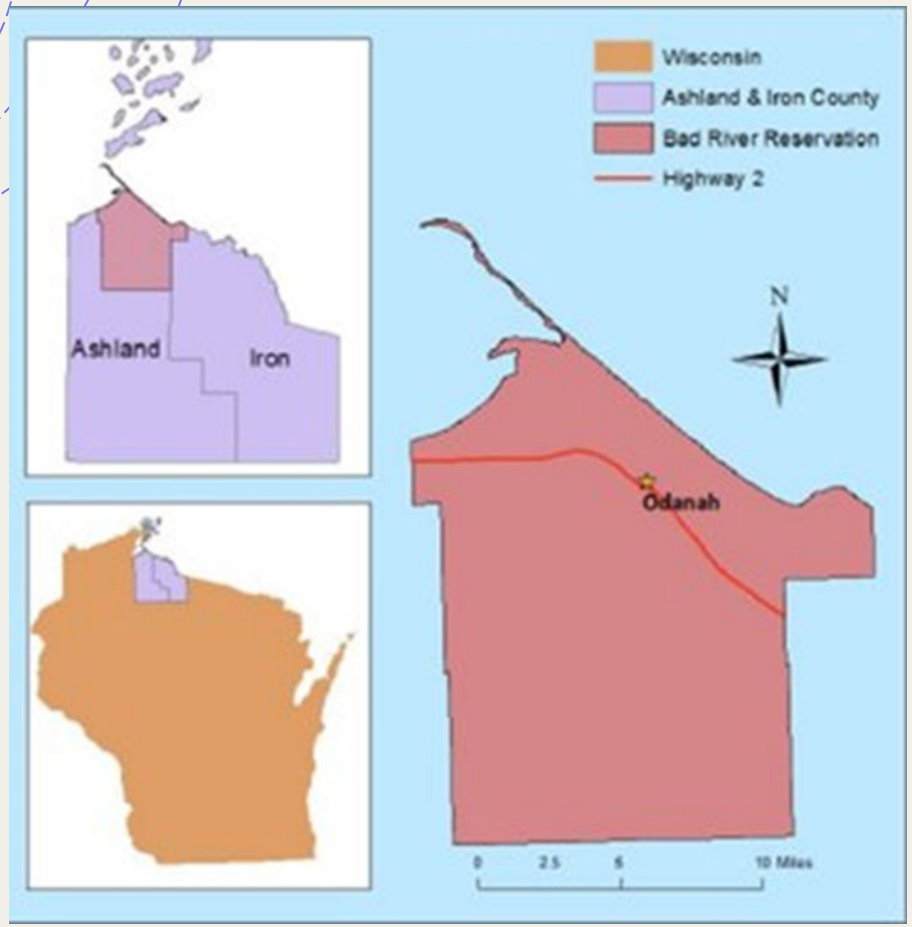
Ishkonige Nawadide
Bad River Microgrids

June 1, 2022

Daniel Wiggins Jr

Bad River Band of Lake Superior Tribe of Chippewa Indians



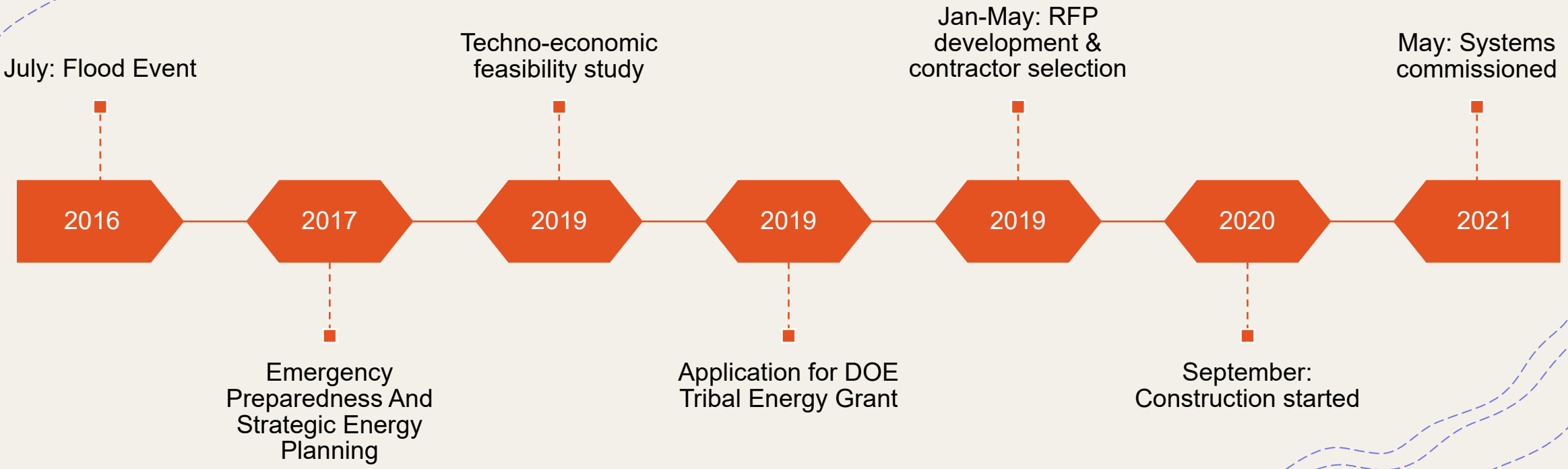
- Located on a 125,000+ acre reservation in Northern Wisconsin on the south shore of Lake Superior
- Territory ceded by the tribe to the U.S. government includes the upper one third of what is now the State of Wisconsin.
- Has over 7,000 members, the majority living off the reservation, about 2,000 live 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



