New Mexico Peaker Power Plants

Energy Storage Replacement Opportunities

Across New Mexico, 11 gas- and oil-fired peaker power plants and peaking units at larger plants help meet statewide peak electric demand. These facilities are primarily reliant on combustion turbines designed to ramp up quickly and meet peak demand, but also include one aging steam plant now used as a peaker. Many of these plants are relatively young and have high capacity factors for peaker power plants, but a few plants with low capacity factors and short run hours may be good targets for replacement with energy storage. Moreover, a few of these plants are located in low-income and minority communities, where vulnerable populations already experience high levels of health and environmental burdens. Deployment of clean energy resources in historically underserved communities nearby can help reduce demand for these peaker facilities. New Mexico, however, still has significant coal generation on the electric grid, and regulations may be required to ensure energy storage systems are not charged with coal generation and inadvertently increase grid-wide emissions. New Mexico has set ambitious clean energy and emission reduction targets, which may provide an opportunity to replace inefficient, high-emitting peaker plants in vulnerable communities throughout the state with energy storage, solar, demand response, and other clean alternatives.

New Mexico State Policy and Regulatory Environment

New Mexico has enacted a suite of policy targets to support clean energy adoption and emission reductions that could facilitate replacement of peakers with solar and storage. Key targets include:

- **2030:** 50 percent of electricity from renewable resources; greenhouse gas emission reductions to 45 percent of 2005 levels.

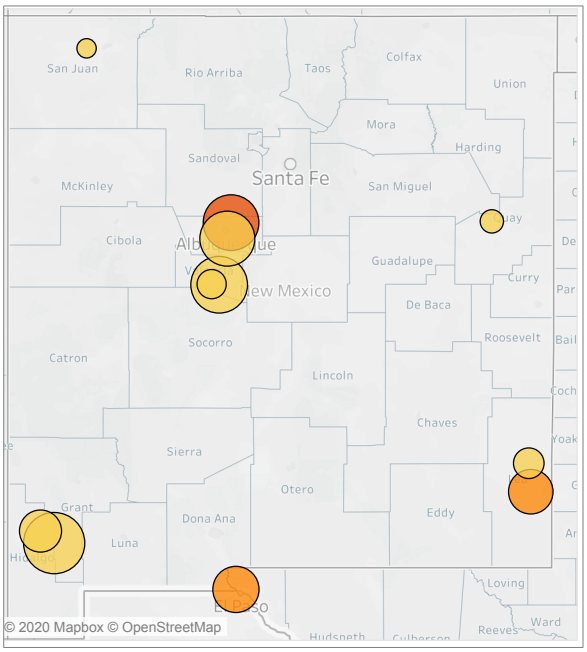

Figure 1: Peaker plants across New Mexico.

- **2045:** 100 percent of electricity from zero-carbon resources.

New Mexico Peaker Plants

Peak electricity demand in New Mexico is partially met by nine gas turbines at stand-alone facilities and at large plants, one internal combustion engine, and one aging steam facility. Some of these facilities have characteristics that make them less likely to be replaced with energy storage, although a few plants may be reasonable candidates. A few factors under consideration include:

- **Age:** Nine are young—under 20 years—but two aging facilities may be ready for retirement.
- **Runtimes:** Many of these facilities have relatively long run hours, but two run less than four hours on average each time they are started up, which aligns well with storage (see **Figure** 2).

