

# Massachusetts

Massachusetts is a national leader in high-technology innovation, and it has extended that leadership into high-technology, clean-energy businesses. The commonwealth has strong demand-side policies that have been connected at the urban level with green-collar jobs. Although the commonwealth has had some successes in clean-energy start-up companies, especially in the biofuels, fuel-cell, and solar industries, refining and manufacturing tend to be located elsewhere due to high overhead costs in the commonwealth.

Among the innovative programs are the following:

- The Massachusetts Clean Energy Center brings together the commonwealth's efforts to support clean-energy business development, clean-energy generation, and green jobs training under one roof.
- The Massachusetts Clean Energy Center has several programs that directly support clean-energy businesses, including venture capital for start-up companies.
- Through the Massachusetts Clean Energy Center, the commonwealth cosponsors the Ignite Clean Energy Competition, a business plan competition hosted by the MIT Enterprise Forum.
- In Boston, there is a clean-energy district and one-stop shopping for business assistance for clean-energy companies.

## General Background Policy

**Energy Goals.** Massachusetts has a renewable-energy portfolio standard of 15 percent by 2020, with an ongoing increase of 1 percent per year. The Department of Energy Resources began issuing annual compliance reports in 2003 and maintains an active classification and qualification system for all power generating facilities. Governor Deval Patrick's 2007 Executive Order 484 mandated that 15 percent of electricity for state buildings come from renewable energy sources by 2012 and 30 percent by 2020. Every effort will be made by the commonwealth to power state facilities with renewable energy resources that are eligible through the renewable portfolio standard. The overall reduction of energy consumption by state-owned buildings is ordered to be reduced 20 percent by 2012 and 35 percent by 2020.

In 2008 the state legislature passed three laws that affect renewable energy and energy efficiency demand. The Global Warming Solutions Act mandates a reduction in carbon emissions to 10 to 25 percent below 1990 levels by 2020 and 80 percent below 1990 levels by 2050; the Green Communities Act, which supports energy efficiency, wind farm sitings, and net metering; and the Oceans Act allows wind, tidal, and wave power in the state's waters.

The Green Communities Act requires utilities to acquire all cost-effective energy-efficiency and reduction measures. The implementation of energy-efficiency measures in the

commonwealth is attractive due to a combination of factors, including northern climate, the potential to avoid high energy prices, and numerous aging buildings (Clean Edge 2010). The Massachusetts Energy Efficiency Advisory Council formed out of the Green Communities Act legislation provides policy guidance. Current policies in place have the state on track toward 18 percent reductions by 2020. Public hearings were held throughout the state in June 2010 to provide an overview of the draft climate implementation plan and to summarize the technical assessment of greenhouse gas reduction to 2020 (Southeastern Regional Planning 2010).

Massachusetts has also been a party to the Regional Greenhouse Gas Initiative. The auction of allowances to offset emissions since the first quarterly trade on September 25, 2008, has generated a total of \$662.8 million dollars for the region. In 2009 Massachusetts received a share of \$50 million in RGGI auction proceeds, and through the first half of 2010 the commonwealth had received another \$25 million (RGGI 2010a, 2010b).

**Public Benefits Funds.** Massachusetts has two public benefits funds: the Energy Efficiency Fund and the Renewable Energy Trust Fund. The Energy Efficiency Fund is expected to mobilize about \$1.6 billion in expenditures between 2010 and 2012 for energy-efficiency and low-income weatherization programs (DSIRE 2010). The three-year energy-efficiency plan for 2010 through 2012 was approved on January 28, 2010, and it is aligned with the directive set forth within the Green Communities Act. In addition to the traditional revenue source of ratepayer surcharges, about 80 percent of the RGGI funds go toward energy efficiency. The Renewable Energy Trust Fund is administered by the Massachusetts Clean Energy Center and has a budget of about \$23 million per year. The fund is supported by a ratepayer charge and amounts to about \$23 million per year that can be spent on support for renewable energy development and on clean-energy companies. Altogether a total of \$6 billion in energy and gas savings to Massachusetts customers is planned to occur as a result of reduced energy bills. This is enough to power 350,000 households. The Commissioner of the Massachusetts Department of Energy Resources Phil Giudice stated recently, “Expanded efficiency programs, funded in part by RGGI, will generate roughly \$6 billion in consumer energy savings in Massachusetts over the next three years...the same programs are also expected to create or maintain nearly 4,000 jobs for contractors, HVAC technicians, architects and other specialists, also over three years” (RGGI 2010c).

**Green Building Policy.** Governor Deval Patrick’s 2007 Executive Order 484 required state buildings to reduce energy consumption by 20 percent in 2012 and 35 percent in 2020 over a 2004 baseline. It also established LEED “plus” as a goal for all major building construction and renovations. Additional legislation passed in 2008 (SB 2768) enabled state agencies to contract for energy conservation and solar photovoltaic projects. Under Executive Order 484, state buildings to the “greatest extent feasible” must meet the following goals by 2012.

