

EUROPE'S GREAT COAL COLLAPSE OF 2019

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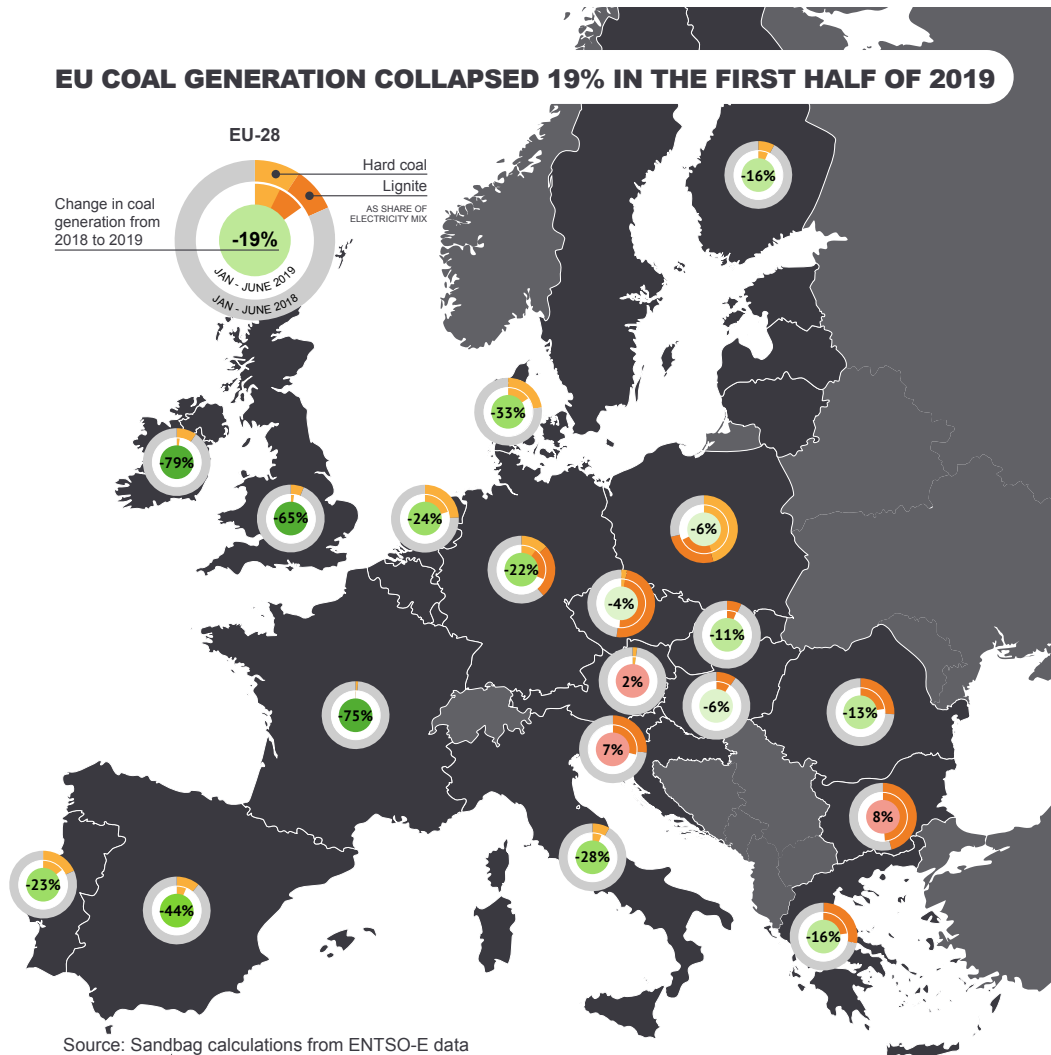
Every January since 2015, Sandbag has published an update on "[Europe's Power Transition](#)", and for the first time, we provide a 6-month mini-review to help explain the extent and reasoning of the huge fall in Europe's coal generation in 2019. To do this, Sandbag curated 20 gigabytes of power operator data from ENTSO-E, and then condensed the most important data to a handy 2MB excel to download from our website so you can also analyse it yourself - please let us know what you find.

