The European Power Sector in 2018:

Up-to-date analysis on the electricity transition

Dave Jones | Sandbag
Matthias Buck | Agora Energiewende
Alice Sakhel | Agora Energiewende

BRUSSELS, 30 JANUARY 2019

Key Findings

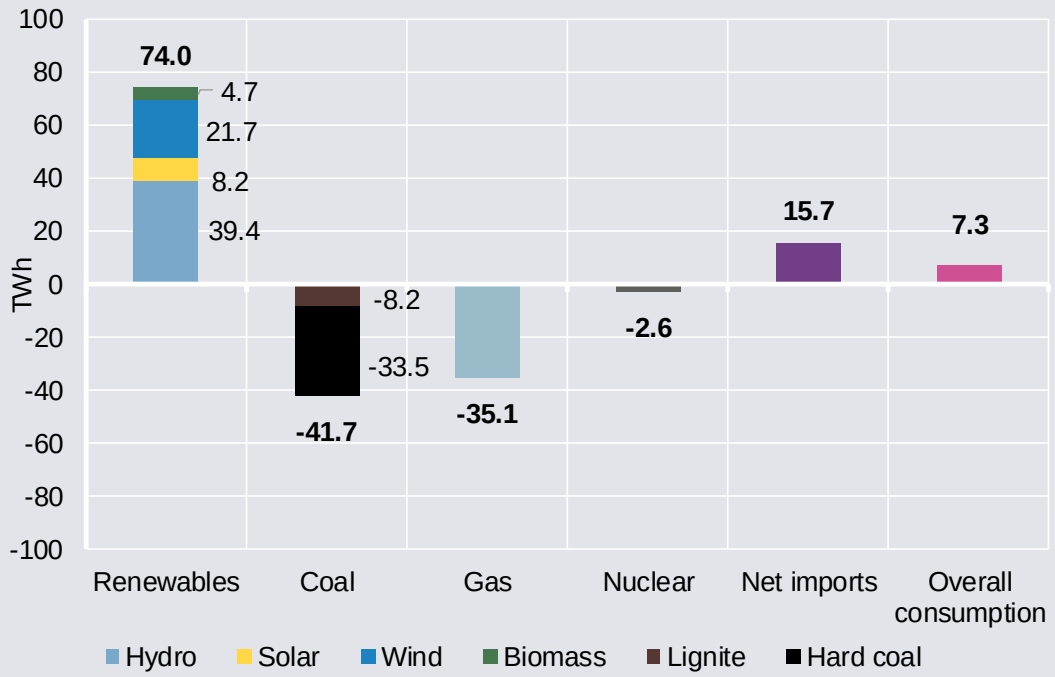
1. CO_2 emissions in the power sector fell by 5% in 2018
2. It's a tale of two types of coal: Europe's transition from hard coal to renewables is accelerating ...
3. ...however, the transition from lignite - the dirtier, brown coal - is proving much harder.
4. Wind is strong, but get ready for solar!
5. For the first time, wind and solar competed with existing coal and gas plants.

Renewables displaced fossil

Structural: Wind, solar, biomass: (GE, UK, FR)

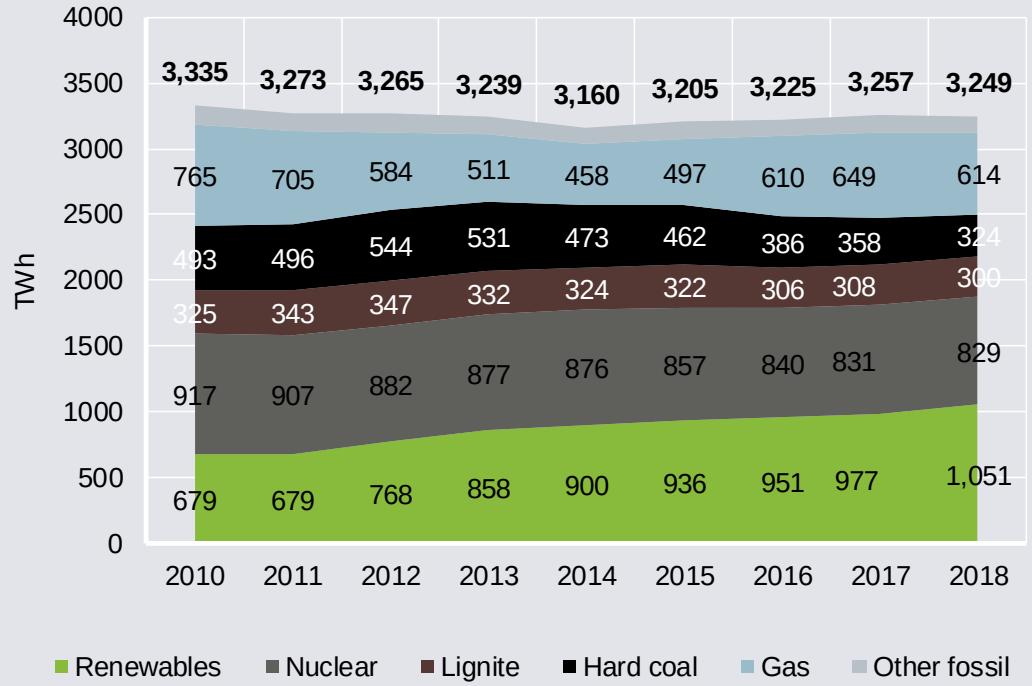
Weather: Recovery of Hydro (IT, ES, FR)

