Electric Solar Panel Array Garden

Consumers Energy/GVSU Partnership

The Michigan Public Service Commission approved a Solar Garden program and Grand Valley State University reached a partnership with Consumers Energy on October 1, 2015, the first of its kind in the state of Michigan. This is largest venture in renewable energy GVSU has ever embarked upon. GVSU financed the garden up front and will receive a monthly credit on their Consumers Energy electric bill for the next 25 years.

Consumers Energy built the 3 megawatt solar garden on approximately 17 acres of university property in Allendale, Michigan. GVSU agreed to subscribe for 500 kW which will generate enough electricity to operate approximately 70 to 80 homes for one year.

The solar garden was completed in April 2016.

GVSU also received $55,000 to design, procure and construct 2–3 mini solar arrays for educational purposes. One of these mini arrays had to be made of solar shingles. The mini solar arrays are used for educating students, faculty, staff, community and first responders. In addition to those funds, the university receives $20,000 each year for a period of 6 years for additional educational curriculum development for students in the energy and sustainability curricula.

Institutional Benefit

There are hard and soft benefits to the university but not limited to the following:

- Grand Valley State did not have to seek out the engineering, material selections, construction or ongoing maintenance.

- This program provides a long term commitment to a renewable energy source for a minimum 25 yr. term for the project with a possible extension.

- The Solar Garden was constructed on vacant land at Grand Valley State University that is now being utilized as an alternative energy source to the university.

- The program provides for local community engagement to learn more about solar energy and strengthen local ties with the community and township.

- The 500 kW renewable energy subscription by GVSU will address approximately 5% of our Consumers Energy electric utility load.

- The program provides an educational opportunity for GVSU students and local emergency first responder training for those that may encounter solar arrays.

- The partnership continues to promote sustainability goals of the institution and student engagement.

Innovativeness, Creativity, and Originality

This Solar Garden program was approved by the Michigan Public Service Commission (MPSC) and is the first of its kind in Michigan. The partnership between Consumers Energy and Grand Valley State University is also a first for a utility company and a higher Educational facility to partner for a Solar Garden. The partnership became reality after 10 months of discussions regarding capacity, possible site locations, property setbacks, technical issues, educational components, community involvement and financial obligations. The end result was truly a partnership between the utility and the university that came about after a great deal of collaborative efforts of many people representing both parties.

Site location had to be carefully chosen from a capacity and a community impact perspective. Both the utility and the university wanted visibility of the renewable energy source but did not want to intrude on neighboring properties. In the final location both objectives were met with an even greater capacity (three megawatt) than initially targeted. The actual construction project is the largest solar panel array in Michigan to date with approximately 11,250 solar panels.

For this Solar Garden program one of the requirements by the MPSC that makes this program unique was the stipulation that the program would help develop educational opportunities to learn about solar power. Between the utility and the university it was agreed that the utility would provide $55,000 up front funding for the design, procurement, and construction of 3 smaller educational solar modules. One of the educational modules had to include a solar shingle system. In return for the funding the university had to provide the utility the opportunity to have input on the design of the educational solar modules and written approval from the utility before commencing the construction of the modules. In addition to the upfront funding the utility also provides $20,000 per year, for a period of six years for educational course development for the solar array modules. The solar modules are to be used for educating students, community members and first responders that may encounter solar powered equipment in the event of an emergency.

During the financial discussions the utility presented several options for the university to consider including paying installments at different milestone years or investing the entire cost upfront. In return the university receives a monthly credit on an existing electrical account for the next twenty five years. This was important to the university as it allowed administration the opportunity to examine the long term benefits of a renewable power source in its portfolio mix and at the same time be financially prudent. The contract is also structured for extensions.

Portability and Sustainability

The Solar Garden program is one that can easily be copied by others in the state of Michigan or across the country. With clear educational objectives and the funding present for the smaller educational solar module systems, the ground work has been laid for a unique learning opportunity for many students, community members and first responders. The educational solar modules are small enough that they could be relocated if need be, yet large enough to provide a measurable output and therefore a real world learning experience. Students can learn from the smaller educational solar arrays and then transfer that knowledge to better understand the capabilities and capacity of larger commercial size projects.