Coal generation in the EU collapsed by 19% in the first half of this year, with falls in almost every coal-burning country. Half of coal's fall was replaced by wind and solar, and half was replaced by switching to fossil gas. If this continues for the rest of the year it will reduce CO2 emissions by 65 million tonnes compared to last year, and reduce EU's GHG by 1.5%. Coal generation already had fallen 30% from 2012 to 2018. Even if these falls continued in 2019, coal generation is still likely to account for 12% of the EU's 2019 greenhouse gas emissions.

Dave Jones, Electricity Analyst at Sandbag, commented:

"2019 may mark the beginning of the end for coal power in Europe. The biggest falls are by those countries encouraging wind and solar and planning for a coal phase-out. Now that carbon pricing is finally working with price approaching €30 per tonne, the economics have already shifted not only from coal to gas generation, but also from coal to clean generation. And now the economics have changed, policy-makers will now find it much easier to support wind and solar, and to plan for a full transition from coal to clean. Every country could achieve a 2030 coal phaseout, if they put their mind to it."

Where did coal collapse?



All western European countries saw big percentage falls, from 22% in Germany to 79% in Ireland. There were times of zero or near-zero coal generation in many western European countries: coal was less than 2% of the electricity mix in Ireland, France and the UK, and only 6% in Spain and Italy, in the first half of 2019. The UK had two weeks in May with all its coal plants switched off for the first time since the Industrial Revolution began. Europe's coal phase-out is truly underway, although the rate of closures is quite slow.

Germany saw by far the biggest coal fall in absolute terms. German coal generation fell by 22%, with both hard coal and lignite falling substantially. Incredibly, Germany was still responsible for 35% of the EU's coal generation in the first half of this year. Over two-thirds of the lignite fall came from RWE's Neurath and Niederaussem plants which are supplied by RWE's troubled Hambach and Garzweiler mines. Generation fell at 32 out of Germany's 35 lignite units, as they no longer generate 24/7.

The falls in eastern European countries were much smaller due to near-zero deployment of wind and solar. Only 5% of wind and solar installed in 2018 was in eastern Europe. The lignite-burning countries did particularly badly: out of 17,000MW installed across Europe last year, Poland installed just 39MW, Czechia 26MW, Romania 5MW and Bulgaria 3MW. Coal fell 6% in Poland as a new gas plant at Plock came online and 16% in Greece as gas generation picked up; in Slovenia and Bulgaria, coal generation even rose slightly.

Why did coal collapse?

There were three primary drivers:

1. **Wind and solar replaced coal**
2. **Fossil gas replaced coal as carbon pricing begins to work**
3. **Coal plant closures**

