Cover Sheet

D.O.E. Grant Award #:	DE-1E0000036	
Type of Award:	Community Wide Solar Photovoltaic Project	
Applicant:	Sokaogon Chippewa Community	
Project Title:	Sokaogon Chippewa Community Emission-Free and Treaty Resource Protection Clean Energy Initiative	
Project Officer:	Jami Alley, PMP, Principal Engineer/Team Leader 15013 Denver West Parkway Mailstop RSF/C106-1 Golden, CO, 80401 (720) 356-1303	
Project Location:	Sokaogon Chippewa Reservation, Forest County, WI	
Project Period:	Started: 2015 Completed: December 2016	
Fuel Production Method:	Solar Photovoltaic Systems	
Tribal Contact:	Fiscal:	Tim Murphy (715) 478-7523 tim.murphy@scc-nsn.gov
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Contractor:	SunVest Solar, Inc. N27W24075 Paul Ct. Pewaukee, WI 53072	Kirk Kindred (262) 547-1200 KirkK@sunvest.com
Date:	February 15, 2018	

Executive Summary

The Sokaogon Chippewa Community (SCC), or the Mole Lake Band of Lake Superior Chippewa, is a band of the Lake Superior Chippewa, many of whom reside on the Mole Lake Indian Reservation, located at 45°29’52”N 88°59’20”W in the Town of Nashville, in Forest County, Wisconsin. The reservation is located partly in the community of Mole Lake, Wisconsin, which lies southwest of the city of Crandon.

The tribe has been committed to combating rising energy prices and achieving long term energy independence through the use of emission free technology that reduces the overall carbon foot print of the community while supporting clean energy practices.

Previous emission free projects include the construction of 11 “Green Homes” that utilize geo thermal technology for heating and cooling and the installation of renewable resource, wood fired boilers to reduce reliance on fossil fuels.

In an effort to strengthen the tribes’ energy independence and promote the use of impact-free sustainable technologies, the community was awarded grant funds from the Department of Energy (D.O.E.) towards the installation of solar photovoltaic panels that will service fifteen tribal buildings. Once receiving approval of grant funding from the D.O.E., a project description listing outcomes, roles, responsibilities, capabilities and commitments were formulated to streamline the installation process.

The tribe collaborated with Sunvest Solar, (SIWI) Pewaukee, WI, as the investor to oversee the use of tax credits and other financial obligations not covered under D.O.E. funding. Sunvest sub-contracted Current Electric, Brookfield, WI as the main installer of the solar photovoltaic panels to be installed on the tribes seventeen buildings and three residences. Project cost totaled $2.1 million, D.O.E. grant funding offset 1.0 million with SCC and investor obligated to a remaining cost share of 1.152 million that would make use of tax credit options as repayment.

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Project Overview

The Sokaogon Chippewa Community received a tribal clean energy initiative grant and installed a community wide solar system estimated to produce 606 kw of carbon free clean energy on seventeen (17) tribal buildings and three (3) residential homes significantly reducing the tribes' energy bills over the life of the system, potentially saving the tribe up to $2.7 million in energy savings over a thirty (30) year time span. Fifteen (15) solar installations utilized aluminum roof-top mounting systems while two (2) installations utilized a ground mount aluminum racking system.

Tribal Buildings with installed PV Solar Panels

1. Tribal Administration Building
2. Mole Lake Casino and Lodge
3. Café Manoomin
4. Health Clinic
5. Convenience Store
6. Elderly Complex
7. Youth Center
8. Family Service Building
9. Housing Department
10. Tribal Roads Department
11. Cultural Building
12. A-Binoojii Day Care
13. Waste Water Treatment Plant
14. Food Distribution Center
15. Fish Hatchery
16. Recycling Center
17. Apartment Complex
18. Three (3) Tribal Residences

Photo Above: Mole Lake Casino and Lodge, Roof Top Installation

Photo Below: Convenience Store, Ground Mount installation

Project Overview

The Mole Lake Band of Lake Superior Chippewa Indians or the Sokaogon Chippewa Community (SCC) is a federally recognized Indian Tribe located in Mole Lake, WI. The Tribes' governance operates under a Constitution and By-Laws ratified on November 3, 1938. As of March 2018, the total number of enrolled tribal members is 1,568. The community occupies a land base of approximately 4,904 acres consisting of Reservation, Trust and Fee Lands.