- 25 percent greenhouse gas emission reductions from 2002 levels
- 20% energy reduction per square foot from 2004 levels
- 15% of energy consumption procured from renewable energy sources (either through purchase of renewable energy or through installation of on-site resources)
- 10% reduction in water use from 2006 levels

**Green Jobs Training.** The Executive Office of Labor and Workforce Development received \$6 million in ARRA funding in 2010 for green jobs training. The state government has also moved to support its green industries with green jobs training programs by bringing green jobs training under the umbrella of the Massachusetts Clean Energy Center, which had several green jobs training programs. The Springfield Technical Community College was awarded \$1.87 million through the Massachusetts Clean Energy Center for the development of a statewide energy-efficiency and building science skills initiative, now known as MassGREEN. The funds came in part from carbon allowance permit revenues under the Regional Greenhouse Gas Initiative. The funding will go towards training in the commonwealth's community colleges, as well as programs for the training of weatherization specialists and weatherization business development.

## **Clean-Energy Industries**

**General Background.** Massachusetts has some of the world's finest universities, pre-existing high-tech clusters in computing and biotechnology, and a state government that has firmly supported clean-energy industrial development. Since 1982 the commonwealth has supported its high-tech industry via an organization that is currently known as the Massachusetts Technology Collaborative (2010). The organization first supported the state's economic development efforts for the semiconductor industry, but when that industry changed, the agency's mission shifted to an economic development strategy of identifying barriers and leveraging partnerships for high-tech industrial development. The agency also supported the growth of industrial clusters, including the state's clean-tech cluster.

In 2000 the agency began to administer the commonwealth's public benefits fund, the Renewable Energy Trust, which in 2009 transferred to the Massachusetts Clean Energy Center, which had been created by legislation passed in 2008. The Renewable Energy Trust had various programs to support clean-tech businesses. The Clean Energy Center subsequently launched a new suite of investment programs to support the state's clean-energy sector. Investments are tiered, with small amounts such as \$40,000 available for new inventions, \$500,000 for technology improvement, and more available for more mature technology. The funding structure helps some companies get through the difficult early stages of development (Padaria 2010, Roush 2009).

In addition to investments from the commonwealth, there is a strong venture capital industry that has invested in clean-tech businesses. The commonwealth's private-sector venture capital for clean-tech businesses, at \$1.1 billion between 2007 and 2009, is second in the country, ahead of New York and only behind California (Clean Edge 2010). The Massachusetts Clean Energy Center also became a sponsor of the Ignite Clean Energy Competition, a business plan competition hosted by the MIT Enterprise Forum (Commonwealth of Massachusetts 2008b).

Massachusetts is also home to the New England Clean Energy Council, which links the major stakeholders in the industry: businesses, investors, consumers, government representatives, universities, labor unions, utilities, and industrial associations. It has programs in

five areas: innovation, growth, education, adoption, and policy. With an active membership of over 150 organizations, the council includes sixty clean-energy CEO's. In 2009 the council led the Governor's Clean Energy Challenge in Massachusetts, signing on 110 businesses with facilities totaling twenty-two million square feet to reduce their energy footprint. The council has also worked with partners to identify a workforce needs assessment focused on the clean-energy and energy-efficiency sectors. Council members were involved with initiating and fostering a public-private partnership to allocate \$50 million per year in each region into early stage ventures and university research projects (New England Clean Energy Council 2010a).

**Biofuels.** The state does not have the huge number of refineries typical of the Midwestern states, but it has nevertheless entered into the industry. In 2008 Governor Deval Patrick signed into law the Clean Energy Biofuels Act, which was intended to spur the industry. The law exempted ethanol derived from cellulosic fuels from the gasoline excise tax, requires all diesel and heating oil in the state to have a biofuel component, and establishes a framework for a low carbon fuel standard. Although the state's industry is small, it is home to some of the leading technology firms, such as Agrivida, Ameresco, BerkShire Biodiesel, BioEnergy International, Mascoma, Qteros, and Verenium (Commonwealth of Massachusetts 2008a).

A Massachusetts Sustainable Forest Bioenergy Initiative has identified 10.56 million green tons of biomass in and nearby the state capable of generating 795 megawatts (DOER 2008). The Commonwealth of Massachusetts contains over four-million tons of woody biomass available for electricity production totaling 150 megawatts of capacity. A Sustainable Forest Bioenergy Initiative within the state highlights the development of research, forest management, and market needs towards providing the structure for developing the biomass supply market within Massachusetts. This initiative was funded by grants totaling \$495,000 from the U.S. Department of Energy and \$245,000 from the Renewable Energy Trust (Massachusetts Energy and Environmental Affairs 2010).

