



## UMass Amherst Solar Energy Plan

Item Type	article;article
Authors	Small, Ezra
Download date	2025-10-19 09:15:29
Item License	<a href="http://creativecommons.org/licenses/by-nc-nd/4.0/">http://creativecommons.org/licenses/by-nc-nd/4.0/</a>
Link to Item	<a href="https://hdl.handle.net/20.500.14394/44236">https://hdl.handle.net/20.500.14394/44236</a>

# DRAFT

# 2013

## UMass Amherst Solar Energy Plan



Ezra Small

Campus Sustainability Manager

[esmall@facil.umass.edu](mailto:esmall@facil.umass.edu)

7/9/2013

## **Mandate and Campus Goal:**

As a state agency of the Commonwealth of Massachusetts, UMass Amherst (UMA) is mandated by the Governor's Executive Order 484 "Leading by Example – Clean Energy and Efficient Buildings" to "Procure 15% of agency annual electricity consumption from renewable sources by 2012 and 30% by 2020."<sup>1</sup>

UMA was not successful in achieving the 2012 goal but is positioned to pursue and meet the 2020 target and set interim 2015 goals.

## **State Solar Progress and Incentives:**

The Patrick Administration's goal to install 250 megawatts (MW) of solar energy was met four years early, and an aggressive new goal of 1,600 MW by 2020 was set. Solar energy installed in Massachusetts has increased 80 times from 3 MW in 2007, due in large part to incentives for renewable energy production that have led to cost reductions in solar electricity.<sup>2</sup>

Renewable energy incentives in Massachusetts are performance based such as the Renewable Portfolio Standard SREC's (solar renewable energy credits), which vary in value depending on market supply and demand, are currently valued at \$550 per MWh (~\$0.55 per kWh) for the 2013 compliance year.<sup>3</sup> Additionally, state agencies are also eligible to receive solar rebates through the Commonwealth Solar II Program as well as benefit from the Net Metering policies in Massachusetts which allows electric customers to receive credits for any electricity that they generate but do not use.<sup>4</sup>

## **Energy Profile and Current Renewable Generation:**

In FY2012, UMA reported to the Department of Energy Resources that it consumed a total of 134,965,286 kilowatt-hours (kWh) (134,965 MWh) of electricity, costing \$10,252,595<sup>5</sup>. The campus has its own EPA award winning Combined Heat and Power (CHP) generation facility which produced over 68% of the total consumed electricity. The other 32% was purchased from the grid. In order for UMA to meet the EO484 2020 goal of 30% renewables, the campus would have to produce or procure 13,058,155 kWh/yr. (13,058 MWh) of electricity derived from renewable sources. Meeting an interim campus goal of 15% by 2015, the campus would have to produce or procure 6,529,077 kWh/yr., (6,529

---

<sup>1</sup> This mandate may be achieved through procurement of renewable energy supply, purchase of renewable energy certificates (RECs) in accordance with EOEEA guidance and/or through the production of on-site renewable power. Only renewable sources that qualify for the Massachusetts Renewable Portfolio Standard (RPS) shall be eligible.

<sup>2</sup> Leading By Example Council Meeting, May 14, 2013 Meeting Notes

<sup>3</sup> Executive Office of Energy and Environmental Affairs Solar Carve Out Program:  
<http://www.mass.gov/eea/energy-utilities-clean-tech/renewable-energy/solar/rps-solar-carve-out/>

<sup>4</sup> Executive Office of Energy and Environmental Affairs Net Metering FAQ's:  
<http://www.mass.gov/eea/grants-and-tech-assistance/guidance-technical-assistance/agencies-and-divisions/dpu/net-metering-faqs.html#one>

<sup>5</sup> 43,527,184 kWh were purchased from the electrical grid (32%) and 91,438,102 kWh (68%) was generated from our Central Heating Plant. Purchased electricity figures include all properties owned and operated by UMA.

MWh). In 2012, UMA produced less than 25,000 kWh (25 MWh) of renewable solar energy, mostly from the South Deerfield Research Farm ground mounted solar array. Despite the low level of current renewable generation, UMA is capable of meeting future EO484 goals.

