

Brace Yourself for Summer 2024

What extreme heat and an active hurricane season could mean for energy demand

By Arianna Goldstein

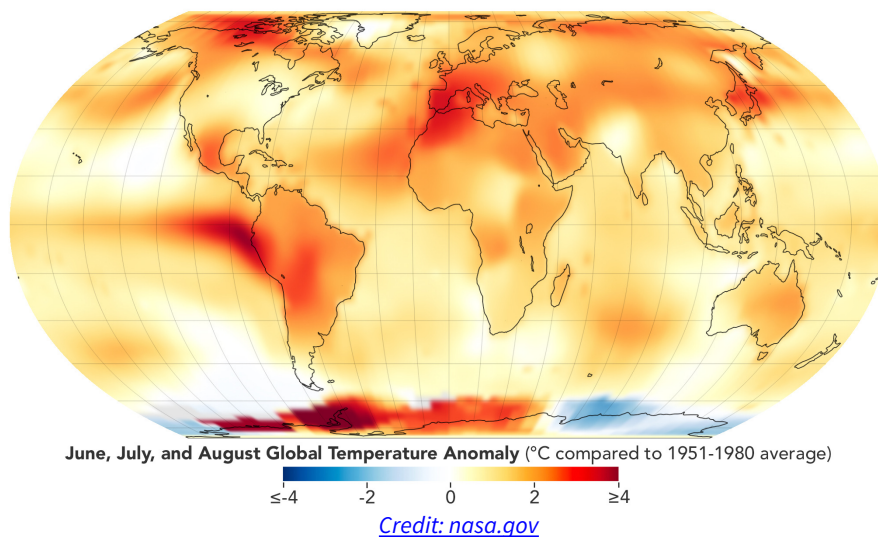


May 2024

Brace Yourself for Summer 2024: What extreme heat and an active hurricane season could mean for energy demand

In the words of Taylor Swift, it will indeed be a Cruel Summer. The summer of 2023 marked a record as the [hottest summer](#) ever recorded according to NASA, driven by high sea surface temperatures and human induced greenhouse gas emissions. This year looks likely to surpass that.

Last summer, ERCOT experienced its highest peak yet of [85.5 GW](#), fueled by intense heat and rising demand. Wildfire smoke painted the sky orange and worsened air quality nationwide, and intense hurricanes reached new heights, hitting higher latitudes in the US than ever before.



A quick glance at the ocean's temperatures [today](#) reveals an Atlantic that feels more like a warm bathtub. As highlighted by Dr. Mark Shipham, Amperon's Chief Meteorologist, in the [Summer 2024 Weather Webinar](#), this summer's hurricane season is forecasted to be like no other due to these warm ocean conditions and the absence of vertical wind shear in the atmosphere. Hurricanes, heat waves, and more extreme storms add stress to a grid that is already under strain due to the retiring of thermal generation plants and the unpredictability of renewables.

Get your AC units ready, because this summer is going to be a “**scortchah**” (as we like to call it up here in Boston), presenting the grid with significant challenges.

