

European weather, gas demand and electricity prices

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Mike Parr, whose comments many readers here will recognise, is one-third of an email discussion group I also belong to; the third member uses the pseudonym Colonel Smithers on this blog.

This blog post grew out of discussion there on European weather conditions and energy pricing that Miulke has been doing.

This post is Mike's work. I added some editing.

This article examines how this winter's weather could affect Europe's gas supplies and electricity prices. It considers the outlook for a mild winter, explains why a developing disturbance above the Arctic could nevertheless produce a prolonged cold spell, and explores what that could mean for energy demand and household costs.

The central point is that a relatively mild winter overall can still contain two or three exceptionally cold weeks. If those weeks coincide with low wind generation, Europe could need substantially more gas for both heating and electricity production, putting pressure on gas stocks and prices.

What is happening above the Arctic?

The most likely outcome for Europe remains a relatively mild winter. However, forecasts suggest that the polar vortex, a large circulation of very cold air high above the Arctic, could weaken sharply in early November. This does not mean that a severe winter is coming, but it deserves attention because such disturbances can sometimes lead to prolonged European cold spells.

In winter, powerful winds normally blow around the polar vortex from west to east. When this circulation is strong and stable, it helps keep cold Arctic air concentrated in the far north.

Sometimes, large atmospheric waves rise from below and disturb the vortex, stretching it or pushing it away from the pole. A sufficiently strong disturbance can cause the surrounding winds to slow dramatically or even reverse. This is known as a sudden stratospheric warming, or SSW.

These disturbances can sometimes affect weather patterns much closer to the ground. They may encourage persistent areas of high pressure over Greenland or Scandinavia, known as “blocking”. These can obstruct the Atlantic winds that normally bring relatively mild air into Europe, allowing cold Arctic or continental air to move in and remain for days or weeks.

During the past few days, forecasts from the European Centre for Medium-Range Weather Forecasts, or ECMWF, have increasingly suggested a major disturbance of the polar vortex in early November.

The high-altitude winds are currently blowing from the west at around 22 metres per second. However, a growing proportion of forecasts suggest that they could weaken sharply during the first part of November.

Around 60% of the conventional ECMWF ensemble forecasts, which test a range of possible developments, now predict a wind reversal by about 9 November. That proportion has risen sharply in successive forecasts. The main ECMWF forecast also predicts a reversal around 5 November.

The apparent cause is unusually strong atmospheric-wave activity pushing energy upwards and deforming the vortex. This is a significant development, but it is not yet a forecast of severe European cold.

For that to happen, the disturbance must influence the lower atmosphere, alter the Atlantic jet stream and encourage persistent blocking in a position that brings cold air into Europe. At present, the evidence mainly concerns the first step in that sequence.

Seasonal forecasts still favour a relatively mild European winter overall, particularly in its early stages. The exceptionally strong 2026–27 El Niño, a Pacific weather phenomenon with global effects, supports that central expectation.

Nevertheless, a mild November and December could be followed by several very cold weeks in January or February. The risk to watch is therefore a persistent cold spell lasting roughly seven to 21 days, rather than simply whether the winter finishes warmer or colder than average.

Why this matters for gas and electricity

Europe enters the winter with gas storage below normal levels and gas prices already high. EU storage is around 75% full, German storage around 60%, and Dutch stocks around the mid-60s. Dutch TTF gas futures are approximately €95 per megawatt-hour.

A mild start to winter would help preserve those stocks. The greater concern would be a prolonged cold spell in January or February, after storage had already been drawn down.

Cold weather increases demand for gas heating. But the high-pressure systems associated with winter cold spells can also bring very little wind, reducing electricity generation from wind turbines.

That creates pressure from two directions. More gas is needed to heat buildings at the same time that gas-fired power stations may be needed to replace lost wind generation. Electricity demand can also rise as temperatures fall.

Recent electricity prices illustrate how sharply costs can change when renewable output and demand shift. On Sunday 25 October, when renewable generation was high and demand was relatively low, average day-ahead wholesale prices were approximately €13 per megawatt-hour in Germany and €23 in Benelux. The following day, those prices were around €117 and €142 respectively.

Spain showed a similarly striking pattern within the day. Prices fell to around zero during daylight hours with high renewable output, then rose to €200–300 per megawatt-hour at night.

These examples illustrate two very different pricing conditions. When renewable generation is plentiful, wholesale electricity prices can fall towards zero. When renewable output falls and gas-fired generation is needed to meet demand, the price charged by those generators can determine the wider market price.

With January 2027 gas futures close to €100 per megawatt-hour, electricity prices above €200 per megawatt-hour are therefore a risk during periods of low renewable output.

What should we watch next?

The central expectation remains a relatively mild start to winter. What has changed is that forecasts now suggest a significant disturbance of the polar vortex, creating a possible route towards a later cold spell.

The next question is whether the predicted weakening actually occurs. If it does, attention will turn to whether its effects reach the lower atmosphere and encourage persistent blocking over Greenland or Scandinavia.

If that brings prolonged cold to Europe, particularly alongside low wind generation, the consequences could be uncomfortable: rising heating demand, greater reliance on gas-fired electricity, falling gas stocks and sharply higher electricity prices.

That outcome is not inevitable. But the first step in the sequence is now sufficiently

unusual to deserve close attention.