The components used for the solar modules are virtually all recyclable and much better for the environment than energy created by fossil fuel methods. The panels have a life expectancy of approximately 40 years with little to no maintenance required.

Both the commercial size Solar Garden and the smaller educational solar modules represent a renewable energy source that illustrates a sustainable example that parallels the objectives for the utility company and the university.

Management Commitment and Employee Involvement

From the very moment of the Solar Garden concept and a partnership with the utility company, was brought to administration's attention it was well received. Grand Valley State University had been looking for a viable, long term commitment in the renewable energy area to add to the university's energy portfolio for some time. This unique partnership not only met that objective but offered a solid educational component that would allow an expansion to Engineering and Sustainability curricula. In addition it allows hands on training for first responders that get called on emergencies to locations that have solar powered systems.

After ten months of discussions and negotiations by university and utility administrations the two parties reached an agreement and the legal documents were signed on October 1, 2015. During that time frame both parties had their respective legal, administrative and engineering employees working on the finer details throughout the discussions that took place. The final agreement was viewed as a model for others to follow in developing a renewable energy partnership and a commitment by both parties for the good of the students, the community as a whole and the environment.

Once the legal documents were completed the university vice president requested proposals on how to best utilize the educational funds from various departments including Engineering, Sustainability and the Michigan Alternative Renewable Energy Center. The result was a number of meetings and a great collaborative effort from diverse faculty and administration to compile all the needs for each department. Those needs and desires included the following summary:

1) Design, procure and construct three educational solar module systems and install monitoring equipment to collect pertinent data.
2) Develop Curriculum by using data collected for at least 6 existing courses in many departments including Biology, Engineering, Environmental studies, Natural Resource Management, and Statistics.
3) Develop a New Course in Renewable Energy Management and Modeling that would train students in applied energy analysis using the Solar Garden as a case study.
4) Engage the Community by offering educational programs, training programs for first responders, summer energy camps, and workshops.

Since Grand Valley State University is subscribing to 500 kW of the 3 megawatt Solar Garden project there is the capacity for more subscribers. Both the utility and the university are promoting the subscription of clean renewable power from the Solar Garden. The university Human Resources Office also shared the subscription information to all employees. The University Alumni association is promoting the subscriptions in their Alumni newsletter.

Documentation, Analysis, Customer Input, and Benchmarking

Due to the time frame of getting the legal documents in order the utility company was operating in parallel with a design consultant on the Solar Garden. Both the utility company and the university were being kept abreast of the ever changing design. This includes the Solar Garden panel layout, property setbacks, inverter count and overall capacity.

Site surveys were made to examine terrain and water drainage concerns. Vehicle traffic was monitored and investigated. Projections on the energy output were being revised as final design was being completed. Additional financial analysis was being conducted at the same time as the design developed.

Meetings were held with township officials from Allendale and Georgetown. Zoning ordinances and property restrictions were reviewed with township official to insure the project could move forward. Steps were taken by the utility company and the university to revise the original site which was made up of two parcels to be one parcel of land. This was required to meet some of the zoning ordinances. Proper documentation was submitted to the townships to meet the ordinances and permits. Additional meetings and conversations took place with the county storm drain commission. Information was distributed by the utility company to neighbors of the project site by either personal contact or written correspondence. Overall this renewable energy project was well received by the township officials and the neighboring community.

Once the Solar Garden project was made public to the masses at Grand Valley State University it was received with excitement and inquiries by the faculty and students. Upon learning about the project both faculty and students offered any support needed to ensure the project would go forward. The university Board of Trustees upon learning of the project, performed their responsibility in scrutinizing all aspects of the project including the land lease and the financial aspect. In the end the Board of Trustees unanimously approved the Solar Garden project.

Our students, with the help of their professors; will collect the data from smaller educational solar modules and benchmark the data for future use in comparing the large Solar Garden. The data itself, in its various formats; will be used by many departments and many courses including Biology, Engineering, Environmental, Natural Resource Management and Statistics.

Since its inception in April of 2016, the 3 megawatt commercial size solar garden has generated 3, 666,528 kWh. This is according to the utility website as of November 11, 2016.