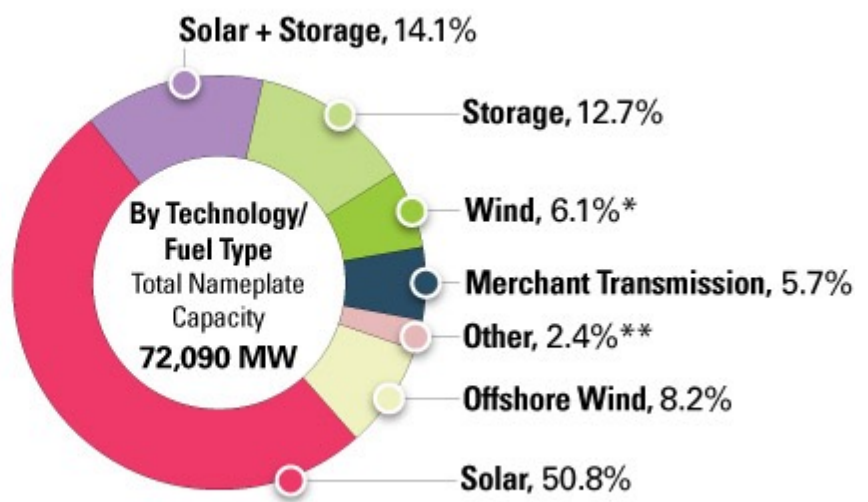
PJM

Last summer, PJM experienced its peak demand day on July 27th, reaching a peak of [146.8 GW](#) at HE18. The year prior, in 2022, the peak demand of [147.3 GW](#) occurred on July 20th at HE18. According to the [PJM 2024 Load Forecast Report](#), peak demand is projected to reach the 151 GW range this summer, higher than previous years. It's primarily due to warmer temperatures but is also a result of shifts in grid load patterns. Factors such as the adoption of electric vehicles and growing industrial demand are [driving up this number](#).

The upcoming summer in PJM marks the official retirement of the [Homer City Coal Plant](#) from the generation stack. Despite the decreasing energy output in recent years leading up to its retirement, the impact of its closure this summer is expected to be minimal in terms of overall changes to energy supply. However, PJM's new interconnection reform program introduces a "first-ready, first-served" rule for new renewable generation projects. Over the next two years, approximately [72 GW of renewable generation](#) is expected to clear the process, contributing significantly to replacing the retired power plants.

Projects To Clear PJM Interconnection Process in 2024 and 2025

By State	Number of Projects	Total Nameplate Capacity (in MW)
DE	5	1,184
IL	82	13,798
IN	69	13,475
KY	39	4,125
MD	6	1,288
MI	8	887
NC	25	1,775
NJ	25	1,528
OH	72	8,613
PA	108	5,055
VA	162	19,012
WV	15	1,350
Total	616	72,090



*Includes one combined Wind & Solar facility of 199 MW
**Other: Natural Gas (1,647 MW, 2.3%) and Hydro (51 MW, 0.1 %)

[Credit: PJM Inside Lines](#)

CAISO

The Atmospheric River has been in full effect this winter, which brought significant rainfall across CAISO. Typically, California is known for hot, dry summers leading to devastating wildfires. However, the current situation paints a different picture. According to the [NIDIS drought monitor](#), California is not currently categorized under any drought conditions, thanks to the surplus of rain they received the past two winters and the milder temperatures experienced last summer.

Wildfires pose a major threat for the grid because they can necessitate the shutdown of transmission lines nearby to prevent overheating. This causes unexpected congestion and possible blackouts. However, with a significant drought no longer looming for this summer, wildfire risk is down. The main risk is a potential decrease in solar generation efficiency due to high temperatures. While thermal power plants can also face overheating issues leading to unexpected outages, it is worth noting that solar panels can experience reduced efficiency in hotter temperatures, depending on their setup angle. This may result in lower solar generation on hot days.

