

# City of Worcester, Massachusetts



## SUSTAINABILITY PROFILE

### Harvesting Sun's Energy at Worcester Technical High School

Sustainability Measure: Solar Power Generation

Solar Array's Capacity: 256 kW DC

As of spring 2015, the photovoltaic system at Worcester Technical High School is the City's largest solar array! Nearly 19,000 square feet of panels are located on four of the school's five buildings. Buildings B, C, and D have pitched roofs against which the majority of the solar panels are placed, facing southeast. The remaining panels are on the flat roof of Building A, tilted upward and facing southwest.

**Funding:** The project was funded via the 20-year Energy Savings Performance Contract and U.S. Department of Energy's Energy Efficiency and Conservation Block Grant (part of the 2009 American Recovery and Reinvestment Act).

Of the approximately \$1.9M of the project costs, about \$740K, or ~39%, was paid for by the EECBG Grant. Revenue from sale of generated renewable energy [credits](#)<sup>1</sup> helps to pay for the project's debt (in a form of a bond).

The savings from the solar panels translate to approximately \$2,700 per month and \$35,460 to date in avoidance of electrical costs.



Buildings B-D; solar panels are on the southeast-facing side of their pitched roofs.

#### *PV System Specifications and Other Interesting Facts:*

- ✓ **Maximum rated capacity:** 256 kW DC
- ✓ **Owned by:** City of Worcester
- ✓ **Date in service:** on-line - 3/7/2013; SRECs - 3/2/2014
- ✓ **Number of panels:** 1,066
- ✓ **PV surface area:** 18,698 SF
- ✓ **PV panel rated efficiency:** 15%
- ✓ **Azimuth:** A: 195°, B: 105°, C: 112°, D: 132°
- ✓ **Inclination:** A: 15°, B-D: 23°
  
- ✓ **Project Cost** (materials and labor): \$1,896,425
- ✓ **Funding Source:** City's Energy Savings Performance Contract and EECBG
  
- ✓ **PV panel manufacturer:** Sharp
- ✓ **Inverter manufacturer:** SatCon Technology
- ✓ **Service Provider:** Borrego Solar Systems LLC

<sup>1</sup> 1 SREC is produced and sold for each megawatt-hour of electricity produced or 181 certificates as of end of March 2015.

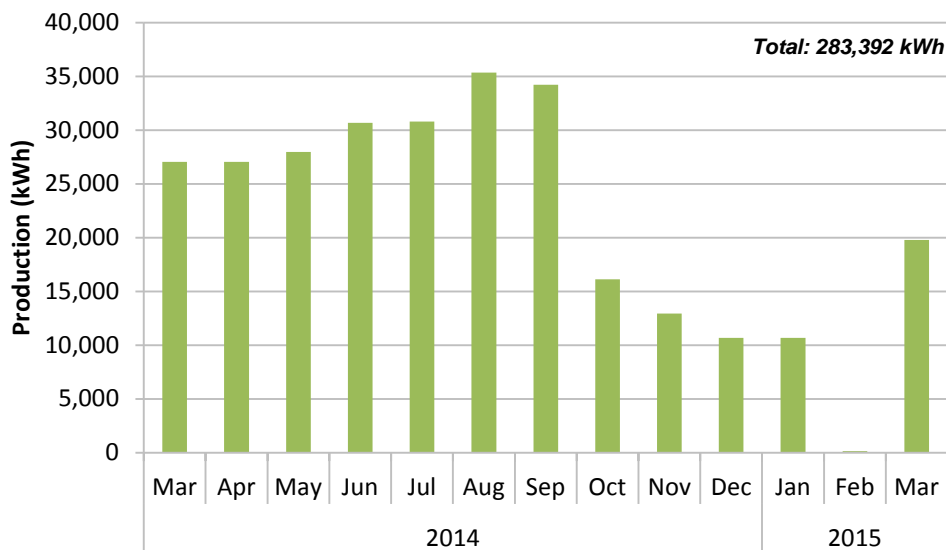


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**Production.** The 1,066 solar panel modules produce approximately 260,000 kWh per year (see chart below), which is enough green power to offset carbon emissions produced by electrifying and heating 16 homes for a year<sup>2</sup>!

Worcester Technical High School's Solar System:  
Electricity Production by Month, March 2014 - March 2015



*Note: The record snowfalls this winter caused the electrical production to plummet to only 132 kWh in February, 2015. The production resumed to a healthy level in March.*

Source: Massachusetts Clean Energy Center's Production Tracking System database

While this solar array is the largest of the municipal arrays in the City as of Spring 2015, the 283,392 kWh produced since going on line in March 2014 through March 2015, was equivalent to an estimated 5.1% of the school's electricity consumption. That is because the demands on electricity are high at this state-of-the-art large facility consisting of five buildings. Some of the technical programs using a lot of energy include automotive collision, biotechnology, culinary arts, carpentry and sheet metal, plumbing and air conditioning, and more. As a matter of fact, last year, Worcester Tech was the highest intensity energy user out of all municipal buildings.

**Operation and Maintenance:** While this project has not yet been closed out, Honeywell International is responsible for detecting and correcting any system malfunctions detected via on-line monitoring of electrical production. Following completion of the Energy Savings Performance Contract phase associated with this project, the Division of Energy and Asset Management will monitor actual electricity production against anticipated production, and the Worcester Public Schools' Facilities Department will be responsible for the general system maintenance.

**Student engagement:** While students are not allowed to access the school's roof (due to safety and liability issues), the Electrical Program at Worcester Tech has a solar panel on wheels that they bring outside on sunny days to teach about photovoltaic technology.



Solar panels on Building A of Worcester Tech.

<sup>2</sup> EPA, "Greenhouse Gas Equivalencies Calculator," <http://www.epa.gov/cleanenergy/energy-resources/calculator.html>, accessed May 21, 2015.