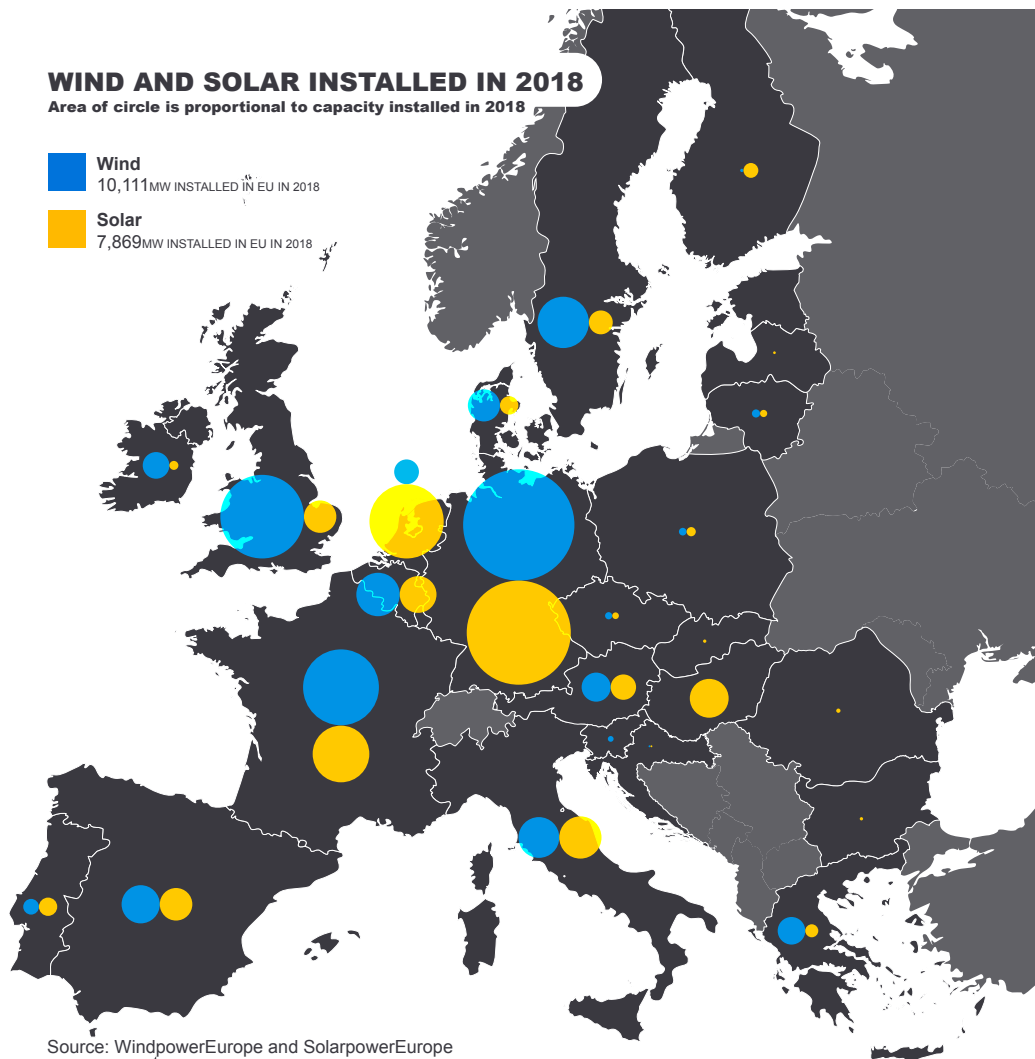
Half of coal's fall was replaced by wind and solar, and half was replaced by switching to gas. In the EU, coal fell by around 50TWh, compared to a rise of 30TWh in wind and solar generation and a rise of 30TWh in gas generation. The remaining 10TWh covered a small structural increase in electricity consumption. It's impossible to show this split: for example, the coal-gas switching in Germany is much higher than it appears, because although German gas generation didn't rise too much, the electricity flows changed resulting in more gas generation in neighbouring Netherlands, France and Italy.

The weather didn't have a big overall impact on coal. Electricity demand fell by 20TWh, due to the much-milder February and March in 2019, when the "Beast from the East" swept through Europe in 2018. However, this was more-than-offset by 30TWh less hydro-electricity generation in France, Italy,

Spain and Portugal, meaning the remaining generation rose by 10TWh. By coincidence, 10TWh is also the underlying trend of electricity consumption rise in the last five years - equivalent to around 0.5% annualised growth. Hence the overall weather impact was around zero.

So let's examine the three drivers in more detail...

1. Wind and solar replaced coal



Half of Europe's fall in coal was due to increased wind and solar generation.

The rise in wind and solar of 32TWh in the first half of 2019 compared to 2018 was in line with expectations. It is slightly above average for this decade, which is no surprise as there were record wind installations, and a pick-up in solar installations. Of the 32TWh rise in wind and solar generation, four-fifths was wind and only one fifth was solar - solar continues to make a small contribution to falling coal generation, but is far off its potential. Biomass generation was unchanged in 2019, as policy correctly shifts away from biomass subsidies, so wind and solar are having to work harder to keep up the overall growth of renewables.

