FINAL REPORT TO THE DEPARTMENT OF ENERGY

RENEWABLE ENERGY AND ENERGY EFFICIENCY

Recipient Organization:	HoChunk, Inc
Project Title:	Community Scale Solar on the Winnebago Reservation
Project Period:	September 1, 2017 to August 31, 2019
Date of Report:	November 22, 2019
Award Number:	DE-IE0000089
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EXECUTIVE SUMMARY:

The Winnebago Tribe of Nebraska, through their affiliated economic development entity Ho-Chunk, Inc; their affiliated non-profit Ho-Chunk Community Development Corporation; and project partner Nebraska Renewable Energy Systems conducted a community scale renewable energy project on their reservation in Nebraska. The project installed PV Solar panels on seven tribally owned commercial/retail/office facilities, on one tribally owned senior residential development, and in a ground-mount array associated with a tribal business – the first ground mount installation on our reservation. The project also installed a wind turbine at our tribal college. The project was undertaken as a part of the Tribe's broader initiative to increase renewable energy production on the reservation, reduce the Tribe's financial obligations for purchasing energy, and lessen our reliance upon outside sources of energy to meet our basic needs. The project enabled us to formalize and strengthen community collaborations and build our capacity to pursue additional renewable energy opportunities that will enhance our energy sovereignty.

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1. Project Overview

Acknowledgment: This material is based upon work supported by the Department of Energy, Office of Indian Energy Policy and Programs, under Award Number DE-IE0000089.

The project team consisted of the Winnebago Tribe of Nebraska, a tribal business (the grantee Ho-Chunk, Inc.); a tribal non-profit (Ho-Chunk Community Development Corporation); and a local renewable energy business, Nebraska Renewable Energy Systems.

Building upon the success of a series of single-site renewable energy projects undertaken on the reservation, the team identified ten tribally-owned locations on the reservation to serve as sites for a community-scale renewable energy initiative to be undertaken in a compressed time period. The ten sites consist of:

- Live/Work Building – PV solar panels with an annual usage rate of 135 MWh were installed on the roof of this newly constructed building that has retail and office space on the ground floor and condominiums on the second floor.
- Woodland Trails – PV solar panels with an annual usage rate of 61 MWh were installed on the roof of this community facility located in the Ho-Chunk Village in Winnebago.
- Rock River – PV solar panels rated at 231MWh annually were installed on the roof of this tribally-owned office and light industrial facility.
- Heritage Foods – PV solar panels rated at 446 MWh annually were installed on the roof of this tribally owned grocery store in nearby Walthill, NE
- Pony/Titan Ground Mount -- We installed our first ground-mount PV Solar array rated at 229 MWh annually at the site of the Pony Convenience Store and Titan Storage, tribal enterprises operating on the northern boundary of our community.
- Distribution – PV solar panels rated at 104 MWh were installed on the roof of this tribal light industrial structure in the HoChunk Village.
- Elder Housing – PV solar panels rated at 85 MWh annually were installed on the roof of our tribal elder housing development.

- Little Priest Tribal College – We installed a wind renewable energy generator rated at 95 MWh on the campus of our tribally owned college.
- Senior Center – PV solar panels rated at 85 MWh annually were installed on the roof of the tribe's senior community center.
- Pow Wow Grounds – PV solar panels rated at .45 MWh annually were installed at the tribe's Pow Wow grounds to offset energy costs associated with this significant annual event on our reservation.

2. Objectives

Key objectives of our project are to:

a. Create an expanded Community Solar infrastructure on the Winnebago Tribe of Nebraska Reservation
b. Install solar capacity on ten structures owned by the Winnebago Tribe or their tribal entities
c. Generate 250kw or more of energy
d. Create a substantial percentage of this tribal community's total community energy
e. Incorporate commercial, mixed use, light industrial, and residential structures
f. Build upon the long term commitment that Ho-Chunk Inc. as made to include clean energy production on the Winnebago Reservation
g. Continue the growth of sustainable energy and increased carbon offset while reducing the amount of outside energy the Tribe and tribal entities must purchase from outside the reservation

3. Description of Activities Performed

The Community Scale Solar Energy Project performed by HCI completed all SOPO items as outlined. The project was prepared and executed within one year and an additional year of monitoring was performed to complete the project on time and on budget.