Fun Fact

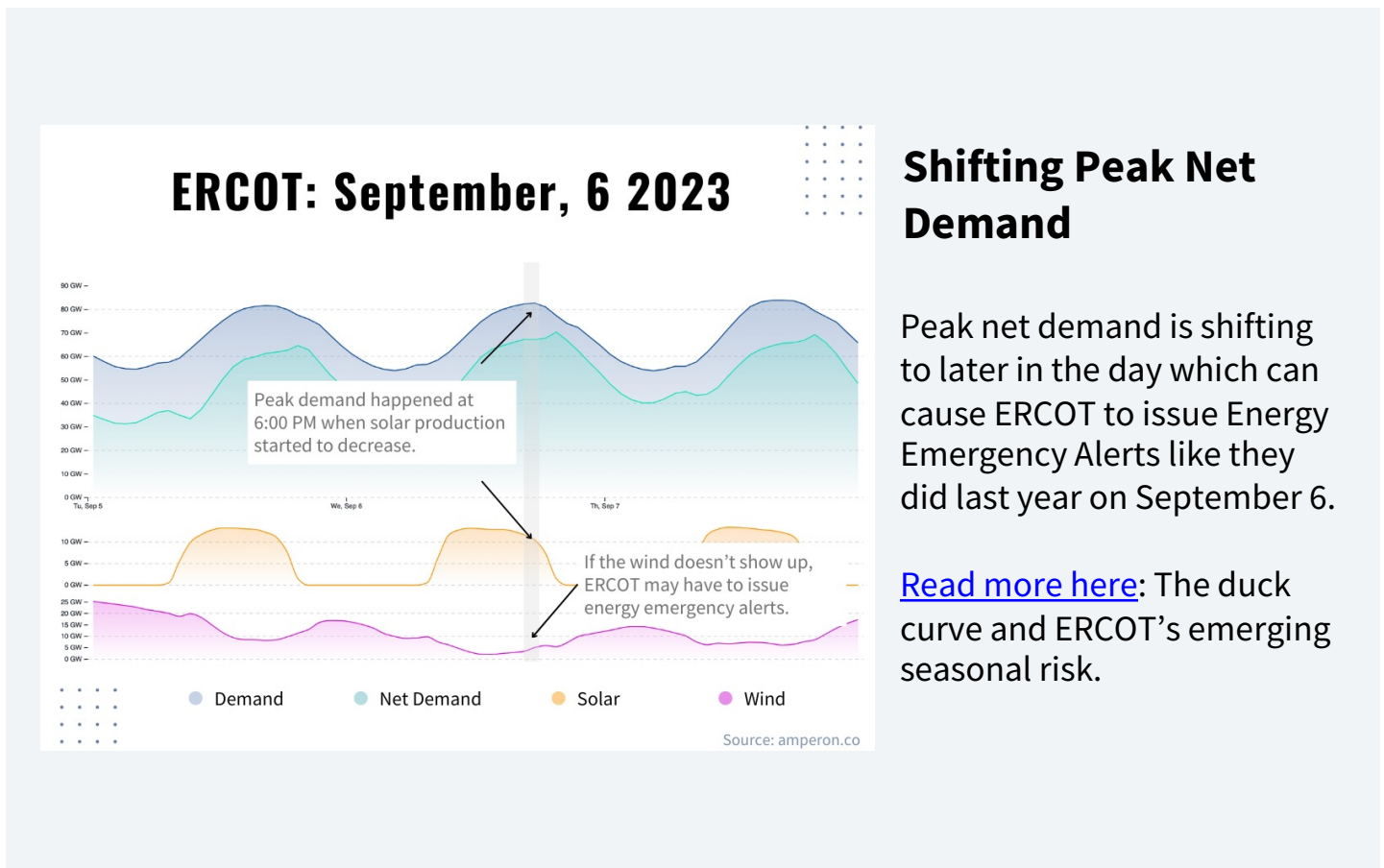
According to the monthly CAISO Key Statistics, as of [April 1st](#), the CAISO grid features an impressive 19 GW of solar generation, showing a growth of approximately 2.4 GW [in the past year](#). Additionally, there is approximately 7.6 GW of battery storage currently operational on the grid, which is 3.1 GW more than this time last year! One can only imagine the leaps in capacity we'll see by next summer in this rapidly changing environment.

The outlook for CAISO hydro generation appears to be promising for early summer, with reservoir levels consistently above the [historical average](#), according to the California Department of Water Resources. Although the [current snowpack](#) in California is slightly below average for this time of year, late season snowstorms helped increase the snowpack in the Sierra Nevadas. The timing of the first heat wave will play a crucial role in the snowmelt dynamics. Prolonged warm temperatures throughout California and the West Coast early in the summer season could accelerate snowmelt, potentially leading to reduced snowpack levels and weaker hydro generation for the rest of the summer.

ERCOT

Texas is bracing for yet another record-breaking hot summer. Last year, cities across the region endured consecutive days of temperatures exceeding at least 100 degrees from June through August. Similar conditions are expected this year too, due to warm temperatures and heightened humidity from elevated sea surface temperatures. Heat waves and rapidly intensifying hurricanes loom as significant threats for ERCOT this summer. As mentioned earlier, heat-related generation outages become problematic during prolonged periods of extreme heat.