### **Funding Renewable Energy:**

Many financing options now exist for large public sector non-profit institutions like UMA. UMA has already received proposals from solar energy providers offering solar power purchasing agreements (PPA's). A PPA is a services contract between UMA and the provider. Under the terms of the contract, the provider would design, construct, operate, and maintain a solar energy system on UMA property at absolutely no cost. In turn, UMA would agree to purchase the solar electricity produced by the system over a twenty or thirty year contract. This model is advantageous for UMA because it preserves funds by eliminating equipment, installation, and maintenance expenditures and lowers the cost of purchased electricity with low to no escalation of price over the term of the contract serving as a power hedge against rising energy costs.

Other financing options exist in addition to the PPA model. Recently, UMA has received proposals to conduct a feasibility analysis for a roof mounted solar photovoltaic system on the Champions Center basketball practice facility, slated to begin construction in August of 2013. This proposal includes a preliminary cash flow model for multiple financing scenarios for the PV system including a self-owned model, a debt financed model, a lease agreement model, and a PPA. The lease agreement model offers a shorter term contract where after 5-10 years, UMA would have the option to own the system and would only need to pay upfront about 20% of the system cost while paying off the rest of the system cost annually or monthly while profiting on the electricity generation and renewable energy credits (SREC's).

### **Positioning UMA as a Sustainability Leader:**

UMA administration should also consider financing onsite renewable energy projects through new energy saving initiatives such as the recent agreement that was made for four of the UMass campuses to serve as host communities for new solar PV electric generating projects through the Net Excess Generation Credit Program. Through this cost-cutting initiative, UMA will receive an energy credit on its monthly utility bill. Energy savings could amount to nearly \$50 million for the system. These savings can enable UMA to develop onsite renewable energy projects. Having onsite renewable energy on the core of the campus has a social benefit that could have a substantial financial benefit for UMA, given the fact that close to 70% of graduating high school students use campus sustainability as a major factor for which college they choose to attend, according to Princeton Review<sup>6</sup>. Developing onsite renewable energy will help position UMA as a destination of choice for top-tier students amongst our institutional peers in the region and nationally.

---

<sup>6</sup> New York Times, August 16, 2011: "More Colleges Adding 'Green' to School Colors"  
<http://www.nytimes.com/cwire/2011/08/16/16climatewire-more-colleges-adding-green-to-school-colors-4232.html>

### **Pending Projects (Ground Mounted Solar):**

UMA currently owns and operates only one solar photovoltaic array on university property located on the UMass Research Farm in South Deerfield, Massachusetts. The 106 panel, 16.45 kW project was installed in the spring of 2010 and represents a larger research program led by the Center for Agriculture. Expanding solar energy and bringing it closer to the center of campus is crucial in demonstrating the University commitment to renewable energy. The 131-acre Hadley Farm, home to UMass equine, sheep, swine and goat programs, will offer up more than 30 acres to continue the agriculture and solar power dual-use research on a larger scale field laboratory to examine dual use of land for pasture and other horticultural crops. It is designed to demonstrate potential benefits to the farmer and to the energy industry as an alternative to ground placement of PV panels that inadvertently removes the land from future agricultural use. This array will be 2 MW in size and is expected to produce up to 2,000,000 kWh/yr (2,000 MWh).

The UMA Physical Plant Division and Campus Sustainability Initiative is currently working with the Massachusetts Clean Energy Center and BEAM Engineering to conduct a feasibility study for the design and implementation of a solar hot water system to preheat make-up water at the Central Heating Plant. Although this project will not contribute renewable electricity generation it is worth noting. The project could save up to 9,700 therms of natural gas and have a lifetime cost savings of over \$5 million.

