could be developed in which a single contractor conducts inspections, testing, and application review for multiple municipalities. MAPC's regional purchasing department is in an ideal position to manage the contracting and administration of such a program.

**34.a MAPC and the Department of Public Health should develop a proposal for regional septic management programs**

**34.b MAPC and the Department of Public Health should disseminate guidance and best practices for regional septic management systems**

**35) Favor decentralized wastewater solutions and strictly condition access to sewer extensions**

In municipalities with a mix of private septic systems and centralized sewer, wastewater management plans commonly recommend sewer extensions to “needs areas” where multiple septic systems are failing. Such extensions are very

costly, reduce groundwater recharge, and may stimulate unplanned growth if not accompanied by careful land use controls.

DEP should establish policy that the land use component of wastewater management plans and their alternative scenarios should be consistent with the municipal land use plan. Sewer extensions should also be accompanied by strict conditions for connections to the system, and clearly defined service area boundaries, in order to prevent the sewer from enabling unplanned growth.

## **I. Protect the quality of water supplies through source controls and land use planning**

### **36) Adopt and update water resource protection zoning**

Cities and towns, through their home rule powers, hold the key to protecting the long-term quality of their drinking water supplies. The federal Safe Drinking Water Act establishes the maximum levels of contaminants allowed in public water supplies to meet public health needs, but achieving those quality standards is largely a local responsibility.

Most threats to drinking water quality are related to inappropriate land uses sited in sensitive areas that may impact water sources. These include aquifer areas that recharge groundwater sources and watershed areas that contribute flow to reservoirs and other surface water sources. Incompatible land uses sited in these areas may provide a potential pathway for pollutants to flow into source waters. Since the regulation of land use is largely under the control of local zoning codes, communities have it within their power to implement local protection measures to ensure the quality of their drinking water.

Over the last 20 years many communities have adopted zoning measures such as Aquifer and Watershed Protection Overlay Districts to restrict land uses that pose a threat to water quality. MAPC worked with DEP and the MWRA to develop a model aquifer protection zoning overlay bylaw/ordinance and a majority of cities and towns in the region have adopted zoning overlay districts. However, a few communities have not yet adopted such zoning measures. In addition, many of the zoning overlay districts on the books were adopted as long as 20 years ago, suggesting that some of them may need to be updated. Updates to these zoning codes may include two kinds of amendments:

- amending the geographic boundaries of an overlay district to reflect changes in water sources or recharge area delineations
- amending performance standards and/or criteria for land uses that are allowed by right, allowed by special permit, or prohibited

**36.a Municipalities should conduct reviews of land use controls and adopt or update overlay protection districts where necessary**

**36.b MAPC should provide models and technical assistance for new or updated water resources protection zoning measures.**

### **37) Strengthen local regulation of hazardous materials**

The zoning measures described above can protect water resources from the impacts of new development, but zoning grandfathers existing development. Yet many communities have existing patterns of development already located within aquifer and watershed areas. In order to regulate these existing land uses, communities may implement non-zoning or “general” bylaws and ordinances or other local controls such as Board of Health regulations.

General bylaws/ordinances and health regulations can protect water quality by regulating existing commercial or industrial uses that involve the storage or handling of hazardous materials. While federal and state laws regulate large-scale operations, many smaller businesses that are below the threshold for regulation may have localized impacts on a community’s water supplies if hazardous materials are not stored and handled properly. Using hazardous materials general bylaws or health regulations, communities can directly regulate

Like the zoning overlay districts mention above, MAPC has worked with many communities to develop hazardous materials bylaws and regulations. But compared to zoning, fewer communities have adopted

**37.a Cities and towns should conduct reviews of local regulations and, where necessary, adopt or update hazardous materials bylaws or health regulations**

**37.b MAPC should provide models and technical assistance for new or updated hazardous materials bylaws and health regulations.**

## **J. Increase waste reduction and recycling**

In 2006, only 25% of the 2.3 million tons of waste produced in Metro Boston was recycled or composted. The need for waste disposal creates both environmental and fiscal problems. The relative difficulty with building more landfills and incinerators in Massachusetts means that disposal is expensive for municipalities and businesses. In 2006, 21% of Massachusetts’ waste slated for disposal was exported out of state at even greater expense, and with the additional concerns of safety and emissions that are associated with waste transport.

