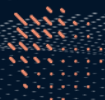


● REPORT · SUMMER 2026

Heatwaves Are Straining Every Form of Power Generation

The hourly evidence from five European power markets, summer 2026.



EnergyTag

Temperature: Open-Meteo · Price: Ember · Clean power
share: Electricity Maps · Coverage 1 June – 27 August 2026

One hot summer, five power markets

In June 2026, France, Spain, and the UK all recorded their hottest temperatures for the month within the same week.¹ Power plants across Europe cut output and wholesale prices spiked: EDF cut French nuclear generation as rivers warmed, five major UK gas plants struggled to cool past 36°C, and Spain's air-conditioned "tropical nights" kept prices elevated long after sunset.¹

Gas markets were strained, pushed up separately by disruption in the Strait of Hormuz. This analysis documents what happened in 2026 and why, market by market, using real generation, price, and temperature data.

It's descriptive, not multi-year proof; confirming the pattern holds beyond one hot summer will take a few more years of data.



Figure 1. The five markets analysed, chosen for contrasting generation mixes.
Geometry: Natural Earth.

Demand rose as supply was strained

Cooling demand rose almost 20% in France's June heatwave. RTE, the French grid operator, estimates each extra degree adds a gigawatt of consumption, mostly air conditioning.¹¹⁰ Italy and Spain also recorded noticeable increases, although the scale varied between countries.

Solar was the exception — UK output rose 46% in a week, and it pairs well with storage to cover the evening gap.³ Spain, the most diversified grid in this report, also had the smallest heatwave price premium: a sign that diversity and flexibility, not any single technology, get a market through a heatwave without a price spike.

Heatwaves are becoming more frequent.

That raises the stakes for building diversity in now, not later.

WHERE THE HEAT HIT SUPPLY



Nuclear

French reactors cut output under river-cooling limits.¹²



Wind

UK wind stalled under the same high-pressure systems.²



Gas

Turbines lost up to 13% of capacity and 7% of efficiency at 40°C.²



Transmission

Lines lost up to 16% of capacity per 10°C rise.^{2,4}



Solar rose instead. UK output was up 46% over four heatwave days in June.³

How to read this report

Heatwave threshold Each country's own meteorological standard, typically three or more consecutive days above a set temperature. Country-specific thresholds appear on each market page.

Clean power share The share of carbon-free generation running in a given hour. Source: Electricity Maps.

Price The day-ahead wholesale price, set a day in advance for each hour of electricity. Source: Ember.

Temperature Daily maximum for a representative city, compared against the 1991–2020 average for the same calendar date. Source: Open-Meteo.

Coverage 1 June to 27 August 2026, unless stated otherwise.

— ON CAUSATION

These heatmaps track a single summer. They show what happened, but they are not a causal study. Gas prices, wind conditions, and solar output all fluctuate alongside heatwaves, so isolating the effect of heat alone is difficult.¹²

We are not pointing to price rises as proof that heat caused them — gas remains the dominant factor. Proving a direct link across markets would take years of comparable data, not one summer.

For now, these are observations from 2026. We intend to build on them in subsequent years.

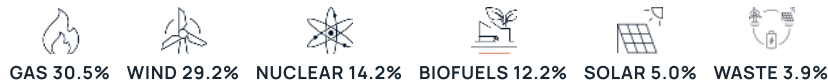
PART ONE

Five Markets

United Kingdom · France · Spain · Italy · Norway

United Kingdom

The evening squeeze



WHAT HAPPENED

Five heatwaves pushed London well above the 1991–2020 normal, peaking around 36°C. Evening price spikes around 18:00–21:00 cluster inside the heatwave windows, while midday stays comparatively cheap thanks to solar. Clean power share dips during the same hot spells.²

MECHANISM

UK heatwaves are anticyclonic — hot, still, and low-wind — so wind generation drops sharply. In June 2026, wind generation fell to around 15% of the electricity mix, from an average of about 30%.¹¹ Cooling demand climbs into the evening just as solar fades, so gas sets a high marginal price at exactly that overlap. Gas turbine efficiency also falls in the heat, adding a second, smaller push the same way.

