

Solar on Skidmore:

The Bright Beginning to Renewable Energy on Campus

Environmental Studies Senior Capstone

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Skidmore College

Acknowledgments and Thank You

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To address Scope 2 emissions, a number of projects

Levinson'12 conducted a feasibility study of a building integrated wind project on campus. Levinson found that the initial investment of the wind turbine would cost the college \$300/year over a 10-year period. The proposed turbine would produce 600 kWh of electricity, and would offset \$72 in yearly electricity costs (Levinson 2011). Skidmore is generally attracted to projects

Scenario Number	Total System Size (kW)	Number of Panels	AC Output (kWh)	Installation Cost (\$)	GHGs offset (metric tons)
One- Sports Center Lg	414	1800	487,201	1,490,400	335.98
Two-Sports Center Sm	24.84	108	29,229	89,424	20.16
Three- Stables	24.84	108	29,820	89,424	20.56

The high initial cost⁴ of a solar installation poses a challenge for the College. Considering this obstacle, the only way to make solar financially feasible for Skidmore is to look for outside funding that would reduce the installation cost significantly. This section provides two different

In addition to grants, some schools have engaged in power purchase agreements for solar projects. Wesleyan and Smith College (not a Peer or Aspirant) have used power purchase agreements for solar, and Wesleyan is considering an additional power purchase agreement project on campus. Power purchase agreements (PPAs) are a common financial agreement to fund solar projects. In a PPA, there is a host and a third party investor; the host supplies the space (roof) and the third party investor pays for and owns the solar panels. The host then purchases the solar electricity from the investor. This arrangement is especially useful for host organizations who cannot afford the high startup costs of solar.

Additionally, PPAs are attractive to third party investors for several reasons. For PPAs

customers, specifically there is a goal for New York to obtain 30% of its electricity from renewable resources by 2015 (NYSERDA 2011).

Additionally, the New York State Senate and Assembly have seen several bills in recent legislature that seek to establish a system of renewable energy credits (RECs)¹¹. While the State RPS currently dictates renewable energy goals, the establishment of a REC system would require electricity suppliers to procure a specific amount of their energy supply from renewable energy sources, thus creating a market and funding the sources for renewable energy. Solar renewable energy credits (SRECs) for example, would be sold by solar energy producers, and electricity suppliers would have to buy a certain percentage of SRECs each year in order to comply with RPS standards and state initiatives. This system of RECs would create an additional source of revenue for installed renewable energy systems.

Scenario-specific Financial Outlooks

Scenario 1-

Given the size of this scenario (Table 1), there are limited grant options for Skidmore. The best option would be a PPA where Skidmore could engage a third party investor who would benefit from the tax breaks. The key to a PPA for Skidmore would be to negotiate a price for electricity that is competitive to their current rate. For example a PPA with a stable electricity price between \$0.10 and \$0.15 may not be attractive when compared to the current electricity; however, in the long run, as grid prices increase, the stable PPA price would produce significant savings. A traditional PPA structure will require Skidmore to speculate a price that will be currently competitive and remain below the future grid price.

An alternative to the traditional PPA is a new PPA structure, in which the PPA electricity price is 'pegged' to the grid electricity price, is another funding-structure option for Skidmore. In this structure, the PPA price is set "x" percent or cents below the grid price (Elphick 2012). Therefore, Skidmore would be guaranteed a PPA price less than their grid electricity, but the PPA price would still follow the increasing trend of electricity prices. In a pegged PPA, there is also more variability than a classic PPA structure, since it will follow price trends.

