Ameresco

Solar PV for the City of Newton, MA

770 kW, Waltham HS, Massachusetts

884 kW, Arizona Garage

210 kW, Hill AFB, Utah

2 MW, Arizona State University
Topics

1. Ameresco
2. Construction Steps
3. Solar PV Projects for Newton
4. Project Financials
5. Discussion
Ameresco: Company Overview

- Leading *independent* energy efficiency and renewable energy company throughout North America
- **2000**: year incorporated
- **2010**: year went public on NYSE
- **$728.2 million**: 2011 Revenue
- **$3 Billion**: constructed projects
- **900+**: employees
- Corporate Headquarters in Framingham, MA

62 offices in 34 states and 5 provinces

ameresco.com
Ameresco: Award-Winning Expertise

- **2012 Excellence in Renewable Energy Awards Winner**
- **Green Ribbon Schools**
- **U.S. Department of Education**
- **Ameresco**
  - Area’s Fastest-Growing Public Companies
  - Boston Business Journal - May 2012
- **Forbes 2011 Best Small Companies**
- **Climate Change Business Journal Business Achievement Award**, Growth 2010 Silver Medal
- **The Globe 100, The Best of Massachusetts Business 2012**

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Ameresco: Building Solar PV on Schools in MA

- Newburyport, MA: 502 kW
  2 Schools and DPW Bldg.
- Waltham, MA: 1,931 kW
  6 Schools and Muni Center.
- Fall River, MA: 576 kW
  3 Schools and Water Treatment
- Lowell, MA: 348 kW
  4 Schools and LMA
- Natick, MA: 1,058 kW
  5 Schools and Senior Center.
- Milton Academy: 192 kW
  Student Activity Center
1. Ameresco
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Construction Steps

Design & Permitting
Mobilization & Crane Ops
Ballast Layout
Panel Assembly & Wiring
Inverter Installation
Commissioning & Witness Test
Additional Structural and Roof Warranty Approvals

To: Building Owner

Re: Letter of Compliance – Photovoltaic Installation on Carlisle Warranted Roof

This memo outlines Carlisle’s recommendations concerning the installation of Photovoltaic (PV) systems over a Carlisle warranted roofing system in order to facilitate the installation of the PV system with limited disturbance to the Carlisle roofing system. The determination of the most suitable PV technology, racking and installation method is the responsibility of the Building Owner or its designated representative. Listed below are the recommendations along with conditions that may impact the Carlisle warranty.

Please note that this list is not an exhaustive one:

1. Determine the building’s structural ability to withstand the PV system.
2. The roofing system should be protected during installation of the PV system to prevent damage. This includes the staging and assembly areas and other areas heavily traveled.
3. To avoid PV system removal costs to the building owner, the PV system should provide adequate clearance for access to the roof membrane should maintenance or repair be required.
4. Field seams that may be concealed by the PV system, and therefore harder to access, should be overlaid by a Carlisle authorized roofing applicator using approved details and products.
5. For non-penetrating PV racking systems, a protection course consisting of Carlisle’s Pressure-Sensitive Molded Walkway Pads is recommended between the PV support system and the roofing membrane. Walkway pads of thickness and density equal or greater than those which can be provided by Carlisle Syntec may be used to prevent damage to the roofing membrane.
6. PV laminates must not be adhered directly to the Carlisle primary membrane. A compatible Carlisle membrane shall be used as a slip sheet and spliced to existing membrane.
7. Racking systems that require penetration of the roofing membrane must be flashed in accordance with the appropriate Carlisle published detail. All flashing details must be performed by a Carlisle authorized roofing applicator.

It is recommended that areas frequently accessed for the purpose of operation or maintenance of the PV system be protected by walkways installed in accordance with the Carlisle published specifications and details. Should Carlisle be contacted to investigate a warranty claim, or to make warranty related repairs, providing access to the membranes (removal and replacement of the PV System) is the responsibility of the Building Owner.

The following table lists the roofing inspections during the PV system installation to ensure continuation of the Carlisle warranty. Upon completion of the roof alteration, an inspection must be scheduled and performed by a Carlisle Field Services Representative.