This year, ERCOT is projected to add [6.4 GW](#) of battery storage to the grid, which will be crucial for alleviating grid stress. However, ensuring a reliable power supply in ERCOT during the summer is a collective effort. Wind, solar, and other forms of generation must contribute, otherwise we see the [effects of grid stress](#). Intermittent renewables during critical periods such as solar ramps lead to strong price spikes around dusk due to sporadic high net loads. This additional storage will help alleviate congestion in heavily-congested areas caused by possible renewable surpluses, and will address grid strain during evening peaks this summer.

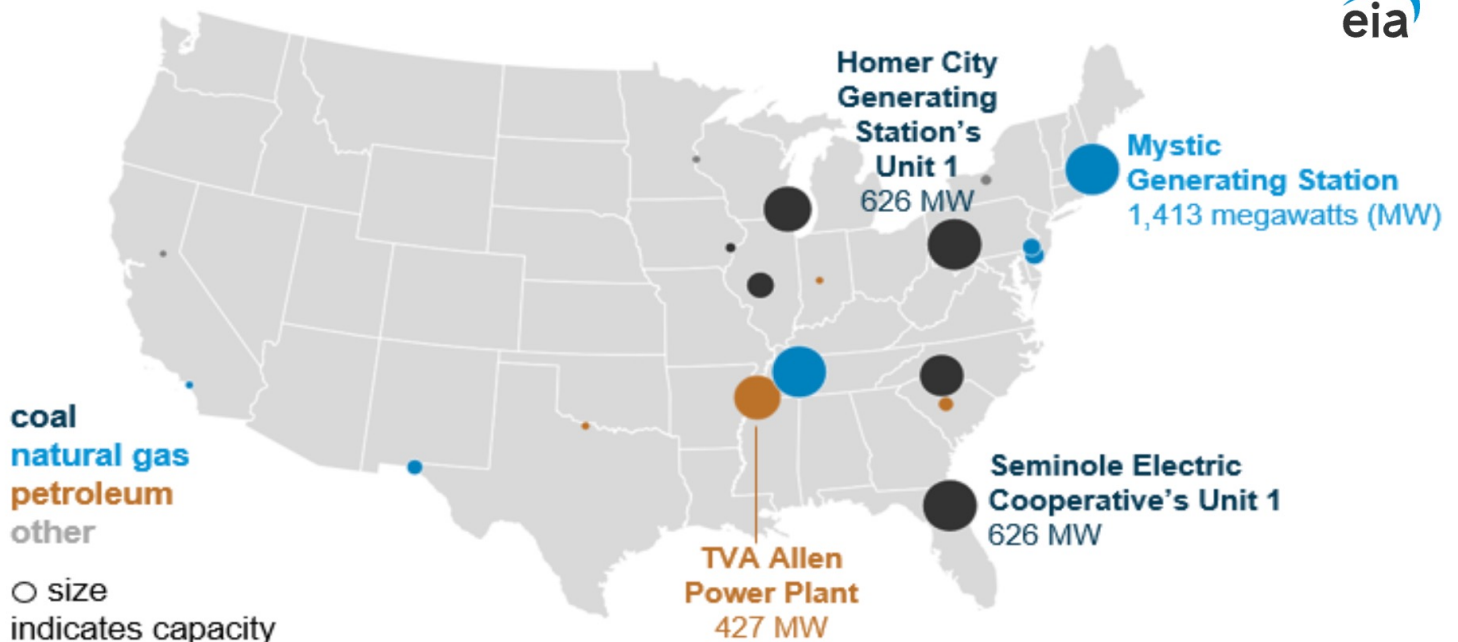


NYISO & ISONE

The heat will continue for the Northeast US, which may seem like a relief after half a year of chilly winter months. Renewable additions to these regions continue to grow, and NYISO recently set a new renewable generation [record](#) for this spring. So far this year, five Vineyard Wind turbines have been installed, with a total installed capacity of approximately 68 MW of electricity — enough to power [30,000](#) Massachusetts homes. This ongoing project is slated to include 62 turbines with a combined capacity of 806 MW, which can power 400,000 homes and businesses statewide. Additionally, Sunrise Wind and Empire Wind projects are on track to advance further and begin integrating within the Northeast RTOs in the coming years.