The Sokaogon Chippewa Community is governed by a six-member council that meets monthly or as required. Decision making authority is done by majority rule. Elections are held annually for council members and bi-annually for officer members.

Under the provisions of the 1934 Reorganization Act, 1,745 acres of land were purchased for the Mole Lake Reservation. This area lies in southwestern Forest County, near Crandon. In 1930, a roll had been taken in the Mole Lake area and 199 Native Americans were determined to be in this band. According to tribal history, these members had been promised this land by a treaty signed with Franklin Pierce. This agent, who was to confirm the treaty and secure the land for them, drowned on his return trip from Washington. The tribe, to this day, actively pursues any knowledge or document to support their claim to the original treaty lands. Before the reservation was incorporated, the Mole Lake Chippewa lived in extreme poverty. The Sokaogon Chippewa welcomed the Reorganization Act and accepted a constitution on October 8, 1938.

At that time, the principle means of gaining a livelihood were boat building, wild rice, wreath greens, selling souvenir bows and arrows, and other novelties. The soil, a sandy loam with gravel outcroppings, yields fair crops of potatoes, short season vegetables, oats, clover, and timothy hay. The game on the reservation included deer, bear, fox, muskrats, and water fowl. With the advent of gambling casinos and bingo, the tribe has continued with an age-old Chippewa tradition of playing games of chance. The introduction of bingo and casinos drastically altered unemployment on the reservation. Rates fell from 80% to 10% within a couple of years. The surrounding communities have also benefited financially and reduced their dependency on federal aid. Today, the Sokaogon Chippewa Community continues to harvest wild rice and spear fish in traditional ways. An accomplishment of tremendous importance to the tribe, a land acquisition of ancestral grounds that was once owned by the BHP Billiton Corporation who intended to utilizes these lands for mining purposes. A joint purchase with the neighboring Forest County Potawatomi Tribe is seen as a historical step towards protecting these lands form future mining efforts while maintaining the pristine beauty that the land has to offer. And now, utilizing state of the art technology, they continue to protect the resources of their environment for future generations. The tribe continues to use its money wisely by

investing in cultural preservation and restoration projects, environmental planning of their resources, education of their community members, and social programs.

The Tribe has developed strong initiatives to protect air and water quality on its reservation and is always very active in combating legislation that would have a negative impact on the environment.

Project Objectives

1. Decrease use of fossil and especially coal-fired power to reduce Tribe's footprint. It will allow the Tribe to further its significant environment protection goals by substantially lowering not only its carbon footprint, but also its environmental footprint associated with other emissions from coal-fired power plants, especially SO_2 and mercury. This is very important in light of the Tribe's commitment to protect its critical treaty rights and resources, including its sensitive wild rice and its fishing rights, both of which are adversely affected by mercury and sulfur deposits.

2. Deploy renewable emission-free energy technology on the Tribe's Reservation along with having a team trained and ready (tribal members) on how to use this technology. (more jobs for members, less maintenance for equipment). By utilizing an emission-free technology, it allows the Tribe to pursue its energy self-sufficiency goals and reduction of its overall environmental footprint while ensuring that it does not add any concerning emissions to the air nearby its sensitive reservation resources. The total number of jobs created during the installation of the solar facilities was 12, and number of jobs for operation and maintenance of the system over its life is 3.

3. This project will service approximately 12 to 15 of the 33 more substantial energy using buildings on the Reservation. In addition, it will serve approximately 6.78% of the total energy load on the Reservation.