**~2x
more**

UK solar over four heatwave days in June generated 46% more than the week before.³

£1,379

Per megawatt-hour paid by NESO to import power on one low-wind June evening — about 15 times a typical day-ahead price.¹

FIGURE 2 · TEMPERATURE, DAY-AHEAD PRICE, CLEAN POWER SHARE

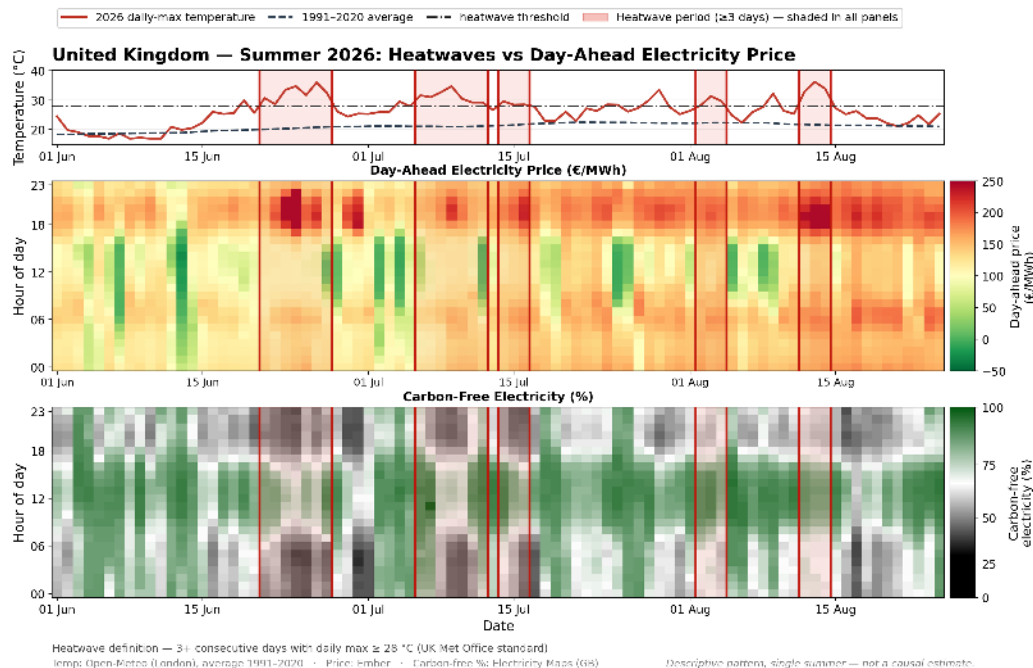


Figure 2. Evening price spikes cluster inside heatwave windows while clean power share dips. Temp: Open-Meteo (London), normal 1991–2020 · Price: Ember · Clean power share: Electricity Maps (GB).



NUCLEAR 66.8%



HYDRO 13.6%



WIND 8.3%



GAS 3.1%

WHAT HAPPENED

France saw sustained, very hot conditions, peaking near 40°C. The normally cheap, green summer flips to red evenings specifically inside the heatwave windows — but clean power share stays high throughout, around 95%.

MECHANISM

Nuclear is the key player. Reactors on the Rhône and Garonne must cut output once river water gets too warm and discharge limits bind, removing cheap baseload exactly when heat lifts cooling demand.¹² Because clean power share stays high even as prices spike, the fingerprint here is a low-carbon supply squeeze — distinct from the wind-driven squeeze in the UK.

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Reactors affected on 12 July alone: three shut down, eight curtailed.⁵

0.6%

Average annual French nuclear output lost to heatwaves, 2003–2022. Cooling-tower upgrades have cut heat-related losses by roughly 90% since.²

FIGURE 3 · TEMPERATURE, DAY-AHEAD PRICE, CLEAN POWER SHARE



Figure 3. Prices spike in the evenings inside heatwave windows while clean power share holds near 95%. Temp: Open-Meteo (Paris), normal 1991–2020 · Price: Ember · Clean power share: Electricity Maps (FR).



WHAT HAPPENED

Spain saw persistent heat through the summer, peaking near 39°C. Midday stays deep green — cheap and solar-covered — but both the evening and, notably, the overnight hours turn red during heatwaves.