In contrast, the retirement of the Mystic Combined Cycle Power Plant, totaling 1,403 MW, is underway in the Boston area. The plant's final unit is set to shut down in [June 2024](#), marking the end of an era for one of the oldest power plants in the country.

Planned 2024 U.S. utility-scale electric generator retirements



Data source: U.S. Energy Information Administration, *Preliminary Monthly Electric Generator Inventory*, December 2023

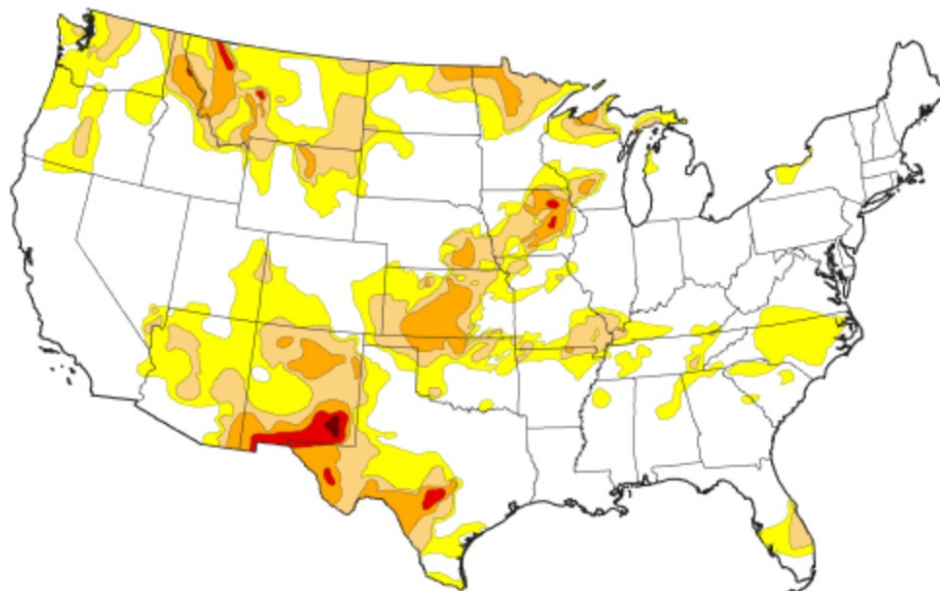
Note: MW=megawatts.

MISO & SPP

In the Midwest and Central US, the weather outlook for this summer echoes a familiar theme: heat waves. Much of the northern MISO region ranges from abnormally dry to extreme drought in places like Iowa, according to the [US Drought Monitor](#). Looking ahead to the summer precipitation outlook, there is no expectation of a surplus of rain in this region. A similar pattern is mirrored in the SPP territory.

Extreme heat waves not only dry up soil moisture, posing a threat to crops, but also escalate cooling demand significantly. This combination can heighten vulnerability to wildfires during the summer months. Whether triggered by human activity or an outlier event like a lightning strike, this risk of wildfires will continue to rise as precipitation remains scarce and temperatures soar. As mentioned previously, the looming threat of wildfires presents a serious risk to the grid. The potential for transmission and generation outages can have significant impacts, potentially disrupting power supply for the regions affected.

Considering the surplus of wind energy in these regions and the ongoing retirement of coal plants, such as the expected retirement of Oak Creek Power Plant Units 5 & 6 in May 2024, any transmission outage on a high-demand day could cause chaos.