Changes in EU28 electricity generation from 2017 to 2018



EUROSTAT data to 2016; own calculations for 2017 and 2018

EU28 electricity generation



EUROSTAT data to 2016; own calculations for 2017 and 2018

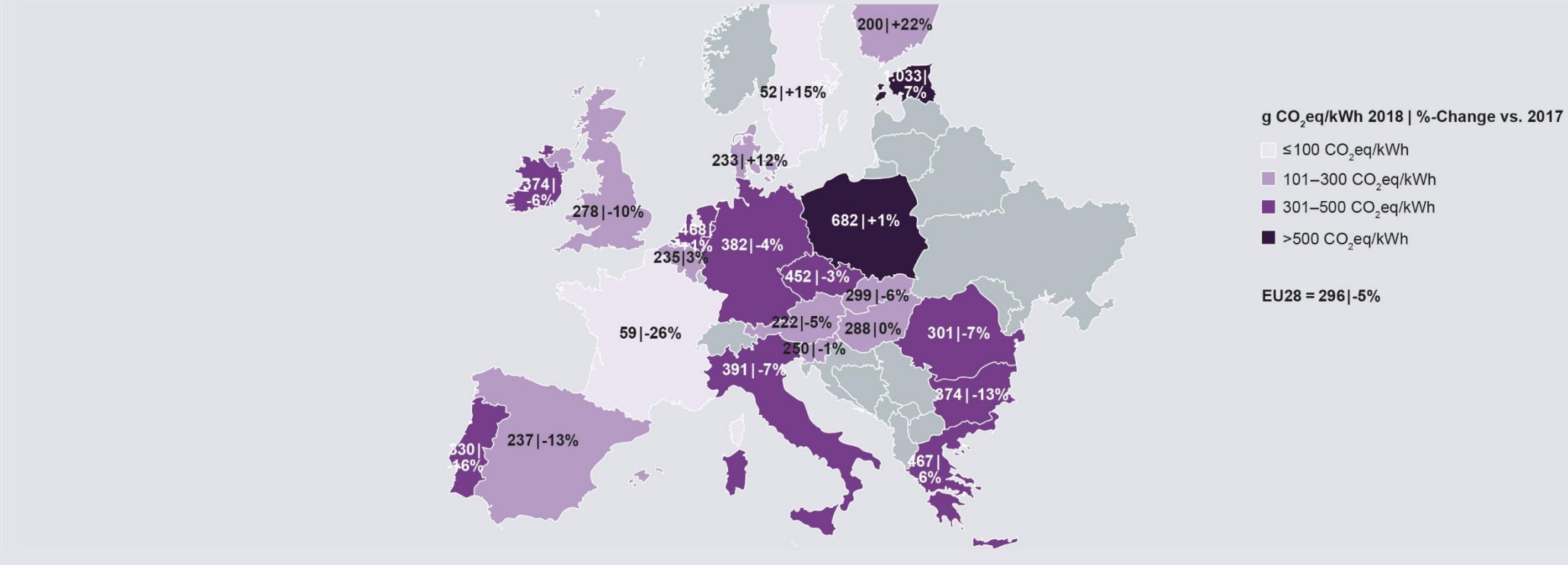
Carbon intensity down by 5%

www.electricitymap.org

sandbag smarter climate policy

Agora Energiewende

CO_2-intensity of electricity consumption



