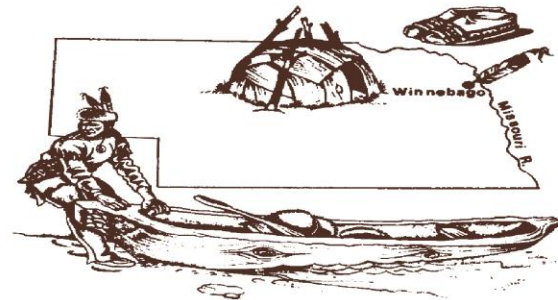




Winnebago
Tribe of
Nebraska

SOLAR PROJECT

Summary of the Winnebago Tribe of Nebraska



- The Winnebago tribal homelands are located in the northeast corner of Nebraska and a portion of western Iowa. Currently the tribe has nearly 5000 member, ½ living with in the reservation boundaries. The Winnebago Tribe of Nebraska is governed by a Tribal Council, consisting of 4 officers and 5 members with each holding 3 year terms. The future of the tribe is directly related to the protection of our homelands and how well we enable our children to continue our cultural traditions and manage our resources in rebuilding our economy.

Project Overview

- The Winnebago Tribes “Solar Project” will focus on renewable energy production and energy cost savings consistent with protecting our natural environment.
- Installation of photovoltaic solar power generation will reduce the amount of energy purchased for the Police/Fire Department building, also providing a source of energy should power be unavailable.
- Powering this building at all times is essential to ensure the safety and well being of our tribal members and resident of the entire reservation.

Project Location

- The project site is located within the Village of Winnebago
- The Winnebago Law Enforcement/Fire Department building is located at 302 Bluff St. Hwy 75/77
- This 8,000 sq. ft. masonry block/steel joist building was built in 1978, yet is crucial in our community.



Project Participants

Business Contact: Pat Madson, Contract Specialist

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Technical Contact: Autumn Nieman, Office Associate