U.S. Drought Monitor Categories



Source(s): NDMC, NOAA, USDA
Updates Weekly: 04/30/24

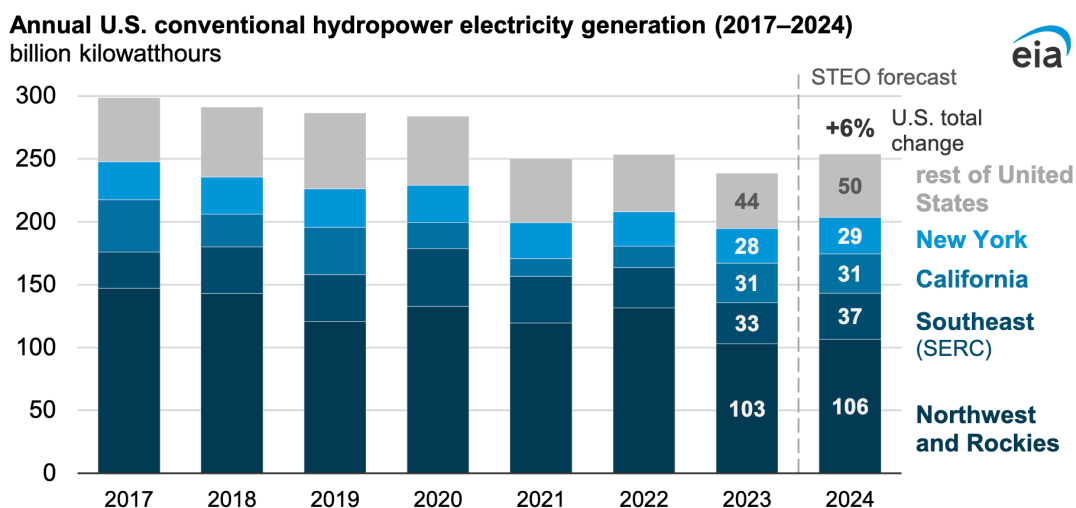
Drought.gov

SERC

Heads up to SERC, and any other coastal RTOs: Get ready for hurricane season! Forecasts indicate a busy season ahead. Last time we saw a La Niña summer in 2020, we had to resort to the Greek alphabet for additional storm names. Colorado State University's 2024 forecast predicts [23 named storms](#) (with Dr. Shipham foreseeing this could go as high as 30), including at least 5 major hurricanes, ranging from Category 3 to Category 5. With La Niña conditions unfolding for this summer, there is less vertical wind shear in the atmosphere, allowing the warm waters of the Atlantic and Gulf of Mexico to fuel these storms to their maximum potential. These powerful storms often lead to power outages, damage to generation units, and strain on the power grid. Generation outages create a tighter supply stack to cover the necessary demand, which results in high energy prices.

It's worth noting that no coastal region can be overlooked nowadays. Hurricane Lee in 2023 was a little too close for comfort in the Northeast, and ERCOT is particularly vulnerable being located on the Gulf of Mexico.

On a different note, Southeast hydropower is expected to increase approximately [13%](#) this year when compared to 2023. This increase will be beneficial during evening peak hours, when solar generation decreases and demand rises. Additionally, as of last week, Vogtle Nuclear Power Plant Unit 4 has officially begun commercial operations. With Unit 3 already a part of the generation stack, this marks the first time both units are operational, making it the largest nuclear power plant in the United States. Each new unit has a capacity of 1,114 MW, bringing the total plant capacity to nearly [5 GW](#). It's worth noting that this is carbon-free energy, making a significant contribution to Georgia's emissions reduction efforts.