### **Existing Proposals (Parking Lot Solar Canopies):**

The global solar energy provider SunEdison, with over 500 MW worth of installed solar systems in its portfolio, in partnership with the energy consortium PowerOptions, has already proposed a PPA for UMA to produce over 8,500,000 kWh/yr. (8500 MWh) by installing a 7,800 kW solar parking canopy system across five parking lots on campus for an energy price lower than the rate for electricity purchased from WMECO (14.5 cents/kW-hr). This annual production would offset an annual usage of approximately 6% of the total energy use of UMA. Parking lots 11, 22, and 33 located in the south western quadrant of the campus, lot 25 south of Forestry Way near the Mullins Center, and lot 32 near the Visitor Center would be covered with parking canopies mounted with solar photovoltaic arrays. The canopies would provide shading for parked cars and could also provide infrastructure for electric car charging stations. Three of these parking lots currently do not have any proposed building project development over the next 40 years according to the UMA Campus Master Plan. Covering parking lots on campus would prevent the need to develop on any existing open green space also provide people and cars with shelter from the sun, rain and snow. Light fixtures and security cameras mounted under the canopies can improve nighttime safety. Other university campuses have implemented large scale solar PV parking lot canopies. For example, in 2012 Rutgers University installed over 32-acres of parking lot canopies on their Livingston campus with a solar PV system that generates 8MW of electricity worth over \$1.2 million annually. The combined value of the SRECs and electricity savings are projected to net Rutgers \$28 million over a 20-year period, exceeding all costs to the university<sup>7</sup>. Here in Massachusetts, public schools and colleges are taking advantage of PPA models to develop parking lot solar canopies. In

---

<sup>7</sup> Rutgers University News Release: <http://news.rutgers.edu/news-releases/2011/04/rutgers-board-of-gov-20110405#.UdwZ0Zx4fwg>

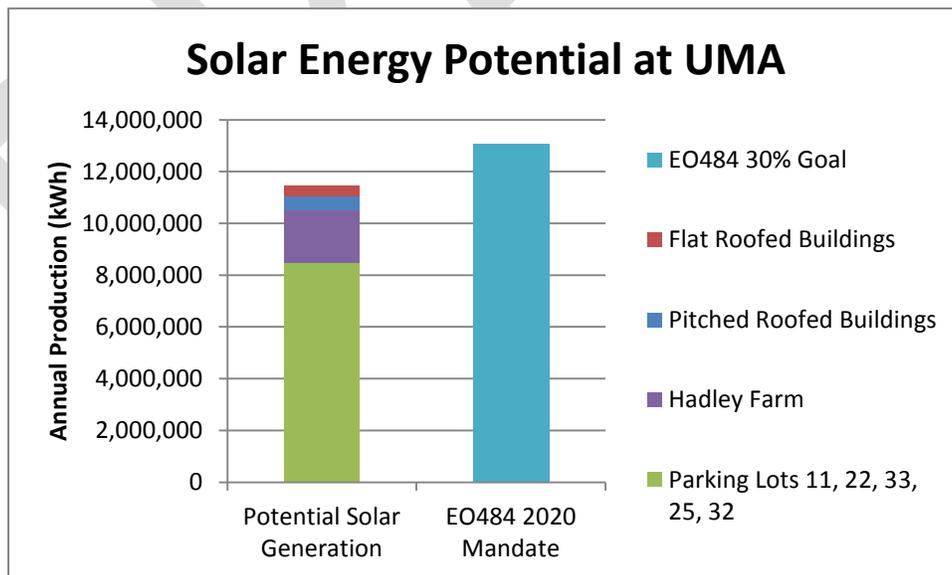
partnership with PowerOptions, Endicott College will be generating 943 kilowatts of solar energy through a planned parking canopy system for its Beverly campus and Bristol Community College is expected to complete within the next year a 2.5 megawatt solar parking canopy system at its Fall River campus. See Appendix for the full PowerOptions proposal.