MECHANISM

Air conditioning demand is key. High penetration combined with "tropical nights" — where temperatures never drop enough for cooling load to ease — extends the price premium well past sunset rather than fading with the evening peak. Solar covers midday comfortably, but the drop-off into evening creates a steep ramp that gas has to meet, and that elevated demand persists overnight.

~7%

Average price premium on heatwave days — the smallest of any market here, and a sign of how far solar and storage have already built in resilience.⁶

FIGURE 4 · TEMPERATURE, DAY-AHEAD PRICE, CLEAN POWER SHARE

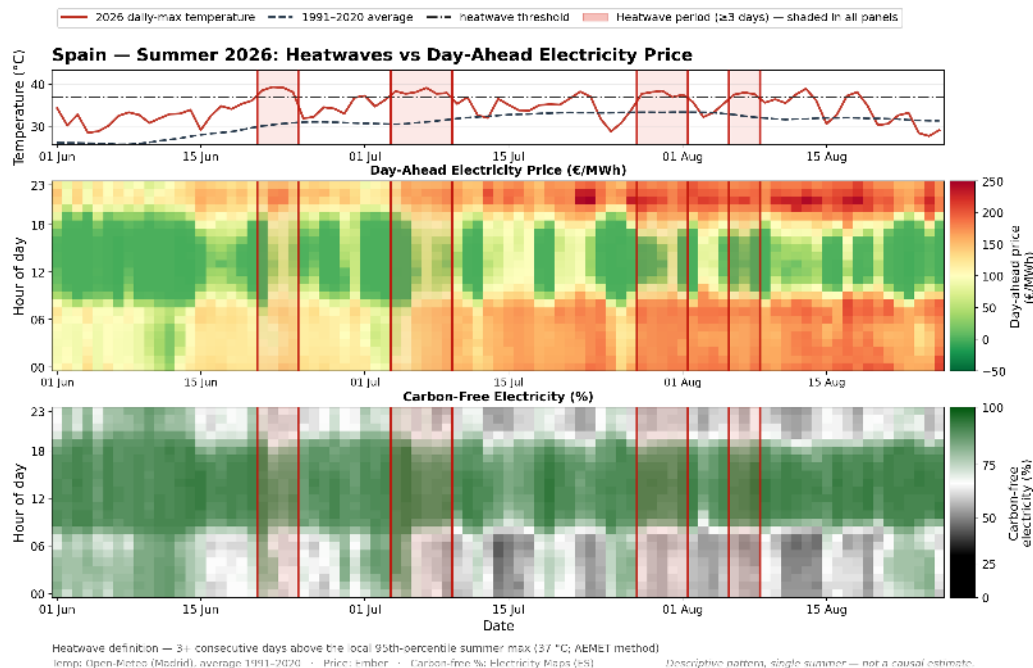


Figure 4. Midday stays cheap under solar while the premium extends into the overnight hours. Temp: Open-Meteo (Madrid), normal 1991-2020 · Price: Ember · Clean power share: Electricity Maps (ES).

Italy

Expensive before the heat



WHAT HAPPENED

Italy saw hot conditions, peaking near 39°C, across the most heatwave days of any market in this report. Prices are already elevated most of the summer, and heatwaves add a comparatively modest evening lift on top of that high baseline.

MECHANISM

Because gas so often sets the marginal price already, there is less headroom for heat to widen the peak the way it does in cheaper markets. Air conditioning demand and gas turbine efficiency loss both nudge the evening higher, and clean power share dips as solar cannot stretch to cover the extra load. The effect is real, just smaller in relative terms.⁷

~13%

Heatwave price premium — nearly double Spain's despite similar solar exposure. A gap storage and flexibility have real room to close.⁸

Po river

Low water pressured thermal plant cooling in the northeast⁷

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Cities monitored by Italy's health ministry hit maximum heat alert simultaneously on 4 August — the first time on record.⁸