Meeting MetroFuture’s goals for waste reduction and diversion will require reducing the amount of waste produced in the first place, diverting more recyclable and compostable material from disposal, and developing markets for diverted material. The MA Solid Waste Master Plan (MA SWMP) was updated in June 2006. Based on careful analysis of the greatest untapped opportunities for waste reduction and the success of past initiatives, it includes strategies for spending resources first in the areas where the biggest “bang for the

buck” can be achieved. It calls for greater enforcement of existing state waste bans; focused efforts with large-scale waste generators in partnership with them and/or related trade associations; development of waste reduction initiatives where the market for material presents particular opportunities for cost effective diversion; and focused efforts on organics, and construction and demolition waste, which are waste streams with the substantial additional diversion potential and benefits. These strategies, and more broadly this approach, remain appropriate. The following recommendations are informed by it.

### **38) Strengthen incentives for recycling and composting**

Price signals influence decision making and behavior at each stage in the path that discarded material takes to reuse, recycling, composting, or disposal. Current signals often incentivize disposal, or fail to differentiate between disposal and diversion even when there is a significant fiscal benefit from diversion. Changing these price signals for those who do not otherwise experience them would yield significant additional diversion.

**38.a Municipalities should adopt Pay-As-You-Throw pricing of residential municipal solid waste**

**38.b MassDEP should increase its efforts to develop models for hauler contracts that incorporate incentives for diversion rather than disposal**

**38.c The Legislature should expand bottle deposits to more types of beverages and direct revenue from unredeemed deposits to enhance state waste reduction programs**

### **39) Increase waste diversion infrastructure at the generator, local, and regional levels**

Capturing material that can be diverted from disposal requires the active participation of those who generate waste – the residents and businesses of Metro Boston. Making it convenient for them to separate and recycle or compost waste is essential to increasing diversion. This means designing convenient waste management into new and retrofitted buildings, developments, and municipal infrastructure.

Regional infrastructure is also essential to cost-effective management of material once diverted. Increased regional composting infrastructure is a particular need, as much of the potential for increasing diversion of waste lies in efforts to increase the composting of organics generated by residential and commercial sources. As acknowledged in the 2006 MA SWMP, additional in-state organics processing capacity can help businesses, cities and towns save money, reduce pressure on disposal capacity, create a valuable product, and support creation of additional jobs in Massachusetts.

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<sup>1</sup> *Fact Sheet: Resource Management in Massachusetts*, as at <http://www.mass.gov/dep/recycle/reduce/rmfctsht.pdf>

- 39.a The Boston Society of Architects should develop guidance or a tool kit on how municipal design review can assess the availability of convenient recycling and composting facilities**
- 39.b MassDEP should support the development of additional in-state organics processing capacity**

<sup>i</sup> Acton Water Department, “Acton Water District's Water Wise Demonstration Garden.”

<http://www.actonh2o.com>, under Conservation: Water Wise Garden. Accessed 4/21/06.

<sup>ii</sup> Concord Department of Public Works, Water Conservation, “Water Conservation News and Notes,”

<http://www.concordnet.org/dpw/waterconserve.htm>. Accessed 5/1/06.

<sup>iii</sup> North and South Rivers Watershed Association, *2006 Greenscapes Reference Guide*, p. 17.

<sup>iv</sup> *Ibid.*, p. 2-7 – 2-14.

<sup>v</sup> *Ibid.*, p. 2-15.

<sup>vi</sup> California Urban Water Agencies with California Urban Water Conservation Council and United States Environmental Protection Agency, *A Guide to: Consumer Incentives for Water Conservation*, prepared by Barakat & Chamberlain, Inc., February 1994, p. 2-5.

<sup>vii</sup> A & N Technical Services, *BMP Costs & Savings Study: A Guide to Data and Methods for Cost-Effectiveness Analysis of Urban Water Conservation Best Management Practices (First Partial Revision)*, prepared for the California Urban Water Conservation Council, December 2003, p. 1-11.