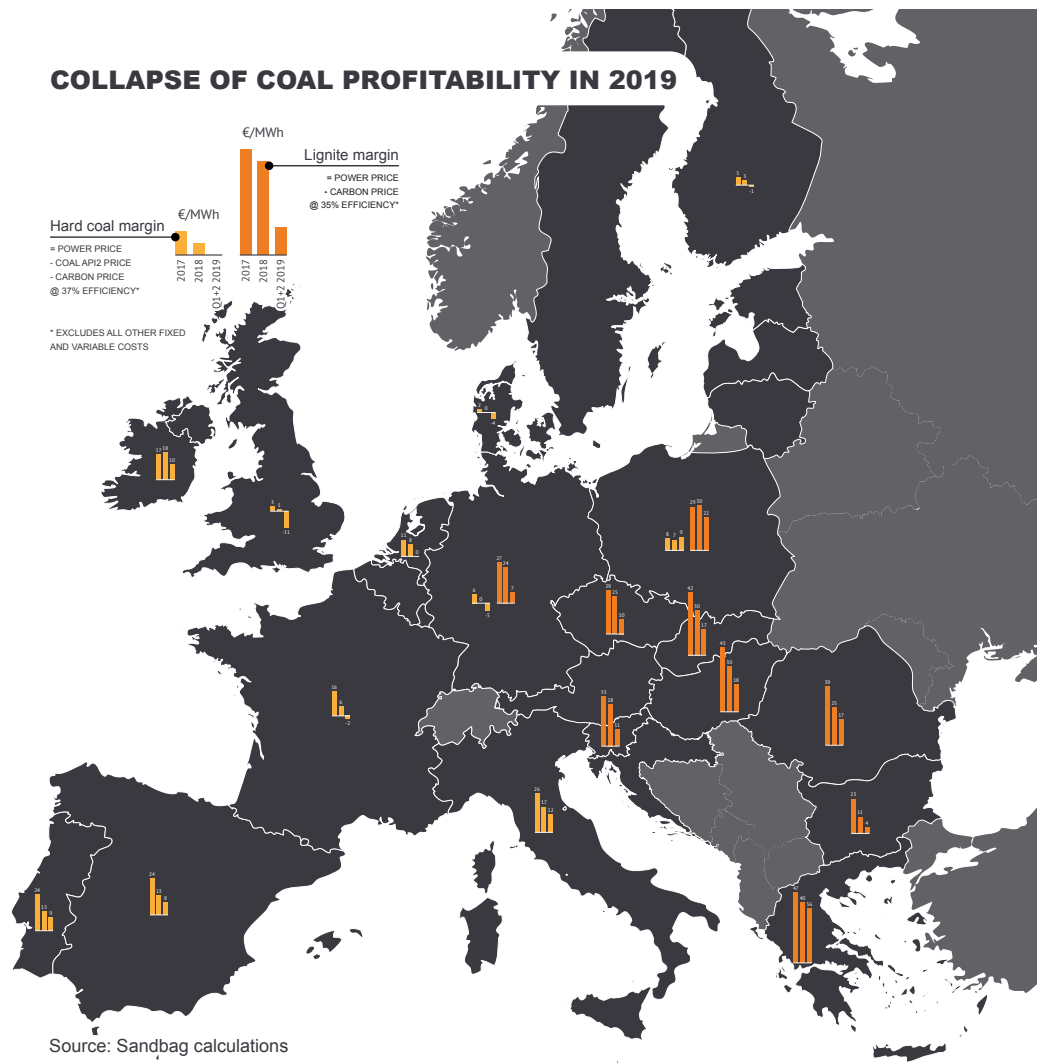
The countries that built the most wind and solar capacity saw the biggest fall in coal generation.

95% of the overall wind and solar installed in 2018 was in western countries, which is where the biggest falls in coal generation were. Germany saw the most wind and solar installed and the biggest absolute fall in coal generation - perhaps, quite rightly, as Germany generated 35% of all Europe's coal even in 2019.

The countries that built the least wind and solar capacity saw the smallest fall in coal generation.

Only 5% of wind and solar installed in 2018 was in eastern countries. The lignite-burning countries did particularly badly: out of 17,000MW installed across Europe last year, Poland installed just 39MW, Czechia 26MW, Romania 5MW and Bulgaria 3MW, and this is reflected in the much-smaller falls in coal generation. Indeed lignite generation in Czechia and Bulgaria actually increased slightly.