4. Be a role model for smaller tribes, who think that these grants and benefits are for the bigger tribes, that every tribe no matter their size can benefit from grants. This grant demonstrates that even Tribes facing significant financial limitations like SCC can use available grant and other funding sources to develop an emission-free renewable energy generation project that creates significant environmental and economic benefits. This replicability is especially important to SCC because it allows the environmental benefits of this project to multiply as other similar projects are implemented.

The specific objectives of this project:

1. Install approximately 605.36 kW of solar photo voltaic (PV) capacity that serves Tribal Buildings in Forest County.
2. Significantly reduce the tribe's energy bills by approximately $2,041,282 over Project life
3. Substantially lower the Tribe's environmental footprint.

Activities Performed

1. Invitation to Indian-owned economic enterprises to submit statement of intent to respond to bid announcement, request for proposals, and selection of contractor and investor. Our biggest concern was finding the most qualified installer and qualified investor willing to implement the project under terms beneficial for the Tribe.

2. Installer prepares detailed site drawings and layouts for each location for Tribe to review and approve. Any questions or concerns were brought up before each drawing was approved.

3. Tribal LLC formation documents, operating agreement, capital contribution agreement and any related agreements will be drafted, negotiated, and finalized.

4. Tribal LLC applies for permit from Tribe and includes in its application package all required documentation for environmental and cultural review. The Tribe then conducts environmental and cultural review and issues access permit.

5. Tribe negotiates and executes electrical services agreement ("ESA") with Tribal LLC. Tribe needed to make sure that agreement was in the best interest of Tribal members.

6. Tribe negotiates design-build agreement between Tribal LLC and the Installer and agreement is executed. All concerns and issues were addressed by the commitment already received by from an investor for the Tribe to have authority, direction, and control over the design and installation of the facilities and by the commitments already received from the installer regarding key contract terms.

7. The Tribal LLC applies for and receives permits for construction of the facilities, in which lied with the installer who had significant Wisconsin experience, including obtaining permits for solar facilities, to design and build the project.

8. Installer applies for interconnection approval on behalf of Tribal LLC and receives that approval, which again goes to the experience and knowledge of the installer.

9. Installer mobilizes construction personnel, coordinates material delivery, and installs project. SCC selected solar PV technology for numerous reasons:

   A: The solar PV facilities produce energy without any emissions whatsoever, which goes right along with SCC Long-Term Vision.

   B: Solar PV facilities can be installed relatively quickly with few siting or other issues. This helps the Tribe to ensure that the project can be installed on time and on budget.

   C: Solar PV is very reliable and has limited maintenance requirements. This allows the Tribe, which has limited financial resources, to ensure that the installation will work effectively, both immediately after installation and over time, and therefore can provide reliable cost savings.

   D: The deployment of solar PV is rapidly increasing due to its decreased cost and the continually rising costs of utility energy.

10. Utility inspects and approves solar facilities and if any concerns were noted or brought up, installer would bring each facility up to par.

11. Installer installs monitoring equipment and ensures that it is functioning properly.

12. Tribe verifies reduction in fuel use by monitoring production from solar facilities and comparing it against energy usage of buildings from all sources. Tribal members were trained to verify and combat any issues that come up with the solar panels.

Site	Projected Energy Consumption Offset	System Price	Size
Mole Lake Casino & Lodge	28.3%	$688,600	225.20 kW
Wastewater Treatment	55.4%	$199,500	47.52kW
C – Store	47.2%	$253,300	63.36kW
Health Center	45.1%	$145,100	44.88kW
Assisted Living/Family Services	53.0%	$66,530	19.80kW
Mole Lake Wood Inc./Roads Building	36.3%	$66,725	19.80kW
Youth Center	58.8%	$66,130	19.80kW
Elderly/Senior Building	37.0%	$66,530	19.80kW
Administration Building	27.9%	$65,935	19.80kW
Apartment Complex	95.8%	$55,660	16.50kW
Housing Workshop	97.9%	$53,300	15.84kW
Recycling – Community Compactor	81.1%	$44,600	11.88kW

Fish Hatchery	84.1%	$59,990	17.82kW
Food Distribution	80.1%	$44,600	11.88kW
Cultural Center	94.2%	$44,600	11.88kW
Housing Office	103.0%	$32,750	7.26kW
Lift Pump	75.0%	$52,000	15.84kW
Residential Housing	95.3%	$54,150	5.73kW

Above are the sites along with the likely energy consumption offset, system price, and size for each of our solar facilities.