Resilience is…

+top priority for the Bad River Tribe (Dependability)

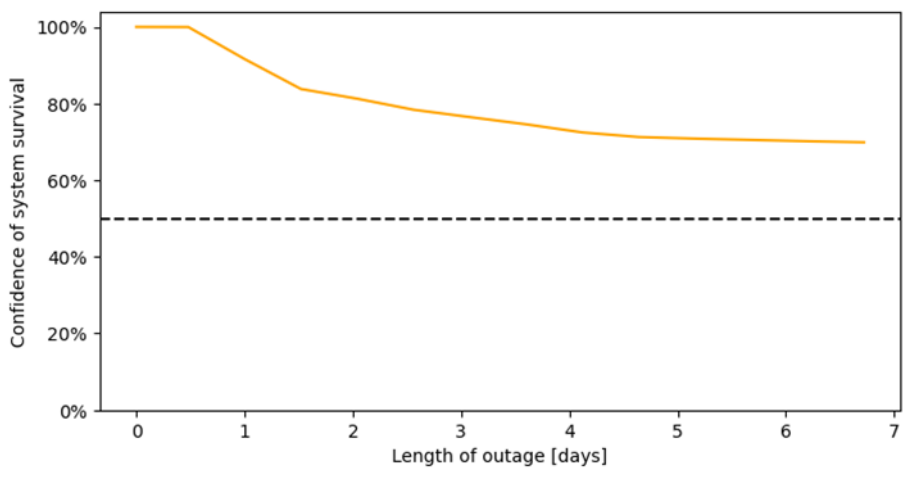
+a powerful differentiator in the grant process