2. Fossil gas replaced coal as carbon pricing begins to work

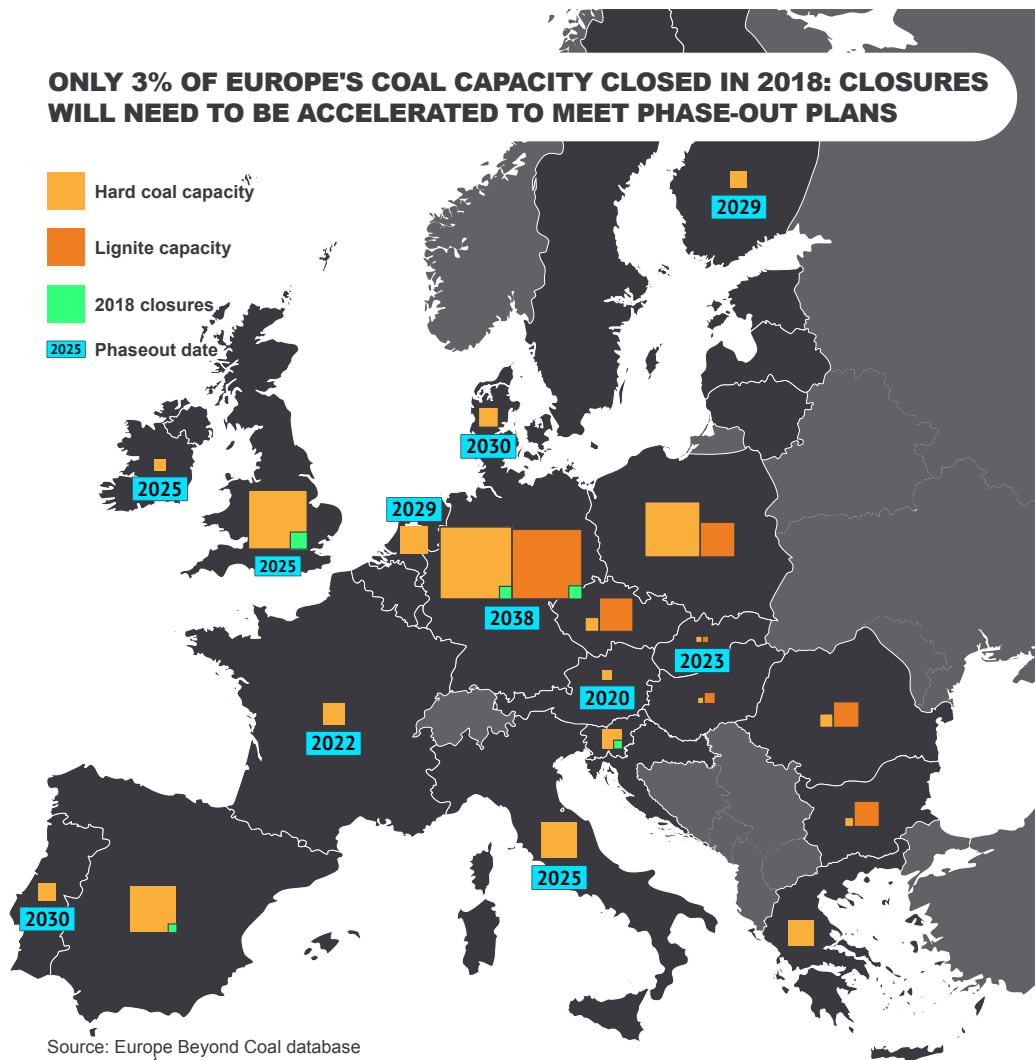


Half of Europe's fall in coal was due to a rise in fossil gas, as it replaced coal in the short-term - the EU's carbon price has started to work. It's not possible to isolate exactly what coal-gas switching was happening where, although the largest pick-ups in gas were in Germany, Spain, Italy and France where there were also big falls in coal. The UK was not impacted much by the higher EU carbon price, since the top-up UK carbon tax had already ensured there was full coal-gas switching happening. It is unlikely the coal-gas switch will lead to more gas plants being built; only one gas plant came online in the whole of Europe in 2018 - Plock, in Poland.

