

Green energy in the Bay State

Three Massachusetts projects aim to generate energy in more environmentally friendly ways.

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While the proposed controversial wind farm on Nantucket Sound is probably the most well known renewable energy project underway in the Commonwealth, there are several other projects being studied and built. Here are snapshots of three.

Brockton “brightfield”

In Brockton, MA, about 25 miles south of Boston sits an array of 1,395 photovoltaic panels erected on 3.7 acres of vacant lot where a coal-to-gas factory once stood. Contaminants from the old factory are sealed in the ground under a plastic cap and 18 inches of soil, rendering the site, a so-called “brownfield,” unusable for most ordinary purposes. But now the site, the nation’s largest in the U.S. Department of Energy’s “brownfields to brightfields” program and the largest solar power plant in New England, is producing an estimated 425 kilowatts of electricity annually, enough to power about 71 homes.



Almost four acres in Brockton, MA, are covered by solar panels, which generate electricity sold to the local electric company to power nearby homes.
(Credit: Schott Solar)

The panels, from Schott Solar in Billerica, MA, are 2.4 square meters, making them the largest panels on the market. Due to their large size, each produces 300 watts of electricity, with fewer connections so there are fewer wires to contribute to energy losses. The project cost a little more than \$3 million to build: \$1 million in funding came from the Massachusetts Technology Collaborative’s Renewable Energy Trust, which is funded by a surcharge on electric bills, \$789,000 from the federal government, and a \$1.6 million bond issued by the city of Brockton. It’s expected to pay for itself in energy savings in 15 to 20 years, says Lori Ribiero, director of the project.

Central Massachusetts landfill gas plant

Another project turning an old problem into a new energy source is a landfill gas plant in Chicopee, MA. As garbage buried in a landfill rots, it produces methane; in addition to being a greenhouse gas like carbon dioxide, it's what makes dumps stink. Landfills often combat the odor problem by capturing the methane and burning it off.

Landfill gas plants go a step further; instead of wasting the methane, they burn it in internal combustion engines that generate electricity. The Chicopee plant, run by Ameresco Energy Services, started operations in 2004 and is producing 5.7 megawatts, enough to power 3,760 homes. Based on how much gas the landfill is producing, the company plans to expand that to 7.6 megawatts in 2008. The engines, of course, produce their own emissions, but using methane that would otherwise be vented into the atmosphere or burned uselessly reduces air pollution equivalent to that produced by 52,800 automobiles or 558,000 barrels of oil every year, based on estimates from the Environmental Protection Agency.

Because the plant's electricity is sold to Chicopee Electric Light, the landfill is directly powering homes in town, says Jeanette Coleman-Hall of Ameresco.

Algae power

[Greenfuel Technologies](#) of Cambridge, MA, takes a different approach to turning waste into power. It uses the carbon dioxide emissions from power plants as a food source for algae. The system taps into the exhaust flue of a power plant and passes a stream of carbon dioxide through a tank filled with algae and a solution of nutrients. The algae grow by consuming the carbon dioxide through photosynthesis, essentially harvesting solar energy while reusing carbon that would otherwise go straight into the atmosphere.

The algae are concentrated, harvested, and go through several already standard conversion and processing steps to produce a variety of alternative fuels: biodiesel, ethanol (which can be added to gasoline), methane, and hydrogen, which can also be used as fuel. A dry cake, which can be fed to livestock, is another possible product.

Last summer, the company wrapped up a two-year demonstration project at MIT's 20-megawatt cogeneration plant, which demonstrated the algae growth and emissions reductions, although it was not a full biofuel production facility. The company ran a second, larger demonstration at a power plant in Arizona. Based on those two pilot projects, Greenfuel estimates it can reduce up to 80 percent of a plant's carbon dioxide emissions and produce 5,000 to 10,000 gallons of biofuel per acre of algae harvested. Greenfuel has teamed up with a German company to produce commercial bioreactors in Europe and has licensed its technology to an energy company in South Africa.