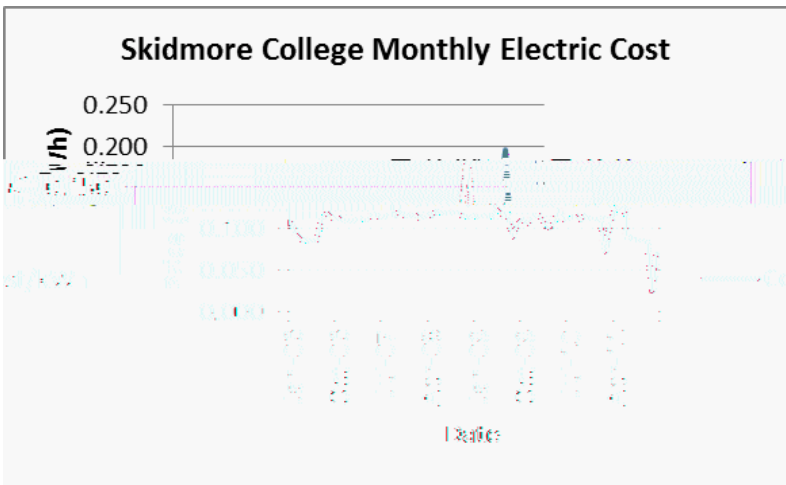
To begin PPA negotiations, Skidmore College would have to submit a request for proposals from different solar contractors and evaluate the proposals. Each proposal will consist of a proposed PPA structure with possible investors and terms of business. The Sports Center may pose a challenge for investor confidence because of concern considering the roofing structure and how it may be perceived as a liability risk to (Elphick 2012).

Table 2 demonstrates the finances of Scenario 1. Since Scenario 1 is not eligible for any current NYSERDA grants and a possible PPA would require a leap of faith (Staye 2012), Table

Total System Size (kW)				
414	487,236	1,490,400	0	49

Scenario 2-

The size of the solar installation in this scenario is ideal for a state level grant for which non-profits are eligible. Within the New York’s Renewable Energy Portfolio Standards (RPS), there is a focus on “custom-sited tier” renewable energy efforts¹². Custom-sited projects are small-scale generators that are site specific (NYSERDA 2011). A solar installation on Skidmore’s campus would be a customer-sited tier, and there are



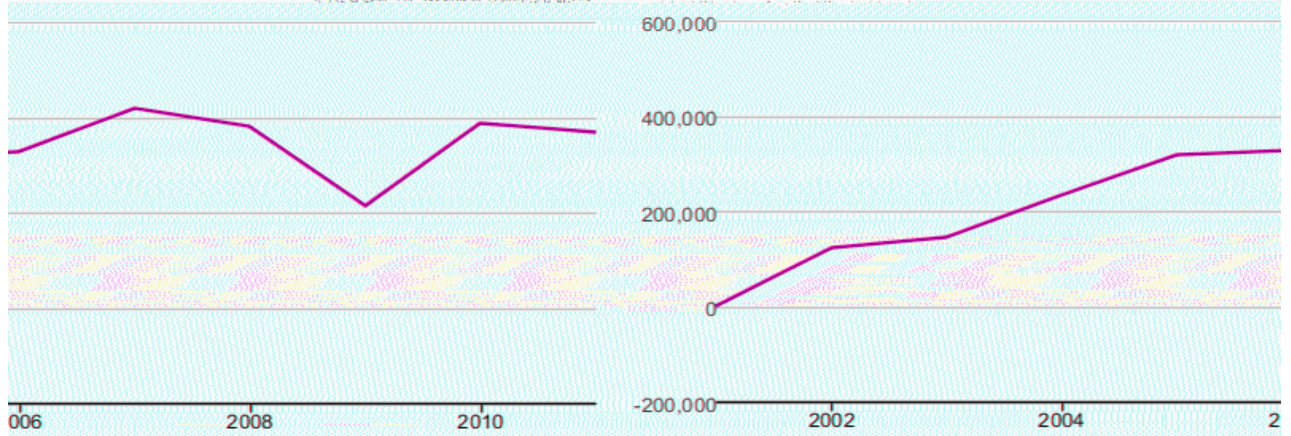
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Electricity Generation for United States