Email: autumn.nieman@winnebago-tribe.com

Technical Support: Ron Nohr, Tribal Engineer

Email: rn1841@yahoo.com

Supervisor: Mitchell Armell, Physical Resource Director

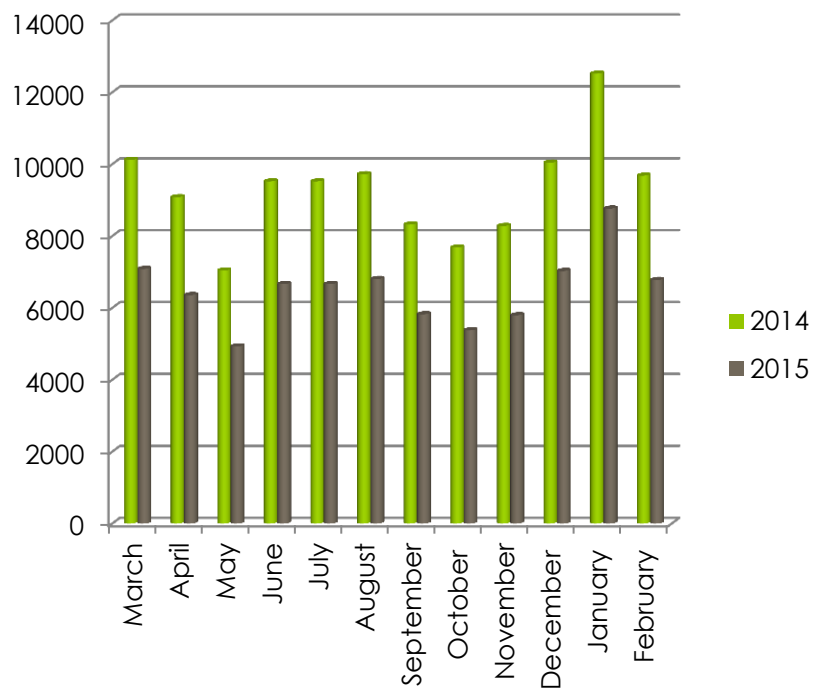
Email: mick.armell@winnebago-tribe.com

Solar Heat & Electric: Michael Shonka

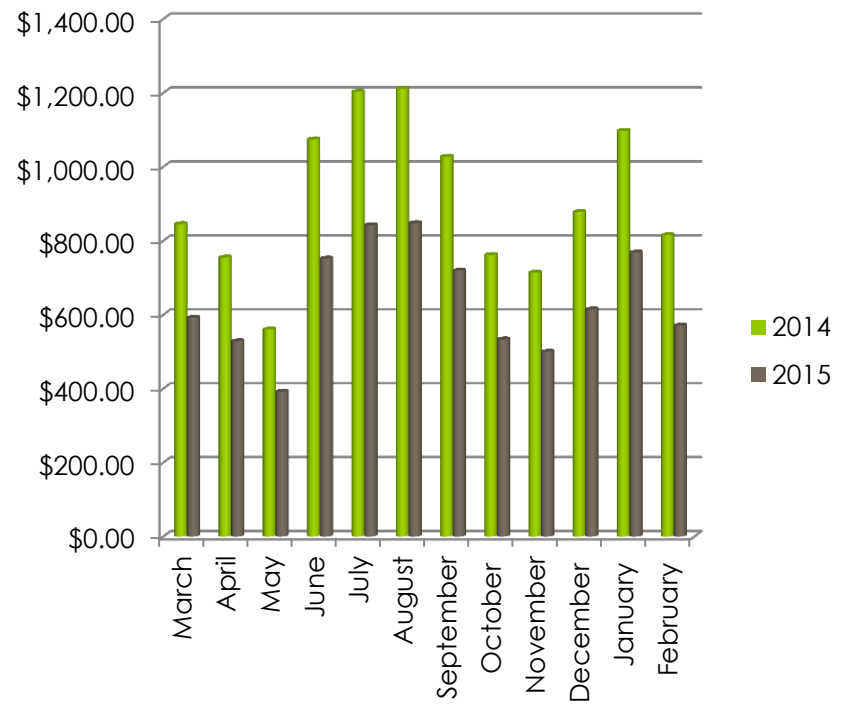
Email: mshonka@qwest.net

Project Objectives

- Recent 12 months of fuel use & 30% reduction



- Recent 12 months cost & 30% reduction



- This is the first energy project for the Winnebago Tribe of Nebraska. Every accomplishment and lesson learned will benefit our future efforts.
- The tribe has 2 entities that are using photovoltaic systems and wind units, and another entity that will be using geothermal energy systems.

Relevant Background



Project Status

- As of April 2015 the “Solar Project” is complete.
- We can now begin tracking the fuel usage and cost saving reductions.



Accomplishments

Panel Info



MonoX[®]

- 280 Watt Modules
x 84 = 23520 Watts
- 60 cell
- Monocrystalline

Accomplishments

Rack Info



LEICHTmount™ FLAT ROOF SYSTEM
lightweight & non-penetrating



- Ballast mount rack
- 4 rows x 21 col. = 84
- 20° tilt
- 180° azimuth
- Exactly fits to roof

Accomplishments Inverter Info

SUNNY BOY 6000TL-US / 7000TL-US / 8000TL-US /
9000TL-US / 10000TL-US / 11000TL-US

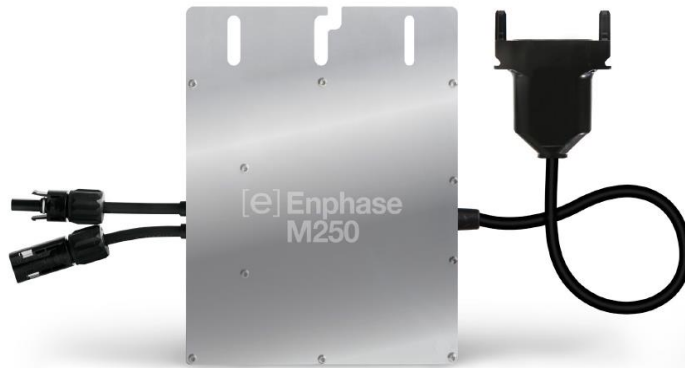


- 11,000 Watt
- Transformerless
- 240 v / Single Phase
- 2 inverters needed
- Only strings of 13

Accomplishments

Micro Inverter Info

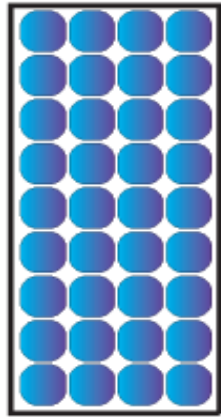
Enphase® **M250**



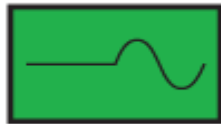
- Needed 6 micro inverters to complete

Accomplishment One-Line Diagram

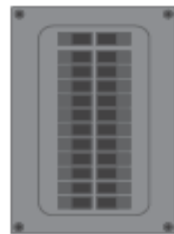
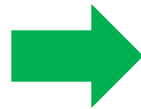
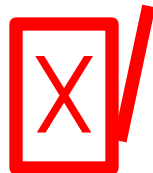
PV Array → Grid