**Existing Studies (Roof Mounted Solar):**

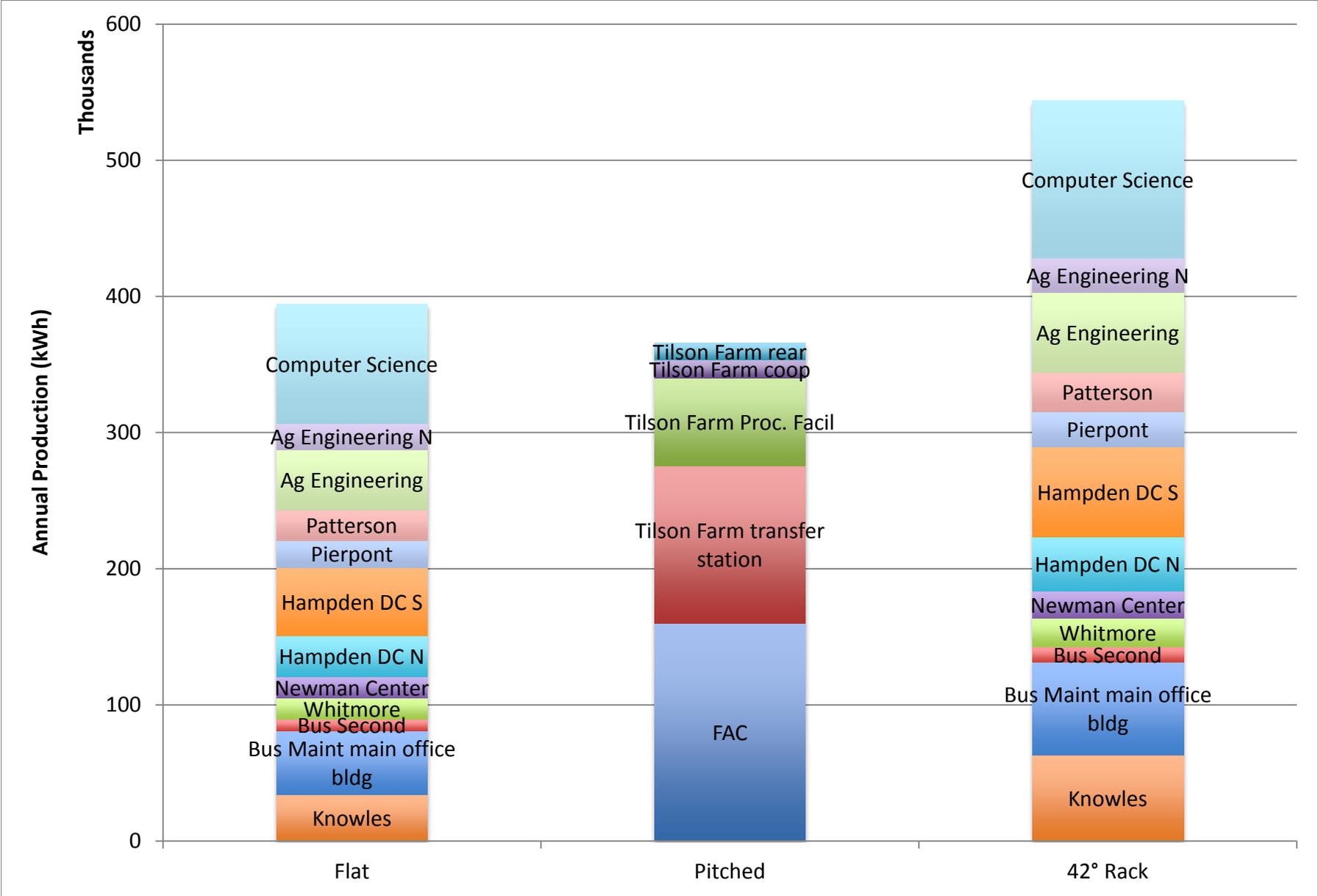
In addition to looking at parking lot canopies, the campus also has the potential to produce over 1-2 MW/yr of solar energy on the rooftops of our existing buildings. A study has been completed by UMA Extension Assistant Professor of Building Energy in the Department of Environmental Conservation, Ben Weil. Professor Weil evaluated the solar potential of buildings on campus that are feasible for roof mounted solar panel systems which is determined by orientation, shading barriers, and roof pitch. The study found that a dozen flat roofed buildings, four pitched roofs including the Fine Arts Center, and a dozen more buildings suitable for pitched racks could combine to produce over 938,000 kWh/yr. (938 MWh). See Appendix for the full study.

