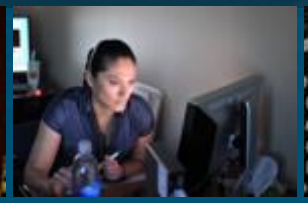
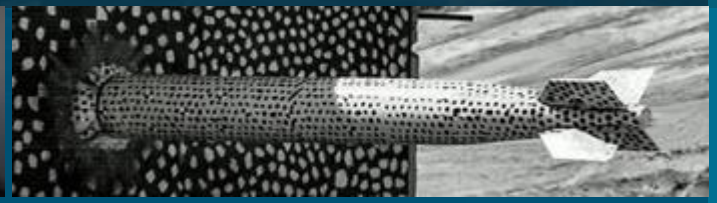
Using Energy Storage to Replace Peaker Plants—Regulatory Trends


Will McNamara, Policy Analyst

SAND2021-2651 O

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.

My agenda for today

- Connecting the Dots
  - What are Peaker Plants?
  - "Just the Facts, Sgt. Friday"
- Why is Energy Storage Preferable Over Peaker Plants?
- General Policy Trends
- State Profiles: (AZ, CA, MN, TX)
- Key Takeaways for the NJ BPU
- Q&A

Connecting the Dots…..

- Resource Adequacy is a primarily a regulatory concept.
- It's not new, but what is new is the extent to which "clean power" can play a greater role in contributing to RA needs.
- Managing RA specific to peak load on the distribution grid is an operational process that is regulated by the state commission. A regulated utility in a vertically integrated market is typically required to set a planning reserve margin, and that usually includes modeling of the peak load.
- A PRM is used to determine the amount of generation supplies that will be needed. The PRM should give consideration to peak demand needs. It is typical to see regions establish a PRM in the range of 15 to 18 percent, which acts as a safety net over forecasted demand.

Connecting the Dots

- How can ES be used to meet the capacity requirements of the PRM? Instead of generating electricity with peaker plants during times of high electricity and fuel prices, ES can be used to either 1) store energy with renewables; or 2) "peak shift" by using lower cost energy stored during off-peak periods to meet the demand.

- Not all ESSs would be considered suitable or practical for use in addressing peak scenarios.

  - ES is not likely to be considered as an alternative in states that have not already developed enabling policies.

  - State regulatory commissions can regulate within their domains only, but there may be opportunity to influence federal regulation as well.

What Are Peaker Plants?

1. Peaking electric generation plants ("peakers") provide added capacity that cannot be met by base load power plants to meet peak day power demands.

2. Peakers only operate when the capacity of a nearby power grid risks being stretched too thin, so energy generated by these plants comes at a premium price that is passed on to consumers.

3. Peakers operate when utilities face high demand for short durations, such as hot summer days.

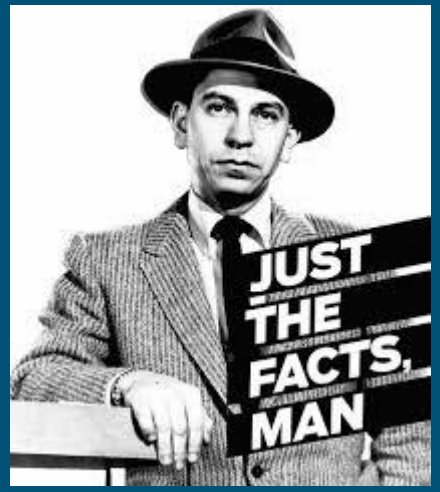
"Just The Facts, Sgt. Friday"

1. The U.S. has more than 1,000 peaker units, which operate only at times of peak load, and often have high hourly emissions.

2. Many are located in areas with high proportions of minority and low-income residents.

3. Peakers plants are also expensive. In New York City, more than 600,000 families spend roughly 6 percent of their entire annual household income on energy payments, and peak electricity in particular is among the most expensive in the country.

4. Over 1.2 million New Yorkers live within a 1-mile radius of a peaker plant—so not only do they pay unusually high electricity bills, but they are also exposed to harmful pollutants produced by the same entities who receive those payments.



"Just The Facts, Sgt. Friday"

5. On average, peakers operate less than 4 percent of the time, less than 300 hours each year

6. Peakers are likely to account for a significant portion of systemwide energy costs and local air pollution.

Top 10 Metropolitan Regions Burdened by Fossil Fuel Peaker Plants

Metro Region	# of Peaker Plants	Total Capacity (MW)	Average Age (Years)	Average Annual Operation (Hours)
Baltimore-Washington DC	9	3,400	55	300
Boston	12	2,300	40	150
Chicago	17	8,400	30	350
Dallas	9	4,100	40	400
Detroit	7	1,000	45	200
Hartford-Middletown-New Haven CT	21	3,700	40	100
Los Angeles	29	7,500	30	400
New York City-Long Island-Newark NJ	46	12,100	40	400
Philadelphia	19	2,900	50	100
Tampa	8	2,500	40	200

Source: Strategen Consulting (based on 2018 operational data)

Why Is Energy Storage Preferable Over Peakers?