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STRUCTURAL FINAL AFFIDAVIT

To the Commissioner, Town of Canton, MA.

I certify that I, or my authorized representative, have inspected the work associated with Permit No. B-11-729, issued November 22, 2011, located at 660 Washington Street on the dates used below or on at least One (1) occasions during construction, and that to the best of my knowledge, information, and belief the work has been done in conformance with the permit and plans approved by the Inspection Services Department and with the provisions of the Massachusetts State Building Code, 780 CMR and all other applicable laws, regulations, statutes, and ordinances.

- Ballast weight agrees with design
- Attached system installed per design

Wayne R. Lawson, P.E., SECB 35102
ENGINEER – MASS REG. NO.

CBI Consulting Inc.
COMPANY

250 Dorchester Avenue, Boston, MA 02127
ADDRESS

(617) 268-8977
PHONE

Inspection Dates: December 13, 2011

Then personally appeared the above-named and made oath that the above statement by him is true.

Before me

My Commission expires 12-24-2015

Ameresco
Green, Clean, Sustainable

ameresco.com
Topics

1. Ameresco
2. Construction Steps
3. Solar PV Projects for Newton
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## Project Summary

<table>
<thead>
<tr>
<th>Site</th>
<th>kW</th>
<th>kWh (Year 1)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Newton North High School</td>
<td>262</td>
<td>300,600</td>
</tr>
<tr>
<td>Brown Middle School</td>
<td>262</td>
<td>309,250</td>
</tr>
<tr>
<td>Memorial Spaulding Elementary School</td>
<td>112</td>
<td>132,425</td>
</tr>
<tr>
<td>Countryside Elementary School</td>
<td>66</td>
<td>78,300</td>
</tr>
<tr>
<td>Bowen Elementary School</td>
<td>50</td>
<td>60,175</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td>752</td>
<td><strong>880,750</strong></td>
</tr>
</tbody>
</table>
Newton North High School (262 kW)
Memorial Spaulding Elementary School (112 kW)
Countryside Elementary School (66 kW)
Bowen Elementary School (50 kW)
• 15 Solar PV Topics for K-12:
  ▪ Renewable energy fundamentals
  ▪ Solar PV design considerations
  ▪ Data analysis
  ▪ Teacher topic summaries
  ▪ Topics matched with MA Learning Standards for Science and Technology/Engineering Frameworks
  ▪ Curriculums accessible online
Topics

1. Ameresco
2. Construction Process
3. Solar PV Projects for Newton
4. **Project Financials**
5. Discussion
Net Metering Provides Additional Energy Savings

Connecting Solar PV Behind New Customer Meter
## Solar PV Energy Savings

<table>
<thead>
<tr>
<th>Description</th>
<th>Rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>NSTAR Plus Supply Rate</td>
<td>$ 0.101</td>
</tr>
<tr>
<td>Plus Ameresco PPA Price (Year 1)*</td>
<td>$ 0.110</td>
</tr>
<tr>
<td>Total Rate Payments</td>
<td>$ 0.211</td>
</tr>
<tr>
<td>Less: Net Metering Credit</td>
<td>$ 0.153</td>
</tr>
<tr>
<td>Net Electricity Rate ($/kWh)</td>
<td>$ 0.058</td>
</tr>
<tr>
<td>Electricity Rate Savings</td>
<td>$ 0.043</td>
</tr>
</tbody>
</table>

* 2.5% annual price escalator
Retail Utility Rates Have Trended Up, But Also Unpredictable

Massachusetts Retail Electricity Prices 1990-2010

- Residential
- Commercial
- Industrial

Source: U.S. Energy Information Administration
Discussion
Wholesale Electricity Prices Are Volatile

New England Electric Market: Eastern Index Prices

Federal Energy Regulatory Commission • Market Oversight • www.ferc.gov/oversight

Eastern Daily Index Day-Ahead On-Peak Prices

Price ($/MMWh)


- Indiana Hub
- PJM West
- Dominion Hub
- West New York
- Mass Hub

Monthly Average

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