Bad River Band of Lake Superior Tribe of Chippewa Indians

+ Located on a 125,000+ acre reservation in Northern Wisconsin on the south shore of Lake Superior

+ Territory ceded by the tribe to the U.S. government includes the upper one third of what is now the State of Wisconsin.

+ Has over 7,000 members, the majority living off the reservation, about 2,000 live on/near the reservation.
Project Summary

+ Focused on resiliency after the 2016 Flood and while experiencing electrical outages at crucial facilities, such as the Health & Wellness Center, the Tribe’s community Clinic.
  + Post flood the Tribe developed an Emergency Response Plan identifying critical infrastructure and mitigation measures addressing future emergencies.

+ The Bad River Tribe was awarded a USDOE Grant in 2019 for the Project.
  + Over 2.2 Million Dollar Project
  + 1.8 Million USDOE Contribution

+ Tribe installed over 500 kW of solar with over 1000 kWh of battery storage at three tribal facilities located in the Odanah Community:
  + The Chief Blackbird Administration Building
  + Wastewater Treatment Plant (WWTP)
  + Health & Wellness Center (H&WC)
2016 Northern Wisconsin
“500 Year” Flood Event
Timeline of Project

- **2016**: Flood Event
- **2017**: Techno-economic feasibility study
- **2019**: Application for DOE Tribal Energy Grant
- **Jan-May 2019**: RFP development & contractor selection
- **2020**: Construction started
- **2021**: Systems commissioned
Resilience is...

+ top priority for the Bad River Tribe (Dependability)
+ a powerful differentiator in the grant process
+ hard to define
+ hard to value
Resilience is...

+ Resilience duration is defined as the amount of time the system can support the building before failing.
+ Resilience performance is dependent on time of day, seasonality, load conditions at the building, etc. and therefore duration varies.
+ The following evaluations are for solar plus storage only; resilience may be supplemented by fuel-based generation.

![Graph 1: Confidence of System Survival vs. Length of Outage (HWC)](image1)

![Graph 2: Confidence of System Survival vs. Length of Outage (WWTP)](image2)
Resilience Seasonality

+ At the health clinic, solar production creates sufficient generation to provide near indefinite resilience from March to November. During winter months, resilience may be supplemented by fuel-based generation.

+ At the waste-water treatment plant, due to flatter load, resilience durations provided by solar plus storage alone cover most nominal grid outages, while fuel-based generation supplements for longer durations.
Rate Tariff Summary & Operating Strategy

Energy
+$0.10 / kWh

Demand
+$10 / kW Winter
+$12 / kW Summer

Sellback
+ Utility avoided cost (no net metering)
+ About ¼ to ½ of the retail rate

Grid-connected (normal) mode operating strategy
- Increase solar self-consumption
- Reduce demand charges
H&WC & WWTP Performance
Total Savings: $14,500
Total Savings: $16,500
Lessons Learned

- Resiliency along with the financial benefits needs to be emphasized in the beginning of planning.
- All microgrids are not smart! Smart controllers can make a difference!
- Microgrids can absolutely be a solution!
  - Tribe is investigating how to expand microgrids to neighboring infrastructure.
  - Two tribal members have installed solar + storage systems for their residents.
- Utilities need to be at the table during emergency discussions.
Miigwech (Thank you)!

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