Using Energy Storage To Meet Peak Demand—Policy Considerations

PREPARED FOR THE NEW MEXICO PUBLIC REGULATORY COMMISSION

November 10, 2020

Will McNamara

SAND2020-12499 PE

Sandia National Laboratories is a multimission laboratory managed and operated by National Technology & Engineering Solutions of Sandia, LLC, a wholly owned subsidiary of Honeywell International Inc., for the U.S. Department of Energy's National Nuclear Security Administration under contract DE-NA0003525.

The research included in this presentation has been funded by the Department of Energy, Office of Electricity, under the sponsorship of Dr. Imre Gyuk.

This presentation is focused on policy.

- I will be discussing the following topics:
  - Operational & policy context for energy storage & peaker plants
  - State activity
  - Q&A session

Sandia National Laboratories

Operational & Policy Context

Operational aspects set the landscape for policy discussions.

- Load-serving entities (LSEs) use a variety of resources to meet demand: baseload units, intermediate plants, and peaker plants.
- The U.S. E&U sector relies on approximately 1,000 peaker plants, mostly fueled by natural gas, to meet infrequent peaks in electricity demand.
- Peakers typically run for 10 percent or less of the year and may never run for more than four hours at a time.
- NREL study: About 150 GW of the existing 261 GW of peaking capacity is expected to retire over the next 20 years.
- This creates a potential for about 28 GW of 4-hour battery storage that could serve as peaking capacity.

Policy will drive opportunities.

- The correlation between policy and the use of ESSs to replace peaker plants is fluid and evolving.
- In this context, policy refers to regulatory / legislative activity at the state level and regulatory activity at the federal level (e.g., FERC's regulation of the nation's RTOs/ISOs).
- At the state level, ESSs are more likely to be developed and adopted in those states that provide regulatory support for ES.
- States are starting to take action to eliminate the use of existing fossil fuel peaker plants and/or prevent the construction of new fossil fuel peaker plants.
- Regulatory activity in states such as California, Minnesota, and New York provide useful examples (provided).

Energy storage can be evaluated against peaker plants.

- Not all ESSs would be considered suitable or practical for use in addressing peak scenarios.
- Energy storage offers an alternative to peaker plants:
  - Peak shifting: Instead of generating electricity with peaker plants, ES can be used to “peak shift” by using lower cost energy stored during off-peak periods to meet the demand.
  - As ESS that relies on lithium-ion batteries can be charged while the ESS is using minimal load and the cost of electricity usage is reduced (e.g., nighttime hours).
  - ES can be used to shift the peak generation from the photovoltaic (PV) system to be used when the demand requires it.

Operational capabilities + cost determine usage.

- Operational factors of the battery—such as discharge time, duration, and capacity—are the keys to determining where and how a battery-charged ESS will be used.
  - Duration can be a key policy issue, as longer durations are required
    - At either at the wholesale level (RTO: PJM)
    - Or state level (California legislation AB 2255 requires a process to procure and deploy gigawatts of long-duration energy storage across the state).
- The cost of electricity from batteries has been on a steady decline for the last decade.
- The cost for a stand-alone ESS now averages about $209 per kilowatt hour (kWh), competitive against the cost of a natural gas peaker plant.

Some states are setting relevant policy precedents.

AZ	CA	MN	NY
ACC regulators approved a contract between APS and FirstSolar for 65 MW of solar + 50 MW of lithium-ion batteries to meet evening peak.	Both PG&E and SCE have received approval to replace peakers with batteries.	Regulated utilities required to consider how ES can replace peaker plants in long-term planning.	The Climate and Community Protection Act (2019) includes provisions prioritizing the replacement of peaker plants with renewable energy and ES.

Other clean energy policies can also enable peaker replacement.

- Policies primarily intended to enable or incentivize the development of ESSs
- Procurement mandates for ES
- Resource adequacy policies
- Creation of Clean Peak programs
- Duration for long-term storage
- FERC Orders (Order 841 and Order 2222)

The energy storage policy landscape continues to evolve.

Sandia National Labs monitors and analyzes activity at the federal and state levels and publishes information in the Global Energy Storage Database, available at this link:

https://www.sandia.gov/ess-ssl/global-energy-storage-database/

Sandia National Laboratories

Q&A Session

Sandia National Laboratories

Thank you!

Contact Information:

Will McNamara

Email:
jwmcnam@sandia.gov

Cell Phone:
505-206-7156