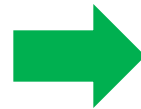
PV Array



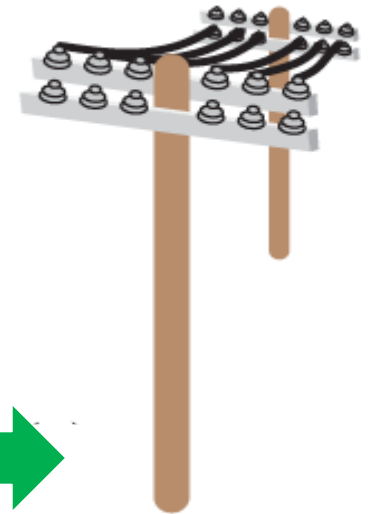
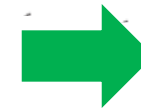
Inverter



AC Service Panel



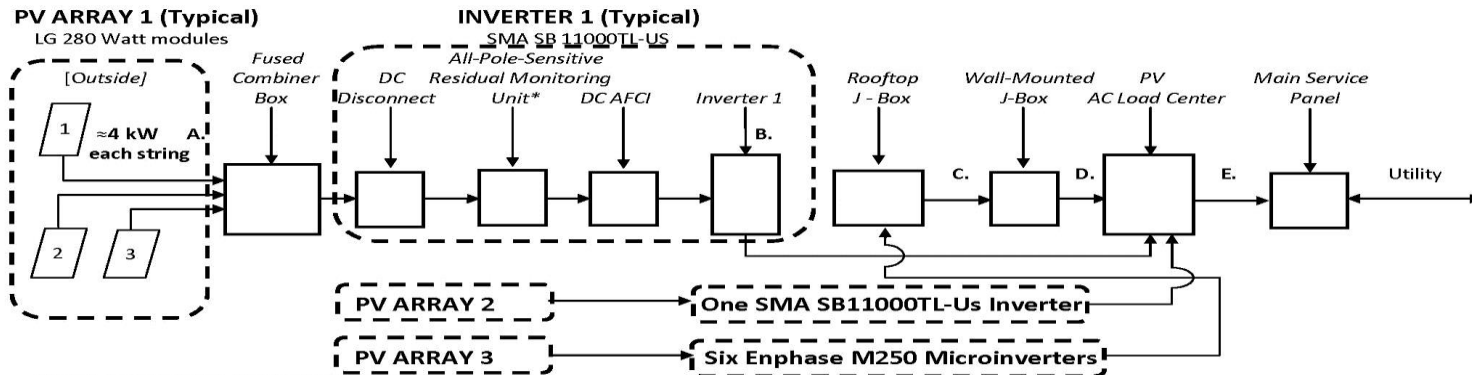
AC Utility Meter



Power Lines

Accomplishment One-Line Diagram

Single Line Drawing for 23 kW Roof Mount



Notes: Solar Electric 23 kW Grid tie system

1. PV Array – 84 modules (3 strings of 13 per SMA inverters) LG 280 Watt modules
 2. DC All-Pole-Sensitive Residual Monitoring Unit*, specs per 2014 NEC, State of Nebraska
 3. DC AFCI, specs per 2014 NEC, State of Nebraska
 4. Two SMA SB11000TL-US, DC voltage variable <1000v, AC 120/240v, 1 ∅ ;
Six Enphase M250 microinverters, AC 120/240 with Integrated Ground Fault Protection
 5. Junction Box
 6. AC Load Center NEMA3R; 70A 2P main breaker, (2) 30A 2P breakers, (1) 15A 2P breaker
 7. AC Load Center (inside)
 8. System is grounded and bonded per 2014 NEC®
 9. All conductor ampacities and voltages adjusted per 2014 NEC®
 10. Raceways sized per 2014 NEC®
- Total Wattage for System = 280 W x 84 modules = 23,520 Watts
(STC nameplate rating; does not include line losses, inverter efficiencies, etc.)
*All-Pole-Sensitive residual monitoring unit is more sensitive than a typical GFCI

December 2014

Wire Notes:

- A. #10 PV Wire → Modules to Inverter (DC only)
- B. (3) #10 + #10 ground → Inverter to Junction Box;
- C. (3) #10 + #10 ground → Junction Box to Junction Box
- D. (3) #10 + #10 ground → J-Box to Load Center
- E. (3) #6 + #6 ground → Load Center to Meter

Solar Heat & Electric

www.SolarOmaha.com

One Line Diagram for Solar Electric System

Lessons Learned

- The main lesson that I experienced through this project is that no matter what schedule you have there are 9 other people that have other schedules, and mother nature is the ultimate schedule that you have to follow.
- Patience and constant contact will get the project done.

Future Plans

- Although there are no plans set in place as of now, the Winnebago Tribe would benefit from any future renewable energy production in the community. There are over 12 tribal buildings that would be an investment if renewable energy was implemented. This one step is a encouragement and will be useful in all our future endeavors.



Questions and Comments...

Thank you for the
opportunity, working with
each of you has been
great.