**Conclusion:**

If UMA was to consider implementing the proposals and studies mentioned in this document, as well as move forward on the Hadley Farm project, the university could potentially procure a total of approximately 11,438,000 kWh/yr. (11,438 MWh). This renewable energy production would offset approximately 26% of the campus purchased electricity (based on FY12 consumption) which would help the university achieve more than 85% of the 2020 goal of producing 30% of our electricity from renewable energy.



There are multiple financing options for developing more renewable energy on campus and doing so would help position UMass amongst our peer institutions as a destination and investment of choice for students and their families.



# University of Massachusetts, Amherst

Solar Energy Services Proposal  
February 22nd, 2012



## Solar Power Within Reach

---



PowerOptions has partnered with SunEdison, a global solar energy services provider, to offer University of Massachusetts, Amherst (“UMass Amherst”) solar electricity at best-in-class prices through a pre-negotiated industry leading Solar Power Purchase Agreement (“PPA”) offering. Working with PowerOptions, SunEdison will design, install and maintain a solar energy system on your property at absolutely no cost to UMass Amherst. In fact, UMass Amherst’s only obligation will be to buy the power generated from the system at a price below your total delivered cost of electricity.

## Program Highlights

---

### Simple Implementation

SunEdison and PowerOptions have tailored a solar program for PowerOptions members which simplifies the PPA contractual process. Upon contract execution, SunEdison will handle all the details – from system installation to ongoing operations and maintenance – leaving you free to focus on your core business.

### Immediate Energy Savings

The solar energy provided by SunEdison will cost you less when compared to the energy you’re buying from the grid today, resulting in substantial and immediate savings.

### Online Monitoring and Ongoing Maintenance

Via SunEdison’s Client Connect® web portal you will be able to track your system’s performance, as well as weather data and energy savings, all in real time. SunEdison’s worry-free monitoring and maintenance services will also keep your system running at peak performance.

# SunEdison and PowerOptions: Trusted Energy Partners

## SunEdison

SunEdison is one of world's leading solar energy services company. From small rooftop systems to large-scale ground mount installations, our expertise spans the entire spectrum of solar photovoltaic technology.

To date we have installed nearly **600 individual systems** totaling over **500 megawatts (MW)** across the globe. Below is a selection of some of our flagship systems.



## PowerOptions

When the electric and natural gas industries were opened to competition, PowerOptions<sup>®</sup> was formed to help nonprofits consolidate their energy buying influence. As a result, PowerOptions was the first energy consortium of its kind, and quickly grew into the largest and most influential energy solutions partner in Massachusetts.

With over 500 members throughout the Commonwealth spending approximately \$200 million annually on their energy commodity, PowerOptions has the leverage to negotiate—which means better contract

terms and conditions as well as greater savings for its members. From its inception, our mission was founded on one simple premise—to bring predictability, dependability and cost savings to nonprofits.

## Solar Energy Q&A

---

### SunEdison/PowerOptions Solar Program

SunEdison has teamed up with PowerOptions to provide its members with an innovative solar program. Under this program, SunEdison will design and install a solar energy system on your available rooftop space or land parcel(s). The system will be installed at absolutely no cost to UMass Amherst. Instead, UMass Amherst will simply purchase the energy from the system, at prices below what you are paying now.

### Solar Power Purchase Agreement (“PPA”)

A Power Purchase Agreement (PPA) is a services contract between you and SunEdison. Under the terms of this contract, SunEdison will design, construct, operate, and maintain a solar energy system on your property at absolutely no cost. In turn, UMass Amherst will agree to purchase the solar electricity produced by the system over a twenty (20) year contract.

Solar PPA’s offer a number of advantages for public sector and not-for-profit organizations. In addition to preserving funds by entirely eliminating equipment, installation and maintenance expenditures, the cost of electricity via a solar PPA is typically lower than the delivered cost of electricity; and with low to no price escalation over the PPA contract term, purchasing solar electricity through a PPA serves as a power hedge against rising energy costs and utility delivery rates.

### Getting Started

SunEdison has completed an assessment of your site and energy profile, the results of which are reflected in our offer within.