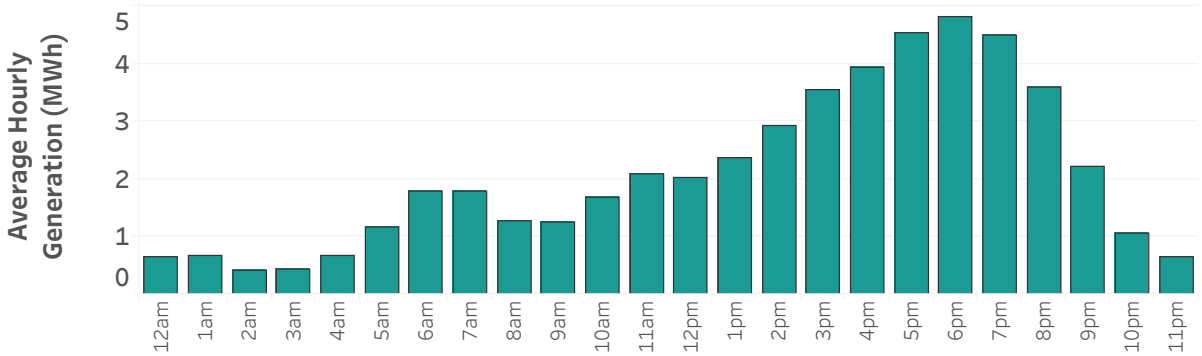

Figure 2: Average hourly generation from the La Luz Generating Station. The plant typically meets some early morning and more often peak afternoon loads. It ran an average of 3.9 hours each time it started up between 2016 and 2018 and had an average capacity factor of 4.1 percent. Batteries can serve a similar role on the grid.

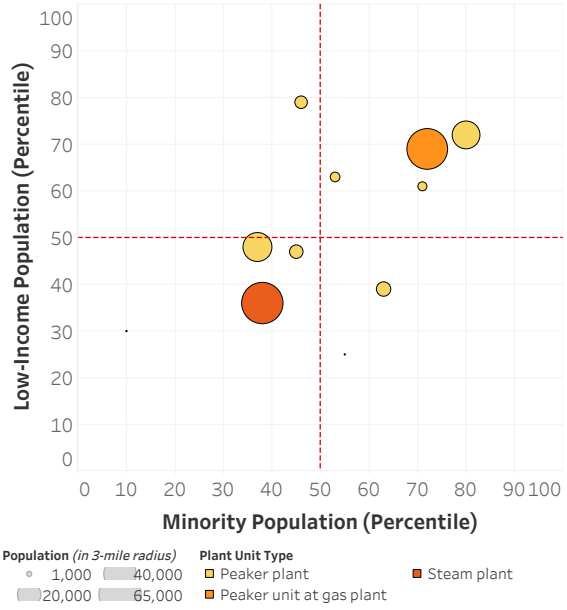

Figure 3: New Mexico power plants are located in largely rural areas with a range of demographic profiles. Bubbles reflect population size. Axes mark state percentiles for low-income (double federal poverty limit) and minority populations living within three miles of each facility.

- **Frequency of use:** Six operate at a capacity factor between 10 and 15 percent—that is, they generate 10 to 15 percent of the electricity that they would if they were running constantly at full power year-round. Four units operating at capacity factors under 4 percent may be more easily replaced with energy storage.

Plants with longer runtimes might be best replaced with a mixed portfolio of cleaner resources that can meet similar grid needs, such as solar, storage, and demand response.

Nearby Populations

New Mexico peaker plants are largely located in remote areas, although two facilities—Reeves near Albuquerque and Rio Grande gas turbine unit near El Paso—have more than 60,000 people living within a three-mile radius. Communities near these facilities have a mix of demographic profiles, including some with large shares of low-income and minority populations nearby (see **Figure 3**). Certain communities also have a high cumulative exposure to environmental health burdens from numerous sources. We developed a cumulative vulnerability index that integrates data on health burdens (asthma, heart attacks, premature birth rates); environmental burdens (ozone, particulate matter, toxics, traffic proximity, lead paint, and hazardous facilities); and demographic indicators (low-income, minority, linguistically isolated, and non-high school educated populations). The cumulative vulnerability index for populations living within three miles of each facility is shown in **Figure 4**. Populations near the Rio Bravo facility in Albuquerque have the highest cumulative burdens reflected in this index.

Emissions and the Environment

Most of the New Mexico peaker units burn primarily gas, which produces greenhouse gases and nitrogen oxides (NO_x). NO_x is a precursor to ozone and particulate matter forma-