<sup>viii</sup> Water Conservation Alliance of Southern Arizona, *Evaluation and Cost Benefit Analysis of Municipal Water Conservation Programs*, p. 24.

<sup>ix</sup> A & N Technical Services, *BMP Costs & Savings Study: A Guide to Data and Methods for Cost-Effectiveness Analysis of Urban Water Conservation Best Management Practices (First Partial Revision)*, prepared for the California Urban Water Conservation Council, December 2003, p. 1-11.

<sup>x</sup> Water Conservation Alliance of Southern Arizona, *Evaluation and Cost Benefit Analysis of Municipal Water Conservation Programs*, p. 18.

<sup>xi</sup> California Urban Water Agencies with California Urban Water Conservation Council and United States Environmental Protection Agency, *A Guide to: Consumer Incentives for Water Conservation*, prepared by Barakat & Chamberlain, Inc., February 1994, p. 2-5 – 2-6.

<sup>xii</sup> *Ibid.*, p. 2-9.

<sup>xiii</sup> Gardens Are... Lectures and Events listing: <http://www.gardensare.com/events.html>. Accessed 4/24/06.

<sup>xiv</sup> Neponset River Watershed Association and Alexandra Dawson, *Options for Managing the Impact of Private Irrigation Wells and Surface Diversions on Wetlands, Waterways and Public Water Supplies*, Prepared for the Westwood Conservation Commission and Mass Department of Fisheries, Wildlife and Environmental Law Enforcement; June 30, 2003; p. 4.

<sup>xv</sup> Code of the Town of Wayland, Massachusetts, Division I, Part II, Article 191, Section 191-4.

<sup>xvi</sup> Massachusetts Water Resources Commission, *Guide to Lawn and Landscape Water Conservation: A Guide for Communities, Property Owners, Managers, and Massachusetts State Agencies*, May 2002, p. 12; and the Neponset River Watershed Association and Alexandra Dawson, *Options for Managing the Impact of Private Irrigation Wells and Surface Diversions on Wetlands, Waterways and Public Water Supplies*, Prepared for the Westwood Conservation Commission and Mass Department of Fisheries, Wildlife and Environmental Law Enforcement; June 30, 2003; p. 16

<sup>xvii</sup> Massachusetts Water Resources Commission, *Guide to Lawn and Landscape Water Conservation: A Guide for Communities, Property Owners, Managers, and Massachusetts State Agencies*, May 2002, p. 4.

<sup>xviii</sup> Executive Office of Environmental Affairs and Massachusetts Emergency Management Agency, *Working Draft: Massachusetts Drought Management Plan*, Revised December 20, 2001, p. 15.

<sup>xix</sup> Massachusetts Water Resources Commission, *Guide to Lawn and Landscape Water Conservation: A Guide for Communities, Property Owners, Managers, and Massachusetts State Agencies*, May 2002, p. 4.

<sup>xx</sup> *Ibid.*, p. 5.

<sup>xxi</sup> Massachusetts Water Resources Commission, *Guide to Lawn and Landscape Water Conservation: A Guide for Communities, Property Owners, Managers, and Massachusetts State Agencies*, May 2002, p. 9.

<sup>xxii</sup> *Ibid.*, p. 6.

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<sup>xxiii</sup> City of Santa Monica, California, “No Water Waste Ordinance”, [http://santa-monica.org/epd/residents/Water/waste\\_ordinance.htm](http://santa-monica.org/epd/residents/Water/waste_ordinance.htm). Accessed 4/17/06.

<sup>xxiv</sup> Western Resource Advocates, *Smart Water: A Comparative Study of Urban Water Use Across the Southwest*, Chapter 2, p. 48 - 49.

<sup>xxv</sup> California Urban Water Agencies with California Urban Water Conservation Council and United States Environmental Protection Agency, *A Guide to: Consumer Incentives for Water Conservation*, prepared by Barakat & Chamberlain, Inc., February 1994, p. 4-10 – 4-11.

<sup>xxvi</sup> *Ibid.*, p. 4-14 – 4-15.

<sup>xxvii</sup> *Ibid.*, p. 4-12 – 4-13.

<sup>xxviii</sup> *Ibid.*, p. 4-13.