+hard to define

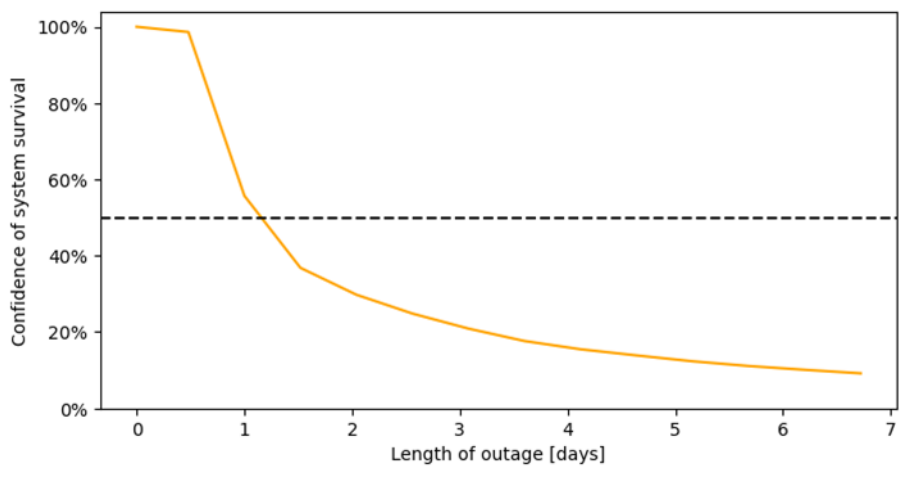
+hard to value

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



HWC



WWTP

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

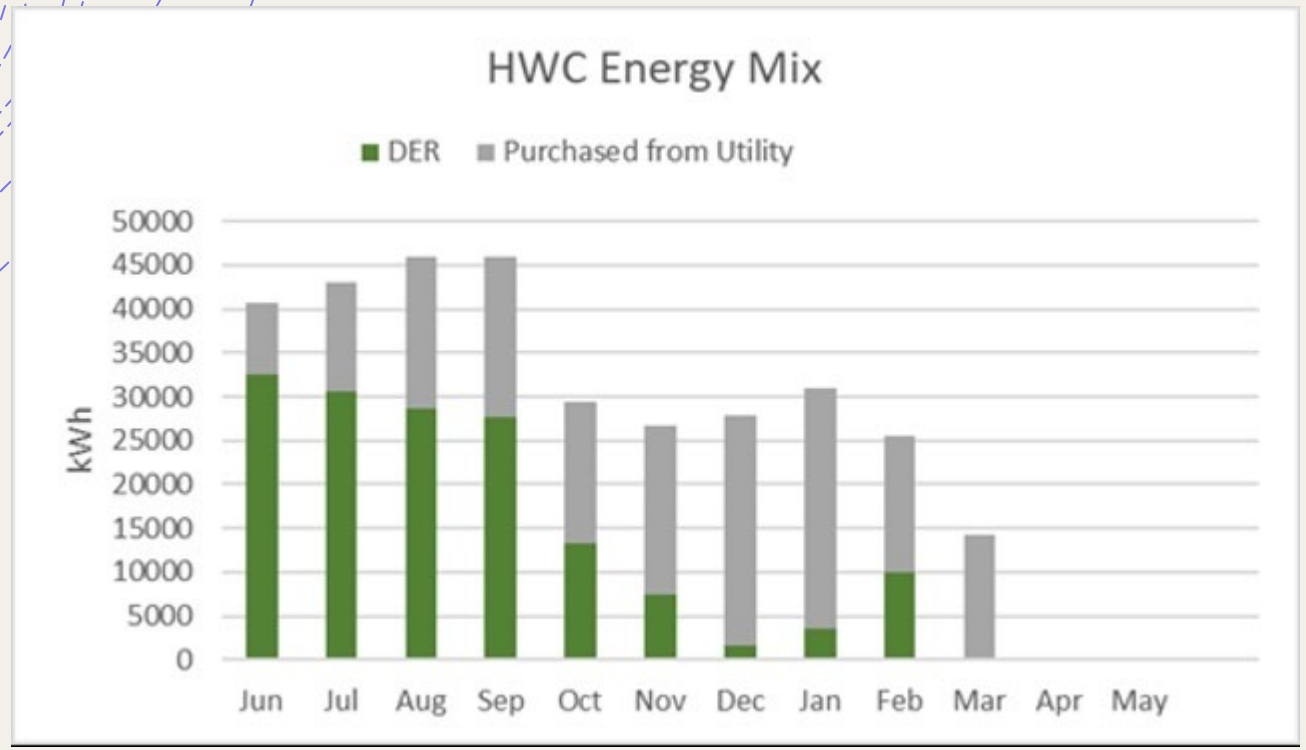
Sellback

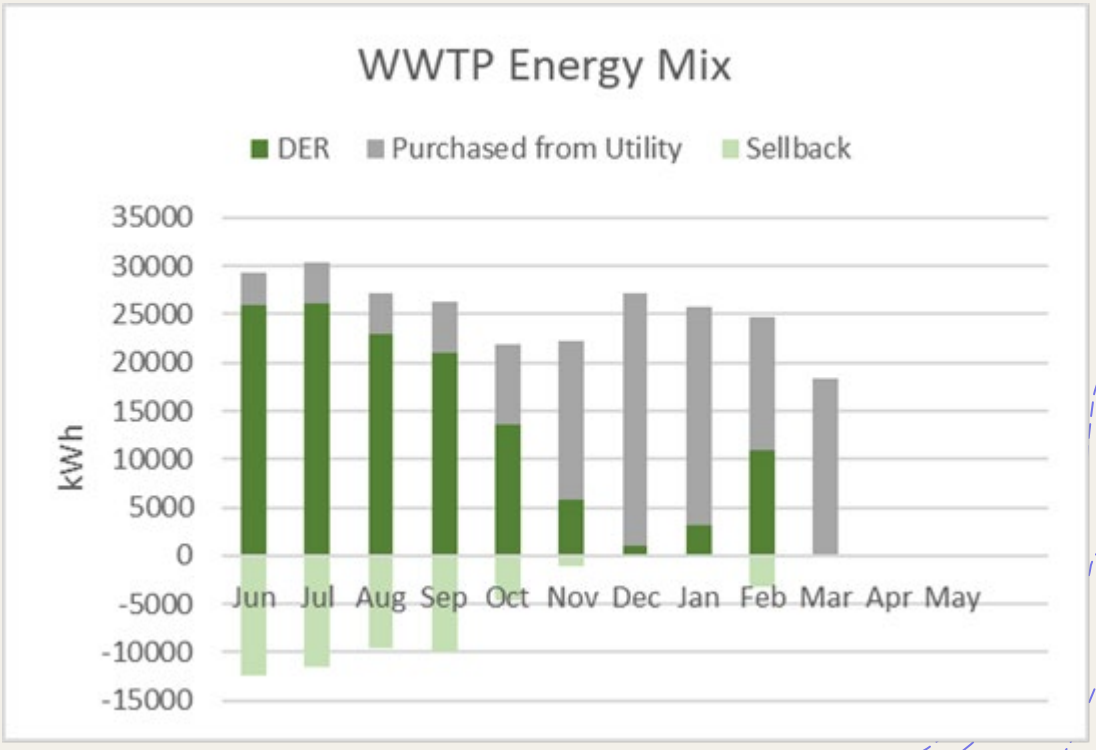
+ Utility avoided cost (no net metering)
+ About ¼ to ½ of the retail rate