FIGURE 5 · TEMPERATURE, DAY-AHEAD PRICE, CLEAN POWER SHARE

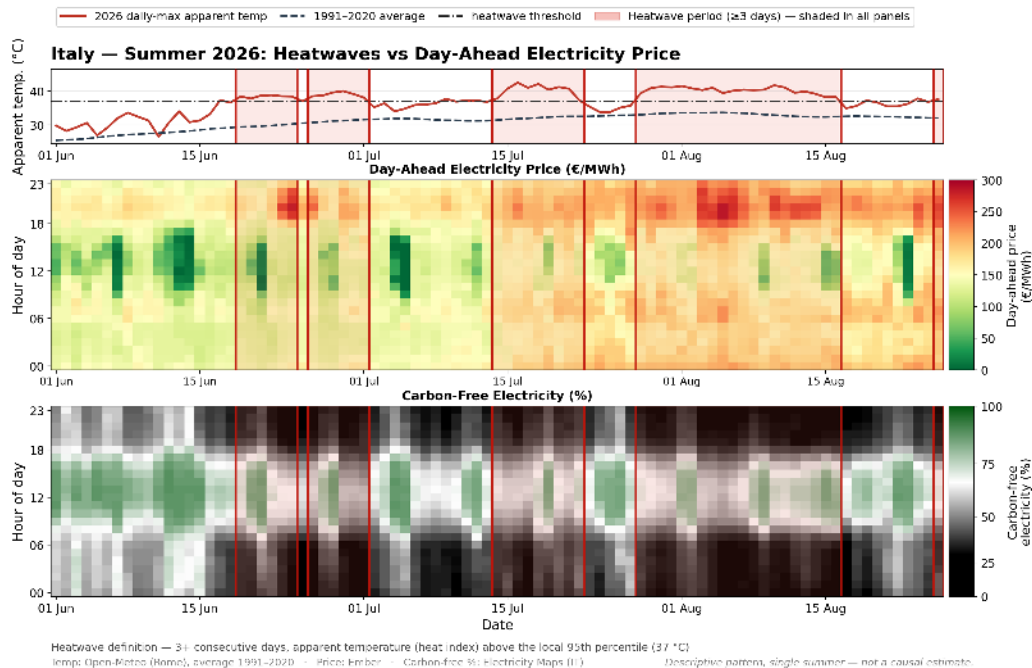


Figure 5. Prices sit high all summer, so the heatwave lift is smaller in relative terms. Temp: Open-Meteo (Rome), normal 1991-2020 · Price: Ember · Clean power share: Electricity Maps (IT).



WHAT HAPPENED

Norway saw only mild heat in 2026, peaking around 31°C, and just one brief heatwave window. Clean power share sat at 98–99% almost the entire summer. A slower story was unfolding in parallel, though: months of low precipitation had already pushed reservoirs toward record lows earlier in the year, a trend that continued through the summer and matters far more for autumn and winter prices than any single hot day in this report's window.¹²

MECHANISM

Norway's grid is close to fully hydro — dispatchable, not heat-stressed, and barely touched by cooling demand. This is the key difference from the other markets: Norwegian prices don't track heatwaves day to day at all. Sustained low precipitation does impact prices, though. Dry weather and low snowfall erode reservoir levels gradually over months, and the effect becomes visible in prices once stocks run genuinely low — typically toward the end of summer and into the following winter.¹²