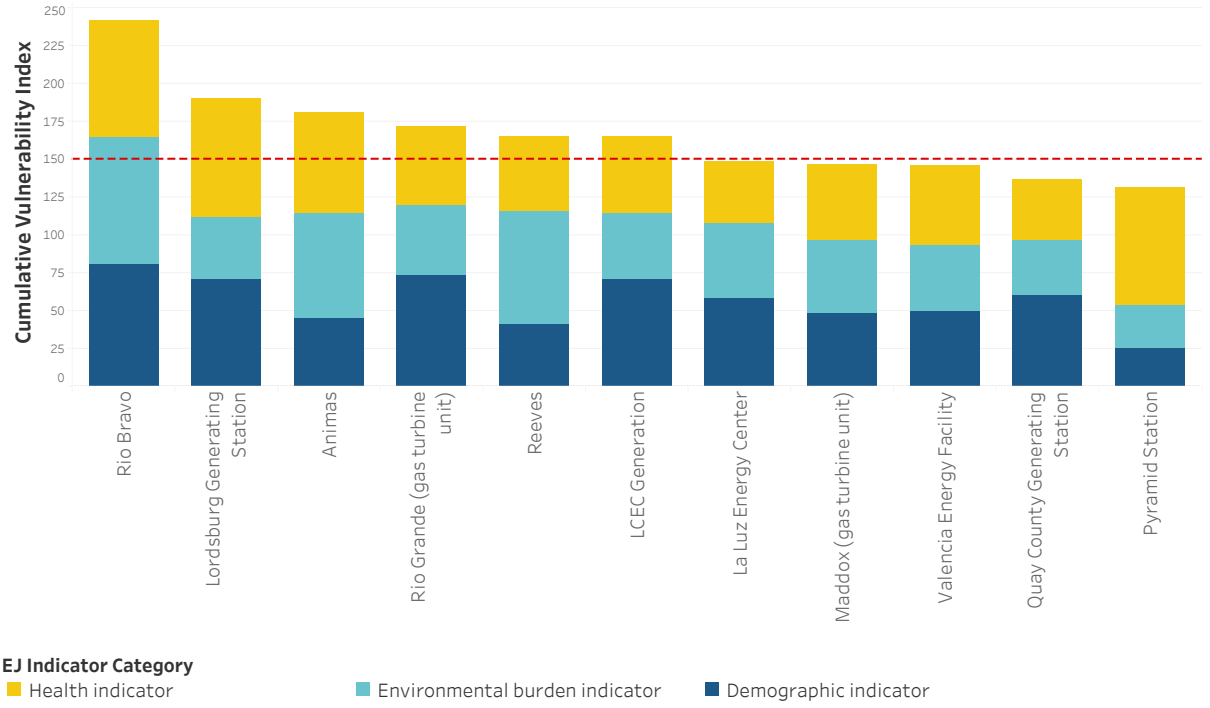

Figure 4: The cumulative vulnerability index reflects a set of environmental, human health and demographic indicators for populations living within three miles of each plant. The score is based on a comparison of indicators to statewide values: if a plant ranked at the median percentile for all indicators, it would score 150, which is indicated by the red dashed line. (Note: Salem has limited data available.)

tion. One facility—Quay County Generating Station—burns primarily oil, is inefficient, and has high emission rates per unit of electricity generated. The Rio Grande gas turbine unit is also located in a region considered out of attainment for federal ozone standards and operated 6 percent of the time on days when local ozone concentrations exceed these standards; operation on hot summer days to meet air conditioning demands can exacerbate these poor air quality conditions.

New Mexico currently has a large share of coal generation on its electric grid. While much of this coal is expected to retire in the coming years, any energy storage deployed in New Mexico must be operated with care to ensure emissions are minimized: charging a battery with excess electricity from coal generation is likely to increase greenhouse gas and criteria pollutant emissions. Regulations to ensure batteries are charged with low-emission resources can help prevent this environmental health impact.

Summary

Many of the New Mexico peaker power plants may be challenging to replace with energy storage due to relatively young ages, high capacity factors, and long run-hours. However, a handful of plants have short run hours, low capacity factors, or are inefficient and aging; these facilities may be good targets for replacement with energy storage or a portfolio of clean energy resources. In addition, investments in distributed energy resources in historically underresourced communities near some of the state's urban peaker plants could help bring resilience to these communities while displacing local emissions. Due to high-emission power plants, such as coal, on New Mexico's electric grid, care must be taken to ensure energy storage is charged with low-emission resources. New Mexico's ambitious clean energy and emission reduction targets, however, provide a supportive environment to deploy solar+storage to displace more inefficient and polluting facilities, particularly in disadvantaged communities. In the attached table, we provide operational, environmental and demographic data for New Mexico peakers and nearby populations. Indicators such as nearby population, emission rates, heat rate (fuel used

per megawatt-hour), operation on poor air quality days, capacity factor, and typical run hours can also inform whether a given plant might be a good target for replacement with storage, solar+storage, demand response, or other clean alternatives. These data should be accompanied by engagement with affected communities to determine replacement priorities and strategies.