Following acceptance of this proposal, SunEdison will send its solar PPA, which has been pre-negotiated by the PowerOptions team, for your review.



# Custom Solar Solution for University of Massachusetts, Amherst

## Technology

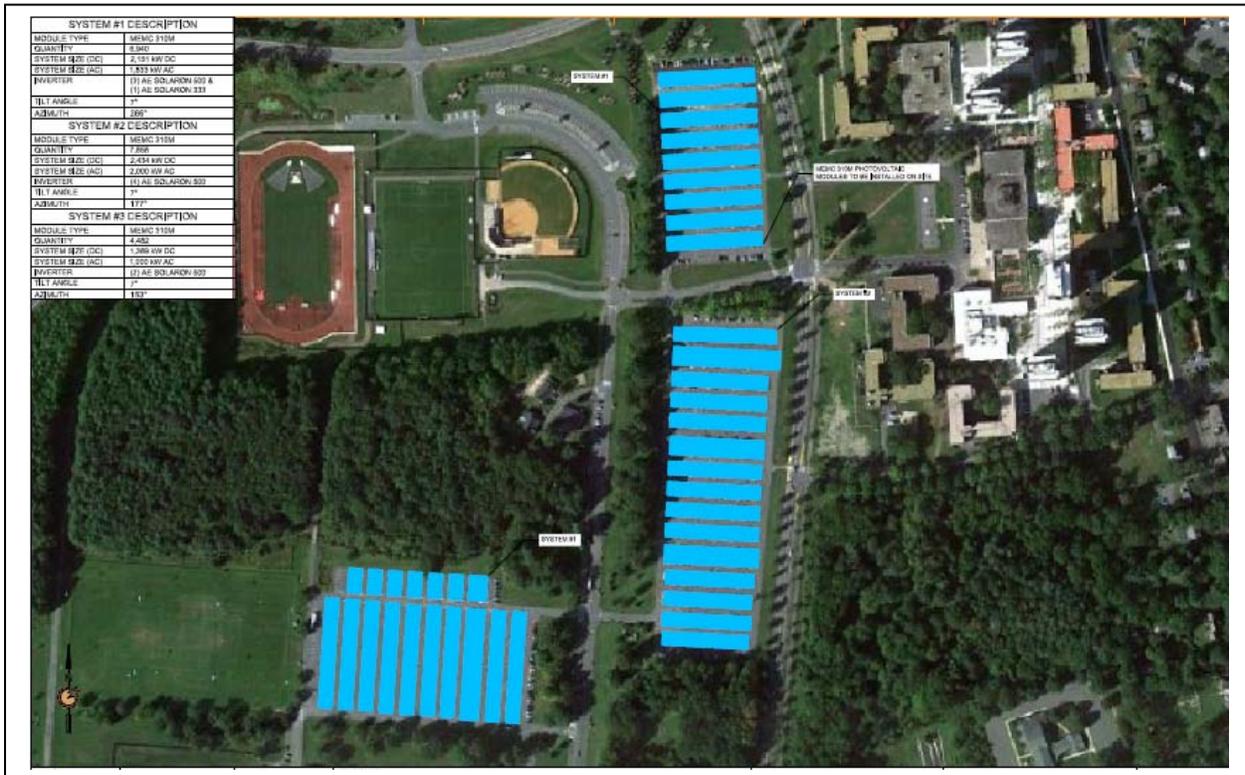
<b>System Size:</b>	7837 kilowatts (kW)
<b>Modules:</b>	SunTech 280
<b>Inverters:</b>	AE Solaron
<b>Mounting Location:</b>	Canopy
<b>Warranty:</b>	20 years