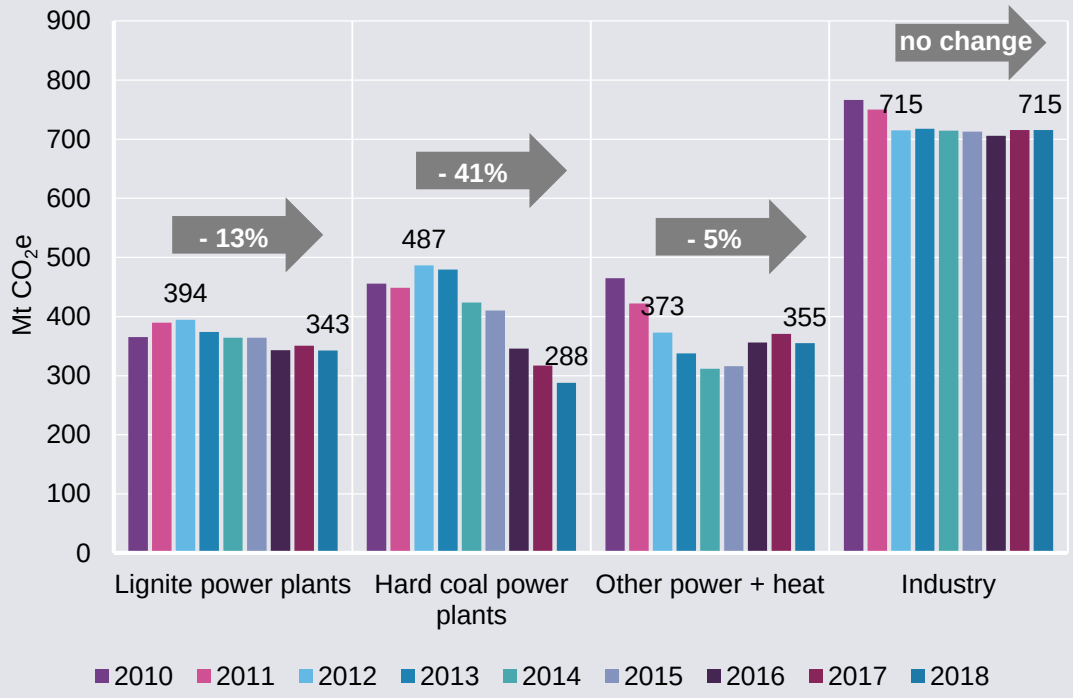
Our aggregation of www.ElectricityMap.org data. They use lifetime carbon intensity figures from 2014 IPCC report by fuel (e.g. 450g CO_2/KWh gas, 820g coal - no distinction of lignite or hard coal, 11g for wind), and generation mostly from ENTSO-E. Carbon intensity of imports/exports are calculated according to generation mix in the giving/receiving country in that hour.