New Mexico peaker plant operational and demographic data.
For methods see: www.psehealthyenergy.org.

	Plant description					Operation and emissions						Demographics (3-mile radius)			
Name (EIA ID)	**Status**	**City**	**Fuel**[1]	**MW**[2]	**Age**[3]	**Capacity factor**[4]	**Run hours/ start**[5]	**Heat rate**[6] MMBtu/ MWh	**CO_2 rate**[7] tons/ MWh	**NO_x rate**[8] lbs/MWh	**% MWh high ozone days**[9]	**Pop.**	**% non-white** (percentile)[10]	**% low-income** (percentile)[11]	**CVI**[12]
Animas (2465)	Operating	San Juan	Natural gas	19	5	14.3%	NA	12.5	0.7	4.0	NA	30,389	53% (37)	41% (48)	180
La Luz Energy Center (58284)	Operating	Valencia	Natural gas	42	5	4.1%	3.0	10.0	0.6	0.1	0.7%	3,417	64% (53)	51% (63)	148
LCEC Energy Center (57872)	Operating	Lea	Natural gas	47	8	11.5%	NA	9.2	0.5	24.7	NA	7,561	71% (63)	36% (39)	164
Lordsburg Generating Station (7967)	Operating	Hidalgo	Natural gas	88	18	1.2 %	3.1	11.2	0.7	1.2	0.8 %	2,937	78% (71)	49% (61)	190
Maddox (gas turbine unit)[13] (2446)	Operating[14]	Lea	Natural gas	98	45	10.1%	NA	13. 2	0.8	2.3	NA	7	66% (55)	27% (25)	146

[1]Primary fuel; many plants burn both oil and natural gas.
[2]Installed nameplate capacity (plant size).
[3]Age of oldest unit in 2020.
[4]Percent of time running as compared to running all year at full capacity.
[5]Average number of hours plant runs each time it is turned on.
[6]Heat rates are energy burned per unit of electricity generated; high heat rates reflect low efficiency.
[7]Direct carbon dioxide emissions per unit of electricity generated; does not include upstream emissions.
[8]Nitrogen oxides (NO_x) emitted per unit of electricity generated; NO_x contributes to ozone and particulate matter formation.
[9]Percent of generation on days nearby monitors record exceedances of federal ozone standards.
[10]Percentile minority population indicates percent of census tracts across the state with lower fraction of non-white populations.
[11]Percentile low-income population indicates percent of census tracts across the state with lower fraction of households below double the federal poverty limit.
[12]Cumulative Vulnerability Index combines state percentiles for demographic, health and environmental exposure indicators. A median on all values would score 150.
[13]Gas turbine unit at 212 MW gas plant.
[14]Some units retiring in 2025.

Pyramid Station (7975)	Operating	Hidalgo	Natural gas	186	17	2.6%	16.7	10.0	9.6	1.2	3.4%	6	31% (10)	30% (30)	131
Quay County Generating Station (58125)	Operating	Quay	Oil	27	7	0.1%	NA	19.6	1.6	19.5	NA	5,708	59% (46)	63% (79)	136
Reeves (2450)	Operating	Bernalillo	Natural gas	154	60	11.5%	16	11.8	0.7	2.8	4.8%	62,238	53% (38)	34% (36)	164
Rio Bravo (55039)	Operating	Bernalillo	Natural gas	150	29	11.2%	9.4	11.7	0.7	0.4	0%	28,093	86% (80)	56% (72)	241
Rio Grande (gas turbine unit)[15] (2444)	Operating	Dona Ana	Natural gas	106	7	14.6%	12.4	9.3	0.6	0.1	6.0%	60,230	82% (72)	49% (69)	171
Valencia Energy Facility (55802)	Operating	Valencia	Natural gas	160	12	6.1%	12.1	10.9	0.6	0.4	2.7%	6,656	58% (45)	40% (47)	145

[15]Steam turbine unit at 373 MW gas plant.