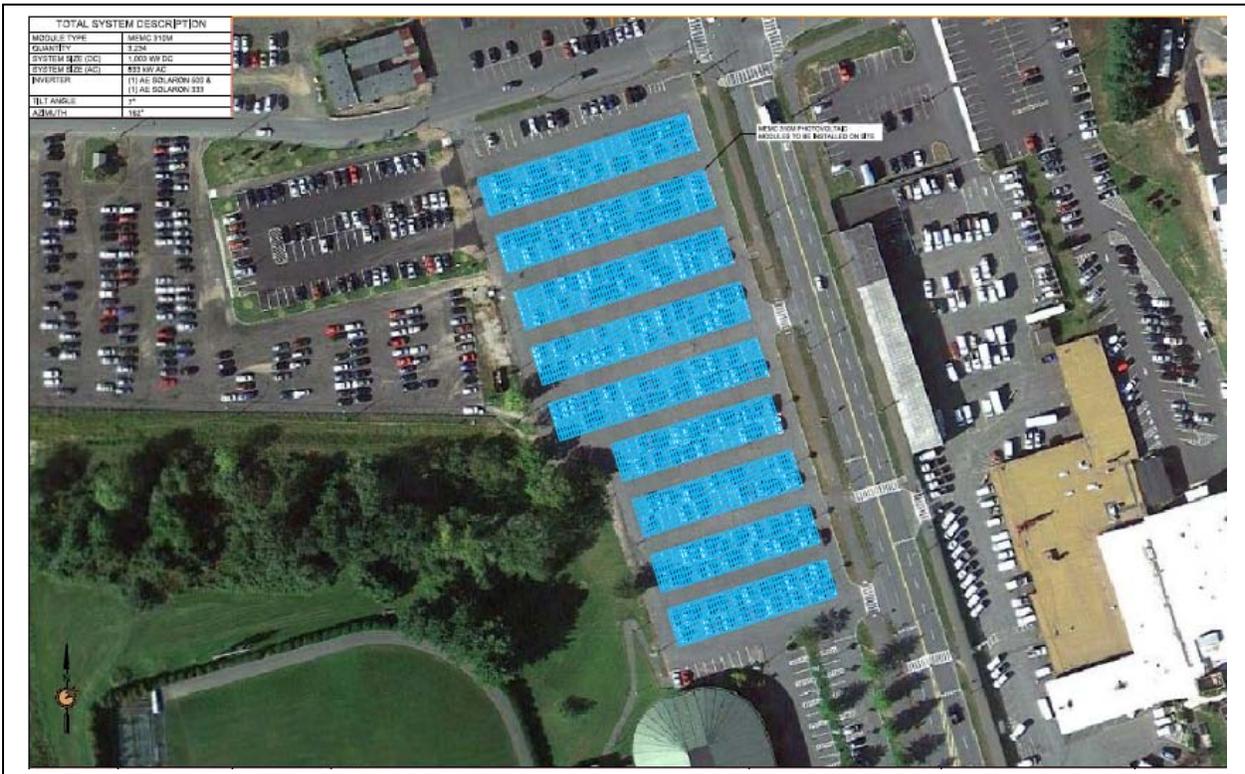
## Price

<b>Upfront Costs:</b>	No charge
<b>Energy Price:</b>	\$0.115 per kWh
<b>Annual Escalator:</b>	0%
<b>Contract Term:</b>	20 years

## Energy

<b>Energy Production:</b>	8,550,167 kilowatt-hours (kWh) per year
<b>Annual Usage Offset:</b>	6 %





# Client Connect

Client Connect is SunEdison's gateway to UMass Amherst's solar information.

## Energy Information

Client Connect provides instantaneous information about the system's energy performance and local weather conditions.

## Real-Time Savings

Client Connect's helpful charts and graphs paint a vivid picture of UMass Amherst's energy profile, as well as monthly energy usage and financial savings information.

## Online Billing

With Client Connect's online billing tool, UMass Amherst can reduce paperwork by easily retrieving monthly energy bills online.



## Contact Information

---

For additional information on this proposal, or the SunEdison/PowerOptions solar program in general, please contact:

### SunEdison

Steven Raeder  
Director of Sales  
410-507-7137  
[sraeder@sunedison.com](mailto:sraeder@sunedison.com)  
[www.sunedison.com](http://www.sunedison.com)

### PowerOptions Contact

Brian Tracey  
Director of Program Development  
617-428-4263  
[btracey@poweroptions.org](mailto:btracey@poweroptions.org)  
[www.poweroptions.org](http://www.poweroptions.org)