FIGURE 6 · TEMPERATURE, DAY-AHEAD PRICE, CLEAN POWER SHARE

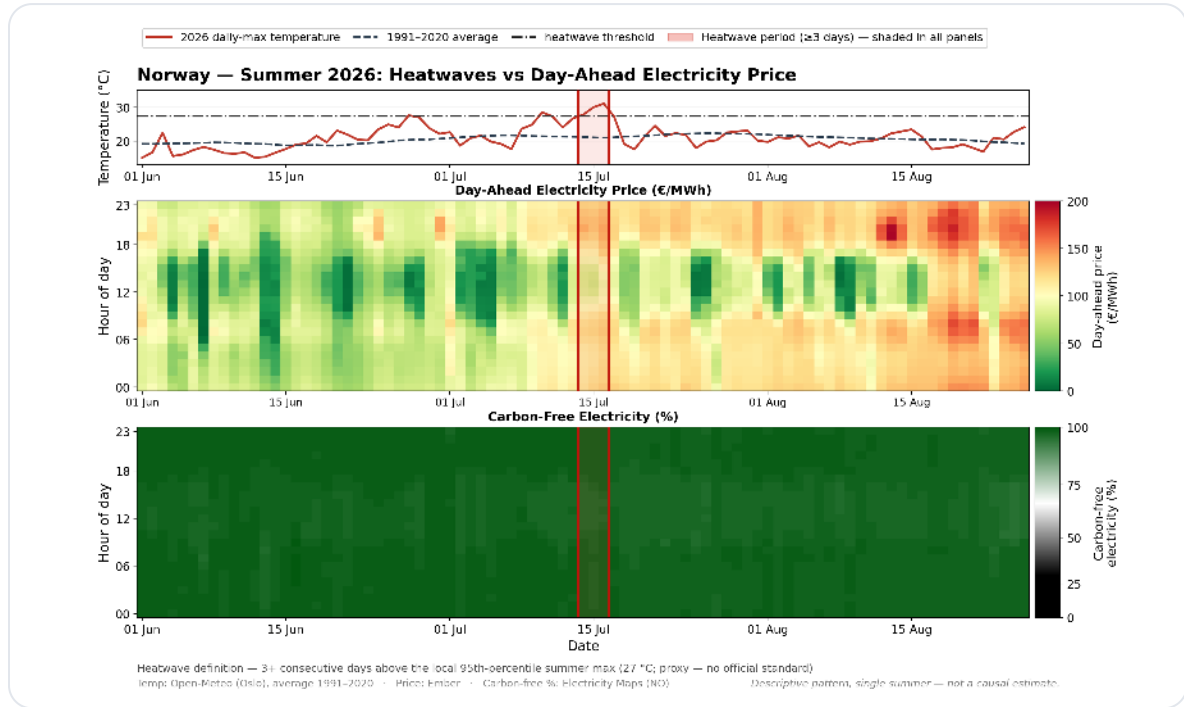


Figure 6. No heatwave signature: clean power share holds at 98–99% and price movement tracks reservoirs. Temp: Open-Metco (Oslo), normal 1991–2020 · Price: Ember · Clean power share: Electricity Maps (NO).

Diversity and flexibility build resilience

Heat stressed a different part of each grid this summer — nuclear in France, wind in the UK, reservoirs in Norway. No two markets failed the same way, which is the point: a varied, storage-backed supply hedges against whichever pressure shows up.



Spain, the most diversified grid in this report, had the smallest heatwave price premium (~7%).⁶



Solar rose almost everywhere — UK output was up 46% in a week.³ Storage is “the missing piece,” per Andreas Jahn of the Regulatory Assistance Project — batteries can shift that surplus into the evening gap.¹



Imports get expensive fast: NESO paid roughly 15 times a typical price importing power on one low-wind evening in June.¹



Heatwave hours with the highest prices tend to show the lowest clean power share — exactly where storage and flexibility add the most value.

Heatwaves aren't going away.

Storage, interconnection, demand flexibility, and dynamic tariffs need to be standard in grid planning, not optional extras. The technology to manage this already exists: a grid built on sufficient storage can ride out a heatwave's worst hours, and those hours are consistently the evening, when air conditioning demand peaks just as solar drops away — exactly where flexibility, not more generation, is the fix.

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3. Renewable Energy Magazine, reporting on UK solar generation during the June 2026 heatwave, June 2026.
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12. Bloomberg, Norwegian Hydro Stocks Hit Record Low, Raising Power Price Risks, 2 September 2026. [bloomberg.com/news/articles/2026-09-02/norwegian-hydro-stocks-hit-record-low-raising-power-price-risks](https://www.bloomberg.com/news/articles/2026-09-02/norwegian-hydro-stocks-hit-record-low-raising-power-price-risks)

CHART DATA SOURCES

Open-Meteo Historical Weather API — temperature · Ember country data downloads — wholesale price · Electricity Maps API — carbon-free share · ENTSO-E Transparency Platform — hourly generation by fuel · NESO Data Portal — UK demand, generation, and import prices.

ON MARKET-MIX FIGURES

Generation shares are the International Energy Agency's 2024 electricity generation sources for each country, shown to one decimal place; shares below 3% are omitted from the header, so the listed figures do not sum to 100%. Country price-axis scales are fitted per market, so the five charts are not directly comparable side by side.