CO_2 falls after last year's pause

-5% EU power sector

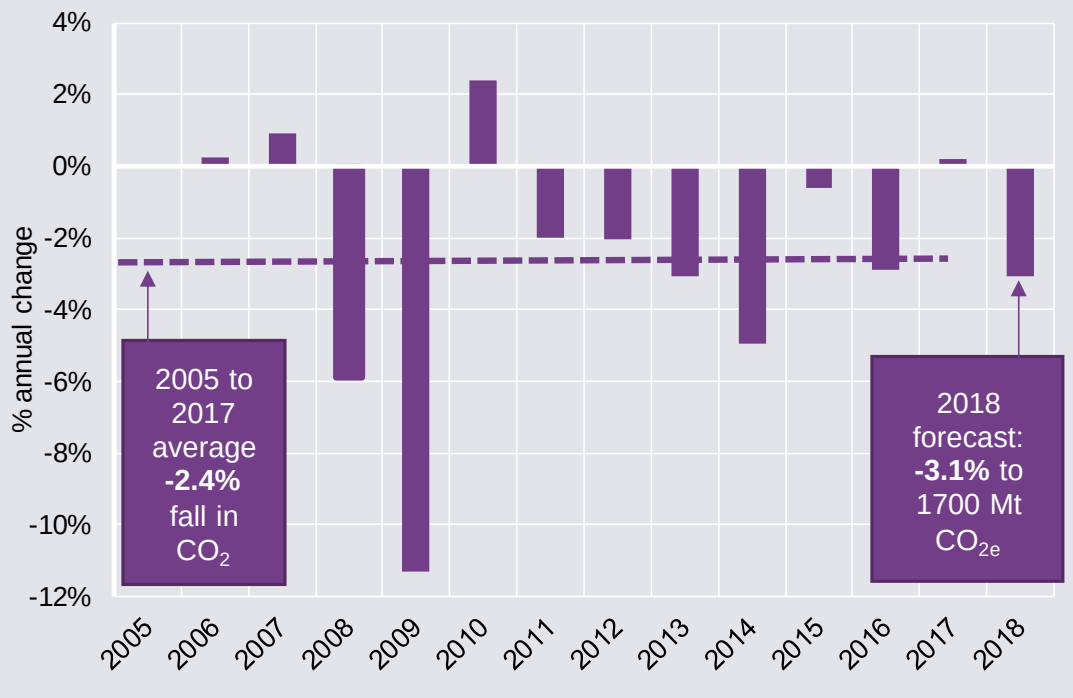
-3% EU ETS

EU-ETS Emissions by sector



EUTL data to 2017, based on Sandbag classifications; own calculations for 2018

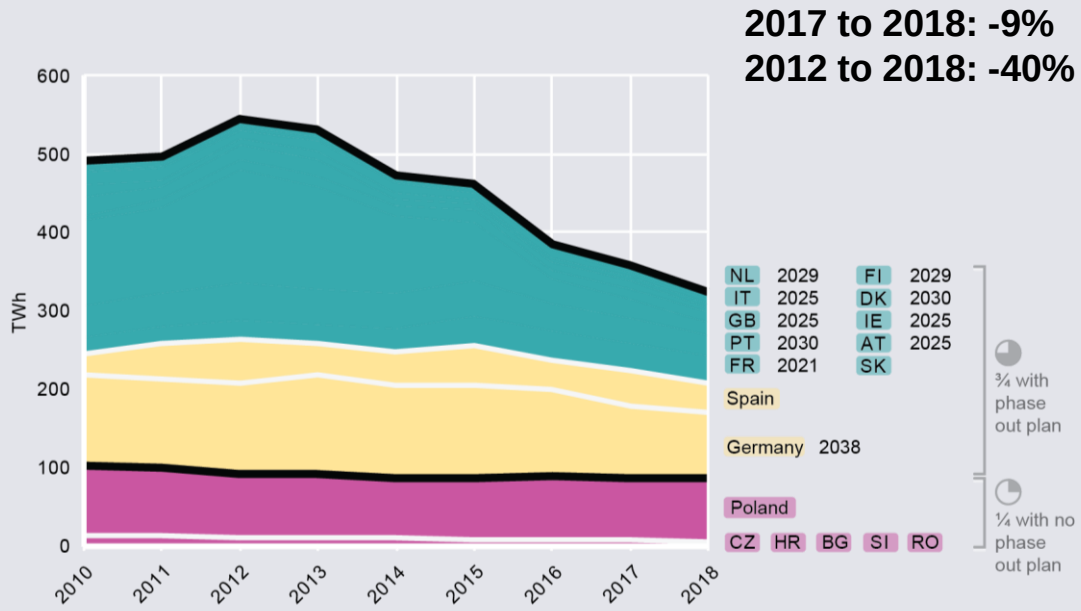
EU-ETS Emissions, annual change



EEA data to 2017 scope-adjusted; own calculations for 2018

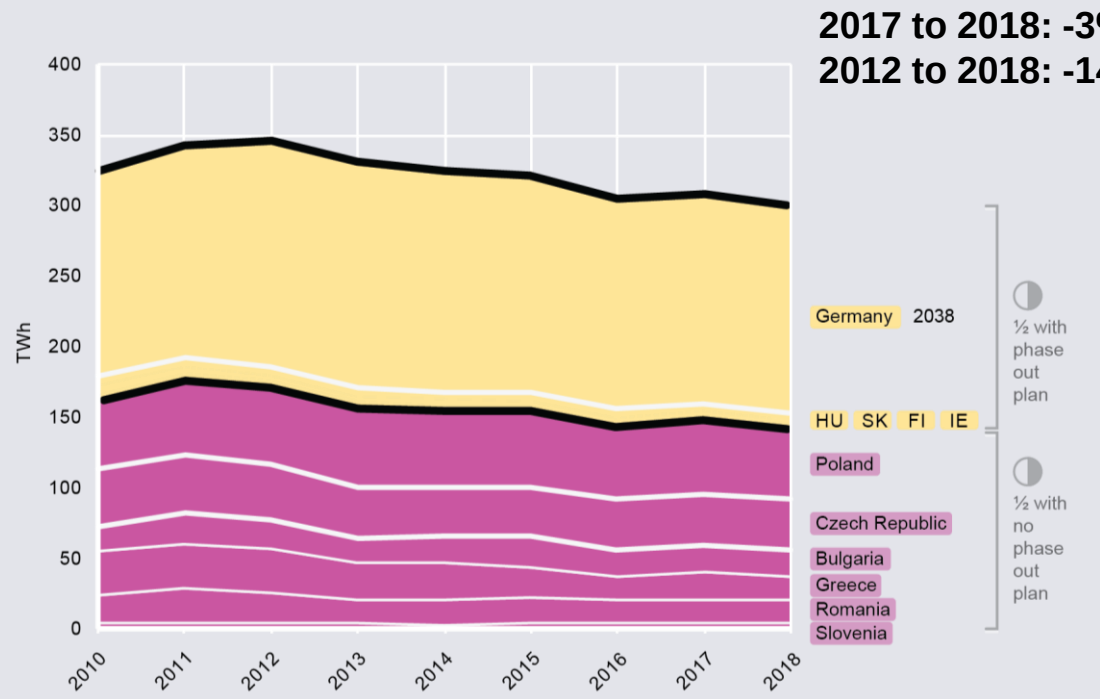
It‘s a tale of 2 types of coal:
...**Hard coal** phase-out is accelerating
...**Lignite** phase-out yet to pick up

Hard coal generation (EU-28)