DOE Winnebago Community Solar Grant Activities Summary

Location	AC kW	DC kW	kWh made	$/kWh	Value	Installed $	$/watt	Usage/yr
Live Work	25	29	40,000	0.1	$4,000.00	$73,322.00	$2.52	135MWh
Woodland Trail	25	29	40,000	0.12	$4,800.00	$70,072.00	$2.41	61MWh
Rock River	25	29	40,000	0.11	$4,400.00	$71,322.00	$2.45	231MWh
Heritage Foods	25	29	40,000	0.096	$3,840.00	$64,072.00	$2.20	446MWh
Pony/Titan Ground	110	116	173,000	0.08	$13,840.00	$244,428.00	$2.10	229MWh
Distribution	18	20	27,000	0.08	$2,160.00	$52,724.00	$2.63	104MWh
Elder Housing	8.5	8.5	12,000	0.12	$1,440.00	$41,402.00	$4.87	72MWh
LPTC	5	5	4,380	0.09	$400.00	$24,472.00	$4.89	95MWh

Senior Center	12	14	20,000	0.11	$2,200.00	$46,165.00	$3.29	85MWh
Pow Wow	6	7	10,000	0.08	$800.00	$26,056.00	$3.72	.45MWh
Totals/Average	259	286	406MWh	0.093	$37,880.00	$714,035.00	$2.49	1459MWh
Summary Figures			1,385,272kBTU			$0.51/kBTU		27% offset

Examples of the initiative's rooftop commercial/residential, and ground-mount installations follow here:

Rock River facility rooftop PV Solar installation -- This is a commercial tribal structure located in Winnebago's HoChunk Village development area.

Winnebago Senior Affordable Housing Project -- PV Solar panels were installed on these residential units to reduce utility costs for low income senior citizens. The resulting cost savings are meaningful for this population of tribal elders.

Pony Convenience Store/Titan Storage ground mount array – This installation was established just off the highway immediately north of our community in Winnebago. In addition to supplying energy for the on-site businesses (and revenue from metered energy sold back to the utility grid) the project creates a first impression for drivers entering our reservation, establishing that we are a forward thinking, climate-conscious, and progressive Tribe.

4. Conclusions and Recommendations

Net metering to replace retail consumption of the end user offers the highest return on investment solar energy can offer. By combining retail offset with a number of projects together, thereby leveraging economy of scale, the result is a very cost effective project that reduces retail power bills. These smaller projects also utilized standard policy and interconnection rules, eliminating any special studies or approvals. Unfortunately, net metering is limited to 25kW and 1% of the local grid. Our recommendation is to foster more growth in this area so that projects can be installed at <$3/watt while replacing retail power. Grouped, decentralized project that can leverage container load panel purchases will provide economic return that cannot be beat, while offering project simplicity that will enable local implementation and monitoring over the long term. Project sites should all verify solar access to ensure projected power production estimations.

Using internal assets of HCI allowed tremendous flexibility in deployment, local (native) labor and met a stated objective of the grant to build local capacity. After several years of not having completed a project and turnover at HCI Construction, this project allowed a strong team to develop by building skills and obtaining the specialized tools needed for solar deployment.

The project allowed us to deploy new systems including attached (non-ballasted) roof mounts by OPSUN and ground mounts in addition to the sloped roof and S-5 clamps we had become accustomed to. This project provided the impetus for new skill sets and dramatic expansion of local capacity. All systems were installed to standard and annual savings expectations outlined in the proposal were met. There were some lessons, but no surprises.

5. Lessons Learned

Most of the lessons learned were positive learning experiences in the field, which we sought. Things like:

- Ensuring parallel line set for long ground mounts
- Drawings and use of power grip anchors
- Managing solar contractors
- Efficient steel cutting and waste minimization
- Preassembly of subsystems to facilitate field assembly onsite
- Physical security
- Familiarity with specialty tools
- Ground mount assembly techniques;Ground mount panel alignments
- Commissioning and monitoring of Fronius units
- Coordination with outside contractors (hole drillers, electricians, roofers)

Overall lessons learned were all positive and will be used as a foundation for more efficient future development. Project budgets were adequate and al SOPO goals were met. This was a huge step for growth for HCI and we are very pleased with how all the projects worked out.