It is likely that coal-gas switching went from “zero” to “ full”. In 2018, a high gas price and low carbon price meant hard coal ran before gas, but the economics switched at the end of 2018, as gas price collapsed whilst carbon price rose, making gas run before hard coal in most countries for most of the hours in 2019. For lignite, for the first time there was evidence in Germany of switching to gas, which - unlike hard coal - could extend further if the carbon price rose more. Lignite switching outside Germany is very limited as those countries have little installed gas capacity.

Lignite plant profitability collapsed in 2019. The rise in carbon price has worsened the economics dramatically, as the “gross margins” show on the map. Additionally, lignite plants have large fixed costs to cover - not only are the lignite plants more expensive to maintain than hard coal plants, but their adjacent mines also have huge fixed costs. We estimate very few lignite plants - if any - will have covered all their fixed costs in the first half of 2019, perhaps for the first time ever. Therefore in the longer term the impact of carbon price may be even more consequential for lignite than for hard coal. Governments and investors now have to decide for how long they will continue to support these loss-making utilities.

3. Planning for a coal phase-out



Only 3% of coal plants closed in 2018, despite many countries planning to phase-out coal in the coming years. Most of these closures were limited to the UK and Germany, so the rate of closures elsewhere was near-zero.

The only **mandated** plants closed were German lignite units at Niederaussem and Jaenschwalde, which led to a large reduction of 4TWh of inefficient lignite generation.

The remaining plants broadly closed due to “poor economics”. Government policy plays a critical role in power plant economics. For example, all the following are likely to have played a role in the UK’s Eggborough’s plant closure in 2018:

- Knowing retrofit isn’t a viable option because of the UK’s 2025 coal phase-out date
- Reduced running due to more wind and solar
- A higher carbon price
- Tighter power plant emissions standards
- Lower capacity payments as new batteries outbid coal in the capacity mechanism

OUTLOOK: Unfortunately, 2019’s coal collapse is not the “new norm”, unless there is a strong policy push:

Coal-gas switching has most likely reached its peak. 2019 has likely already seen full coal-gas switching for hard coal, so the economics could only reverse back to more coal again. The biggest concern is that the carbon price is robust to the collapse in coal generation: 35% of EU ETS emissions were from coal power plants in 2018, so more ETS tweaks might be needed to keep carbon price from falling. Having said that, lignite-gas switching hasn’t reached its full potential yet in Germany, so a continued rising carbon price would result in a speedier lignite phase-out.

Wind and solar deployment is not fast enough in key lignite countries. The key lignite countries of Poland, Czechia, Romania, Bulgaria and Greece will not see falling generation unless they speed up wind and solar deployment. Additionally, as electricity consumption begins to rise from electric cars and other electrification, renewables will need to be deployed at double-speed in all countries, to ensure that coal falls at the same historical rate.

Coal plants need to close faster. Only 3% of coal plants closed in 2018. However, big progress is being made behind the scenes in many countries in

planning for a coal phase-out. All countries in western Europe have a date by which to phase-out coal, and this is needed also for eastern countries. But many other preparations are also needed:

- All stakeholders must work together with workers to ensure a just transition and a speedy transition. If compensation must be paid to close coal plants, it should recognise that these coal plants are unlikely to be profitable today, and likely to be even more-so tomorrow.
- Governments need to tilt the playing field away from coal, by tightening air pollution limits, embracing higher carbon pricing, and not subsidising coal through capacity payments. Unsustainable coal-to-biomass conversions continue to be a threat in the future; inefficient coal plants need to be closed not converted to burning trees.
- Governments must encourage investment not only into wind and solar, but also electricity storage, interconnectors and demand response, and engage grid operators to speed the phase-out of coal.

So will governments embrace the swing in economics from coal to clean, and accelerate their coal to clean revolution?

Footnote on data quality:

This report is primarily based on data from ENTSO-E, which collects data from national grid operators. Sandbag has curated this data, but this is very hard: ENTSO-E make the data very difficult to collate, and the national grid data supplied is sub-standard. We have done our best to give an accurate picture of the data in the best way possible, but small mistakes will still exist.

Please do access the data yourselves that we have provided, so you can pull out other insights relevant for your line of work. We hope you enjoyed our analysis.

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Report design:

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