1. *Economics:* By 2023, the cost of ES will be less than building new peaker plants. (Energy Transition Lab)

2. *Operational Efficiencies: Response times:* ES offers the power grid faster response times. Peaking facilities require up to 20 minutes to deliver power (Clean Technica).

3. *Regulatory Consistency:* ES technologies have emerged as a critical component of policies that maximize the benefits of clean energy technologies.

General Policy Trends

- *The Reality:*
  - "In the next decade, the U.S. needs to add nearly 20 GW of peaking capacity to the grid to remain reliable, led by California, Texas, and Arizona." (GTM and Wood Mackenzie)

- *The Challenge:*
  - "We can't see a reason why we should ever build a gas peaker again in the US after, say, 2025." (GTM & Wood Mackenzie)

Arizona (Policy)

1. Arizona Public Service (APS) has traditionally relied on natural gas for peaker plant services.

2. Ballot initiatives in Arizona to establish a 50 percent renewable energy mandate have been unsuccessful.

3. Regulatory initiatives still in play would create a clean energy goal of 80 percent by 2050 and/or a mandate that 50 percent of all energy generated in the state come from renewable resources by 2028.

Arizona (Results)

1. APS says it will deploy 850 MW of battery storage and at least 100 MW of new solar generation by 2025.

2. Specific to peakers, APS has contracted for 150 MW of third-party-owned storage, which was chosen over the alternative option of building out new natural gas peakers.

3. APS reached a settlement with the Residential Utility Consumer Office that prioritizes ES as an alternative to developing fossil fuel peakers.

4. Perhaps most noteworthy is the fact that the solar-plus-storage bid beat out other generation sources, including multiple proposals for natural gas plants.

California (Policy)

1. The CPUC adopted a RA policy framework back in 2004, which placed RA obligations applicable to all LSEs within the CPUC's jurisdiction: IOUs, energy service providers (ESPs), and community choice aggregators (CCAs).

2. California does not have formal capacity market, but instead addresses RA needs through the CPUC program (comparison with Texas).

California (Results)

1. Southern California Edison, at the behest of regulators, halted a new gas peaker slated for the beach in Oxnard and ordered up a suite of batteries in its place.

2. The CAISO studied clean energy technologies and determined they could fulfill the reliability role the gas plant would have played; that provided a valuable external validation for the concept.

3. Regulators approved a set of batteries at Moss Landing rather than grant "reliability must run" payments for a trio of Calpine gas plants.

Minnesota (Policy)

1. A 2019 state law requires utilities to consider ES in their IRPs. (Verbiage included in an omnibus jobs and energy bill).

2. When seeking to build power plants or power lines, utilities must show that ES *cannot* more cost effectively meet customer demand.

3. Utilities must propose at least one ESS and are allowed to recover costs associated with ES pilots.

4. These mandates are contrasted against the fact that MN does not offer any ES incentives for commercial or residential customers.

5. Further, MN is part of MISO, which has not finalized how ES will be valued.

Minnesota (Results)

1. Xcel Energy has established goals that call for reducing carbon by 80 percent by 2030 and for producing no carbon through energy production by 2050.

2. Xcel's plan calls for retiring all its remaining coal plants within the next decade, operating the Monticello nuclear plant until 2040, and adding 4,000 MW of solar and 1,200 MW of wind.

3. Great River Energy: "We see storage assets as a potential replacement for peaking assets," resource planning manager Zac Ruzycki said. "That's how we're going to look at it … but even without the legislation, we were going to do this anyway."

Texas

1. Limited policies in support of renewable energy.

2. Texas has 65 oil- and gas-fired peaker plants, 21 of which are located in regions where air quality is worse than federal ozone standards.

3. Texas is actually considering expanding four of its peaker plants, but environmentalists are pushing for cleaner alternatives, such as a mix of ES/solar and solar to meet peak grid needs.

4. ERCOT has not yet implemented explicit policies to improve and support ES, even though Texas has more wind energy capacity than any other state.

5. T&D utilities cannot own storage assets.

Acknowledgements

The Energy Storage program at Sandia is supported by
DOE Office of Electricity Energy Storage Program
Dr. Imre Gyuk, Program Manager

Relevance To BPU

- How does this topic apply to New Jersey policymaking that is under the domain of the BPU?
- Q&A

Acknowledgements

Knowledge is also gained and shared among our team of colleagues at Sandia.

Collectively we work to support Sandia's role in Advancing Energy Storage on the Grid:

- Improving Safety and Reliability
- Engineering Analysis and Project Support
- Policy Analysis and Regulatory Outreach
- DOE Supported Demonstration Projects
- Industry Outreach

Acknowledgements

Contact Information:

Will McNamara

Policy Analyst

Sandia National Laboratories

505-206-7156

jwmcnamara@sandia.gov