**Smart-Grid and Building Technologies.** Massachusetts has some industry presence in this field, notably EnerNOC, but the commonwealth has not yet developed a full cluster of research and companies. In April of 2009 National Grid launched a \$57 million smart-grid pilot project in Worcester (Smart Grid News 2009). Over 15,000 New England customers benefit from smart meters, programmable thermostats, and e-billing. There are also plans for integrating distributed generation systems. Despite the accomplishments, Massachusetts does not have a smart-grid industry equivalent to that of California or Washington. It is likely to use smart-grid technologies rather than manufacture them.

**Solar.** Massachusetts has a solar energy set-aside in its renewable portfolio standard, and in 2010 the commonwealth was setting up a solar renewable energy credit market similar to that of New Jersey (Kahn 2010). Governor Patrick has the goal of 250 megawatts of installed solar capacity by 2015, a goal that could put the commonwealth at a rank of number two in installed capacity, after California and above New Jersey. The goal is supported by the Commonwealth Solar programs, which provide incentives for solar installations. Although the developments will spur the solar installation industry, there are also elements in place for a solar manufacturing industry. Among the solar manufacturing companies are Evergreen Solar, Konarka, Solectria, 1366 Technologies, Spire Solar, and Wakonda Technologies. The commonwealth has invested in

some of the solar manufacturing companies, such as Evergreen, which received tens of millions of dollars in state assistance. However, in 2009 the company announced that it would move some of its manufacturing to China due to price competition. In response to criticisms that the commonwealth had lost its investment in the company, State Energy Secretary Ian Bowles noted that the company had exceeded its promise of creating 350 jobs by creating 700 permanent jobs and 225 temporary jobs; hence, its decision to move some of its manufacturing to China would not affect its overall promise to create 350 green jobs in the commonwealth. He also noted that Konarka had decided to locate manufacturing within the commonwealth (Roush 2009). In support of the industry are a strong entrepreneurial tradition and research strengths at MIT and the University of Massachusetts at Amherst. Together those universities received nearly \$60 million from the U.S. Department of Energy (2009) for Energy Frontier Research Centers for solar-energy-related research.

***Transportation and Energy Storage.*** Massachusetts has an established fuel-cell industry, with about sixty companies engaged in hydrogen- and fuel-cell-related research, and the companies are networked by the Massachusetts Hydrogen Coalition, which was founded in 2004. Fuel-cell companies include Ballard Material Products, Nuvera, and Protonex Technology. The commonwealth also has some leading companies in energy storage, including A123 Systems (batteries, but with much of its manufacturing in Michigan), Beacon Power (flywheels), General Compression (large-scale energy storage), Boston Power (rechargeable lithium ion batteries), Evercel (Nickel Zinc Battery Chargers), and Premium Power (grid scalable zinc flow advanced energy storage). The University of Massachusetts at Lowell is the home of the Massachusetts Hydrogen and Fuel Cell Institute. Although there are strengths in both energy storage and fuel cells, the commonwealth does not have the state-government programs designed to build and develop the industry similar to those of Connecticut, Michigan, New York, and Ohio. The Massachusetts Hydrogen Coalition administered through the New England Clean Energy Council has a mission to expand hydrogen, fuel-cell, and related industries in Massachusetts (New England Clean Energy Council 2010b).

***Wind.*** The commonwealth has some wind manufacturers, such as Second Wind, but the total number of operations and the growth in wind manufacturing is lower than in California and other states described in our report (American Wind Energy Association 2009, Sterzinger 2009). However, the Clean Energy Center manages a federally funded wind turbine testing center in Charleston. Another, separately managed wind-energy facility is the Marine Renewable Energy Center of the University of Massachusetts Dartmouth, which could become a center for off-shore wind and tidal research. The University of Massachusetts at Amherst is home to the University of Massachusetts Wind Energy Center, which has been in operation since 1972 and claims to be only American university program that offers graduate training that specializes in wind energy.

In May of 2010, the nation's first large scale wind farm entered into a renewable-energy purchasing agreement with National Grid (Cape Cod Today 2010). Local and State permitting for Cape Wind was completed in 2009 and federal permitting issued in April 2010. Once underway, the construction will take two years. This development is planned to create 130 off-shore wind turbines capable of generating a total of 468 megawatts at maximum capacity and 170 megawatts at average capacity. The assembly and construction of Cape Wind is expected to create 600 – 1,000 temporary jobs while adding 150 permanent jobs. Economic output to the

region will also be increased between \$44 to \$71 million dollars (Cape Wind 2010). The Alliance to Protect Nantucket Sound (2010) represents the main opposition group. It is composed of a diversity of stakeholders including elected officials, tribal nations, tourism and business operations, commercial fishing, environmental organizations, towns and counties along with boating and air safety navigation authorities. Visual impact issues and negative long term impacts on the region's economy are some of the issues concerning this group. The Alliance intends to seek an injunction from the court to prevent construction until the case is finalized (Daley 2010).