In an effort to produce clean, renewable energy, the Sokaogon Chippewa Community installed approximately 605.36 kW of solar photo-voltaic panels on its reservation that service (17) seventeen tribal buildings and (3) residential homes.

Lessons Learned

Lessons learned are as follows:

1. Site selection and evaluation during the planning stages could have been more thorough. Analyzing each sites possible production and historical consumption on a site by site basis would have proven to be beneficial before installation. Installation of a solar farm that made use of direct sunlight that served all tribal entities could have proven to be more advantageous. Site selection was somewhat limited due to obtaining the required approvals from the EPA and THPO Departments.

2. A comprehensive examination of previous electrical consumption should have been reviewed more thoroughly before selection of panels and required equipment. A hybrid system that utilized battery banks during off peak power production could have decreased each sites total dependency on the electrical grid and further decreased overall electrical consumption.

3. Dissemination of information between the Tribe and contracted parties could have been vastly improved upon. Community involvement and support could have been heightened through the scheduling of informational meetings that explained the overall project scope, benefits, associated costs and anticipated deliverables upon completion.

4. Overall building capacity and the future effect of installations was not researched properly and could limit the Tribe when selecting new renewable energy projects. Possible technological advancements were not considered or discussed during the planning stages, resulting in the acquisition of possible outdated equipment in years to come.

5. Invoicing of excess energy produced from tribal building installations still needs to be examined. The Tribe will need to develop accounting principles that invoice any revenues generated from roof top and ground mount installations. Costs associated with regular maintenance of the tribes' buildings that currently have roof top installations will need to be addressed in the event that solar panel removal is necessary.

6. The unpredictable seasonal snow accumulations and how this affects production during winter months was not anticipated during the planning stages. Specialized equipment that would aid with the removal of snow that covered panels during winter months might need to be purchased. The roof top placement of solar panels on some of the tribes' buildings are not accessible during winter months due to the danger of serious personal injury. The snow loads do not slide off of the panels as predicted, resulting in a significant decrease in energy production.

Photo below: Snow covered panels, light accumulation.

Conclusion

Installations range in size from 5.3 kW to 105.7kW and are a mix of roof and ground mount installations. Preliminary estimates indicate offsets for the percentage of energy consumption range from 3.2% to as high as 103%. After one year of installation, performance was recorded and offsets were calculated to be less that preliminary estimates.

The solar installation on the Sokaogon Chippewa Community Reservation has brought benefits for the Tribe and will continue to do so. The biggest impact is the reduction in the Tribe's footprint. This is very important in light of the Tribe's commitment to protect its critical treaty rights and resources, including its sensitive wild rice and fishing rights. With this being one of the biggest concerns, this project has helped tremendously in terms of less pollution in our lands and lakes. Our calculations say that for every kWh of energy that is purchased from the grid means added CO_2, SO_2, NOx and mercury emissions, which endanger its sensitive wild rice and expose its members to greater methyl mercury concerns from the large amounts of fish they consume.

Many of our Tribal members have benefited from this project also. Funds have been opened up for our lower income members along with furthering our involvement in a go-green society. Because of the success of this program, the Tribe has also worked to assist Tribal members in obtaining solar for their individual homes and successfully installed solar panels to 49 low income Tribal members' houses.

Photo: Roof-Top solar panel installation, Economic Support/Family Services Building

Photo: Roof-Top solar panel installation, Food Distribution Building

Photo: Roof-Top solar panel installation, Housing Offices

Photo: Installed Fronius Inverters, Health Clinic Basement