Grid-connected (normal) mode operating strategy

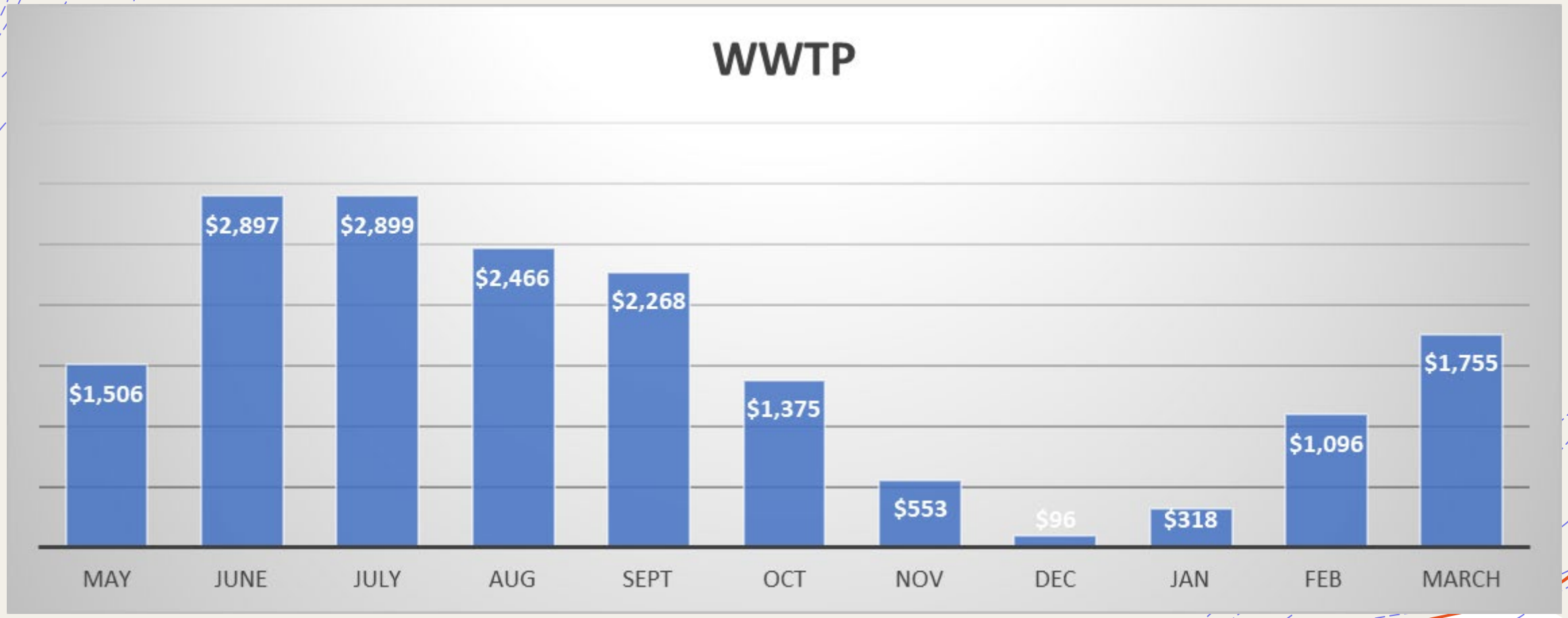
- Increase solar self-consumption
- Reduce demand charges

H&WC & WWTP Performance





Savings



Total Savings: $14,500

Savings

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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