Abstract: San Carlos Apache Tribe (SCAT) is currently served by an unreliable power grid. Generation and transmission assets are limited and power is costly. When storms are expected to occur in the region, the regional hospital is disconnected from the grid to avoid damage to sensitive medical equipment. In this situation, power is provided by diesel backup generators during business hours. Construction of a 2 MW solar photovoltaic array co-located with the hospital is planned. In this study, we have analyzed the benefits behind-the-meter Battery Energy Storage Systems (BESS) can provide to decrease fuel and electricity costs. Results show that energy storage has the potential to reduce fuel costs and reduce curtailment of solar generation.

San Carlos Apache Tribe Facts
- Located in Southeast of Arizona
- Population: 10,000 people
- Area: 2,900 sq. miles (2x Rhode Island)
- Limited electric power resources

Benefits of Energy Storage
- BESS can be deployed virtually anywhere
- Behind-the-meter (BTM) cost savings with BESS:
  - Reduce demand charges
  - Reduce PV curtailment
  - Reduce fuel consumption of diesel generators

Assumptions
- Backup generators, PV array and BESS are BTM
- BESS round trip efficiency: 86% \(^1\)
- BESS throughput is under equivalent of 3,500 cycles at 80% depth of discharge over its life (10 years)
- Load does not increase in the period

Case Study
- San Carlos Apache Healthcare
- Power outages are very common during monsoon season (June through September)
- To avoid damage to medical equipment, hospital is islanded from distribution grid when storms are expected to hit the region during business hours
- To provide redundancy, generators operate at low load levels and should be capable of providing power in case one of them goes offline
- Cost savings are estimating the reduction in fuel and electricity costs when BESS is deployed with PV and diesel generators

Conclusions
- Integration of BESS has potential to be economical
- By deploying renewables plus storage on tribal lands, the tribe can secure greater energy independence and economic development
- BESS can reduce fuel costs and electricity charges generating a positive NPV in all scenarios
- Cost savings are due mainly to reduction in demand charges
- Reduction in PV curtailment and fuel cost savings provide smaller benefits

References

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