## **Boston**

***Sustainability Plans.*** On April 22, 2010, Boston's Climate Action Leadership Committee unveiled a goal of reducing the city's greenhouse gas emissions 25 percent by 2020. The plan calls for advancing the city's green jobs and economy through public and private leadership. A variety of climate mitigation goals, including energy efficiency and behavior change, are designed to save over \$2 billion dollars by 2020. Mayor Thomas M. Menino presented a wind turbine proposal at Moon Island in Boston Harbor, allocating \$2.8 million.

***Green-Building Initiatives.*** In January 2007 Boston became the first city in the U.S. to enact a green building ordinance that requires all new and rehabilitation construction in excess of 50,000 square feet to earn LEED certification. Furthermore, all new affordable housing must meet the LEED silver standard. Boston's Climate Action Plan includes a section devoted to buildings, and the city has undertaken various initiatives to support retrofitting and weatherization. For example, the Boston Energy Alliance was announced in 2009 as a revolving loan fund that would mobilize up to \$500 million to support retrofitting of buildings (City of Boston 2009a). Mayor Menino's "Food and Fuel Campaign" offered summits that provided access to information and financial assistance for food and energy in partnership with nonprofit organizations (City of Boston 2009b). The city's Renew Boston program, announced in 2009, provides support for weatherization and energy-efficiency improvements, with \$6.5 million from the Energy Efficiency Block Grant program (City of Boston 2009c). Of that funding \$1.8 million went toward energy-efficiency retrofits of 3,100 Boston homes (City of Boston 2010a, 2010b). Additional support for weatherization and green building work came in 2005 from a coalition of community development corporations and financial institutions, which launched the Green Building Production Network to support affordable housing, and the coalition has received various grants in the \$2 to \$7 million range to pursue the projects (Boston Community Capital 2009). The Solar Boston Program encourages rooftop solar.

***Green Jobs Training.*** Boston does not have a longstanding green corps, but in 2009 Mayor Menino announced a \$300,000 Empowerment Zone grant that enabled the creation of the Green Youth Corps and other green jobs training programs. In 2009 the city also received \$18 million in funding from the American Recovery and Reinvestment Act for green building improvements in public housing, and it applied for a \$4 million grant from the ARRA to fund a green pathways out of poverty program. Another \$6 million in stimulus funding supports the Renew Boston Initiative, which supports energy-efficiency improvement (American Institute of Architects 2009, City of Boston 2009a, 2009b). In 2009 Boston Mayor Menino announced green jobs

training programs based on a grant to Boston's Empowerment Zone from the U.S. Department of Housing and Development that enabled green jobs training. The youth training programs, also called the Green Youth Corps, took place in partnership with various community organizations, including Bikes Not Bombs and Alternatives for Community Environment. Mayor Menino's Greening the Empowerment Zone Initiative also made funds available for adult training in brownfields remediation and green facilities maintenance, as well as job creation in residential weatherization . He also made \$250,000 in city funds available for jobs training in green facilities maintenance from the Neighborhood Jobs Trust, which administers job training programs for low-income residents (Boston Redevelopment Authority 2008).

***Green Business Initiatives.*** In 2008 the Boston Redevelopment Authority developed the "Green Tech Initiative," which is aimed at bringing new clean-tech businesses to the city and greening existing businesses. The program provides "one-stop shopping" to assist green businesses that may want to relocate to Boston. Services include site selection, financing assistance, workforce training, and assistance with contacts in the city government. The city has also established an "industrial green corridor" in the Newmarket Business District (Boston Redevelopment Authority 2009).

## **Civil Society Organizations and Policy**

The initiatives led by Mayor Menino and the city government have taken place alongside a variety of initiatives in support of green job development from civil society organizations. The Sustainable Business Network of Greater Boston, which supports small and independent businesses in the region, began a partnership with the Boston Redevelopment Authority in 2006 to support the greening of small- and medium-sized businesses. From the bimonthly meetings for local businesses the two organizations launched the Sustainable Business Leader Program (2009), which provides assistance to the businesses that want to undergo further green. Another network has emerged from regional labor, community, and environmental organizations as the Green Justice Coalition, has pushed for weatherization and building efficiency legislation at state and city government levels as a strategy for green job creation (Green Justice Coalition 2008). In 2005 a coalition of community development corporations and financial institutions launched the Green Building Production Network to support affordable housing, and the coalition has received various grants in the \$2 to \$7 million range to pursue the projects (Boston Community Capital 2009).

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