Data source: U.S. Energy Information Administration, *Short-Term Energy Outlook* (STEO), April 2024
Data values: U.S. Regional Electricity Generation, Electric Power Sector

How to Prepare for Summer

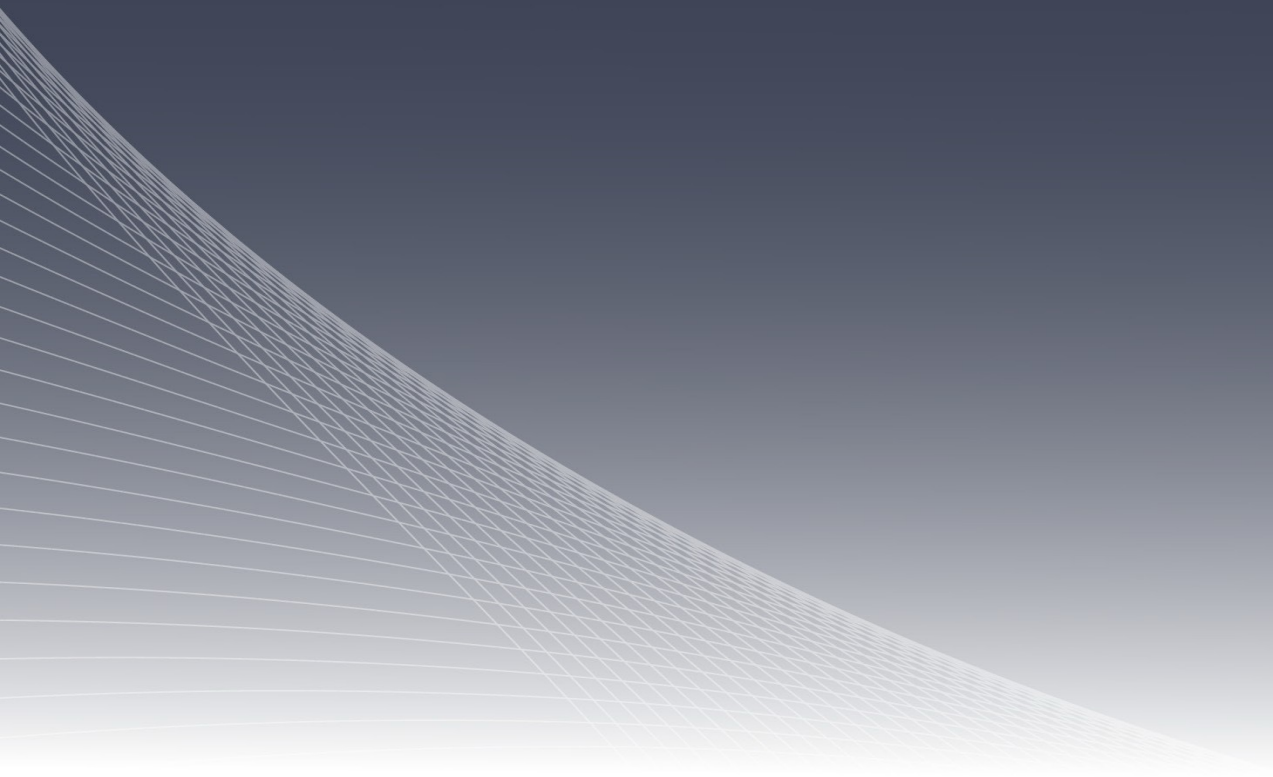
If you have made it this far, you have just been handed the "Manuscript" for this upcoming "Cruel Summer." Another scorching summer is on the horizon, with the added challenge of increased hurricane activity. Stay ahead of these extreme events by subscribing to Amperon's energy forecasts, which now include Amperon's newest and most accurate [ensemble forecast](#). This innovative forecast blends forecasts from each weather vendor, resulting in the most precise demand forecast available on our platform.

To help you navigate this volatile summer season, Amperon provides:

- Short-term, 15-day demand and renewable generation forecasts run every hour to mitigate operational risk
- Long-term demand forecasts and scenario testing to allow clients to plan for infrastructure and growth up to five years out
- Daily weather analysis from our Ph.D. in-house meteorologist
- Coincident Peak Alerts for CP events in your region

Additionally, explore our [Advanced Weather Package](#), which can stress-test demand forecasts up to 2 weeks (or a "Fortnight") in advance. With temperature offsets up to 15 degrees F, this upgrade ensures that you are fully prepared for extreme heat.

To learn more about the benefits of Amperon's forecasting service, visit [Amperon.co](https://amperon.co) or contact sales@amperon.co.



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