Net Generation

Indexed to 2001 as value

Indexed to 2001 as value

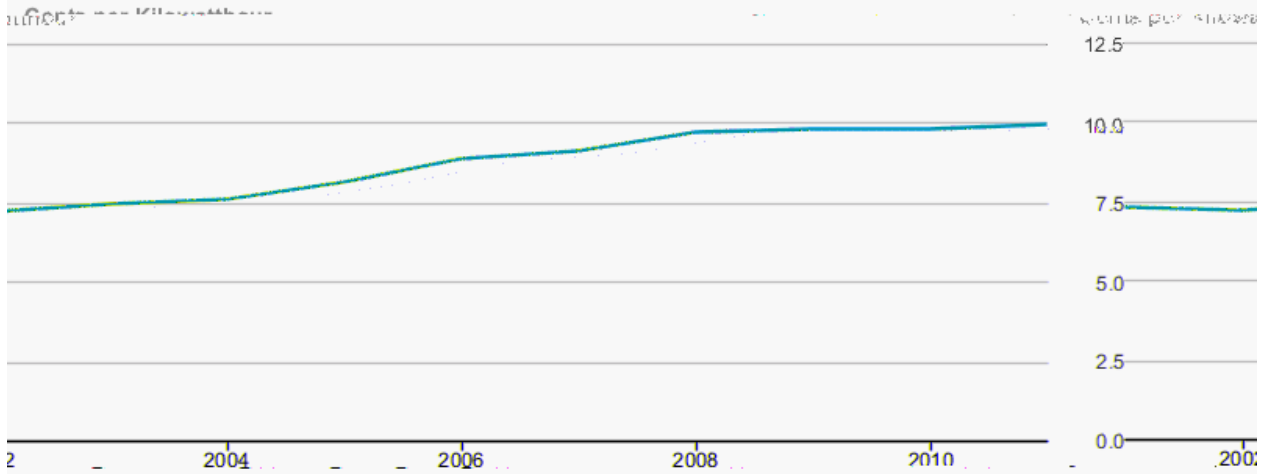


Source: U.S. Energy Information Administration




Source: U.S. Energy Information Administration

Average Retail Price of Electricity



United States: All Sectors

 Indicates proposed Solar Site

 Indicates proposed site for geothermal



generates results using the site-specific variable inputs, and compares the inputted values to the ideal scenario for maximum solar potential. For example, a fixed solar installation would be installed at the same latitude as the site coordinates for maximum solar potential.

:
Base cost of solar installation (panel price, inverter price and labor): \$3.60/W
Panel Make and Model: Quantum Technologies, QS 230W/60-156 SP 2BB
DC rate per panel: 230W
Inverter Make and Model: Emphase Energy, M215-60-SIE-S2x
De4 15 0 0 11 (4(te)11 () -5 (M) 11 de) -11 rtand 4 JTJET Q ϕ.24 0 0 0.24 135.4655714 cm BT 0.0109 Tc 45 0 0 45

	energy project that will be completed next year. The 6-megawatt, ground-mounted solar farm will produce 7,500 megawatt hours of electricity annually — the equivalent of powering 950 homes each year.	ondgreen/topics/energy-and-greenhouse-gases
Adam Joseph Lewis Center for Environmental Studies and the adjacent parking pavilion (installed 2006).	A 159 kW PV, largest PV array in Ohio.	Colin Koffel colin.koffel@oberlin.edu http://www.oberlin.edu/sustainability/portfolio/energy.html

*Indicates Aspirant School

Complete List of Skidmore's Peer and Aspirant Schools

Below is a comprehensive list of grant searching resources. All of these websites were used in our financial study and provide useful, current information on renewable energy requirements and funding.

NYSERDA- <http://www.nyserda.ny.gov/>

NYSERDA is the online resource of the New York State Energy Research and Development Authority. NYSERDA provides many online resources for education purposes, employment opportunities, energy efforts specific to the state of NY and many funding opportunities. NYSERDA is a useful resource for grant research considering the concentration of federal loans they administer. Grants can be found under the “Funding Opportunities” button.

DSIRE- <http://www.dsireusa.org/>

DSIRE is the Database of State Incentives for Renewables and Efficiency. DSIRE is a database for the United States that provides a comprehensive list of state, local and federal incentives for renewable energy initiatives. Since DSIRE compiles incentives by state, one can quickly access grant opportunities for any state. Further, these opportunities are focused on renewable energy which is useful when looking for solar specific grants.

Grants.gov- <http://grants.gov/>

Grants.gov is the official US government online resource for non-profit grants. Grants.gov provides several attractive features that are useful for grant research. One can search for grants by agency, such as Environmental Protection Agency or the Department of Energy. Or one can search by keyword, this is especially useful for solar grants, because this search option will provide results from all government agencies.

EPA- <http://epa.gov/>

The Environmental Protection Agency’s website is a useful resource for education about

RECs

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