EUROSTAT data to 2016; own calculations for 2017 and 2018; phase out details from Beyond Coal 2019

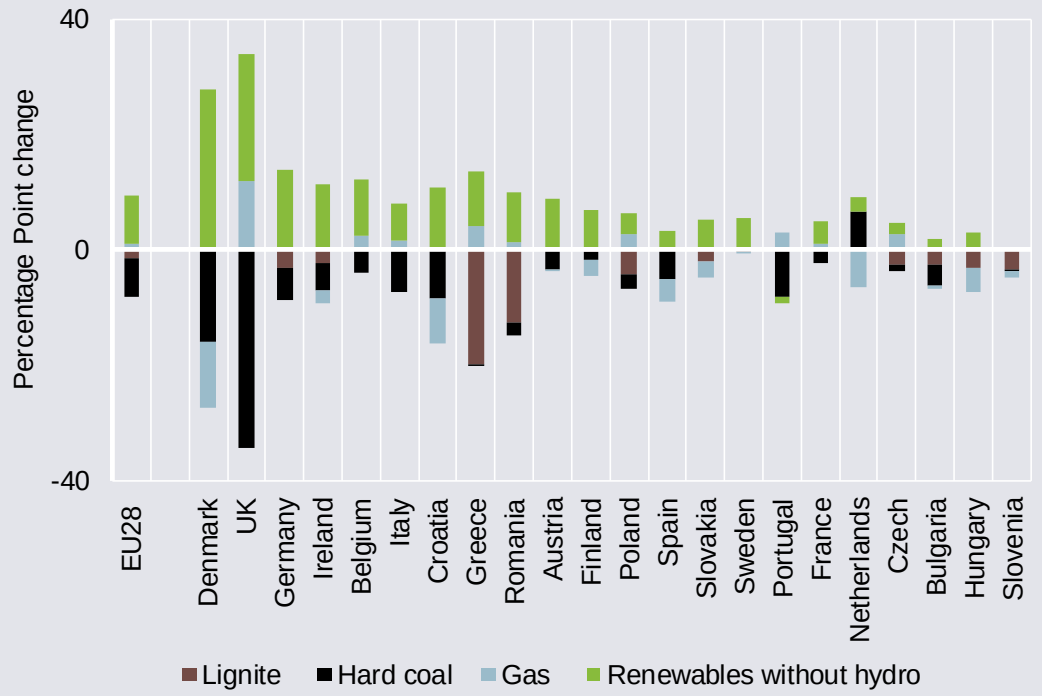
Lignite generation (EU-28)



EUROSTAT data to 2016; own calculations for 2017 and 2018; phase out details from Beyond Coal 2019

Renewables is displacing coal.
But renewables isn‘t being built everywhere...
which is why lignite is slow to fall...

Electricity mix percentage point changes, from 2012 to 2018



EUROSTAT data to 2016; own calculations for 2017 and 2018

Wind and Solar forecasts for countries with no lignite phase-out

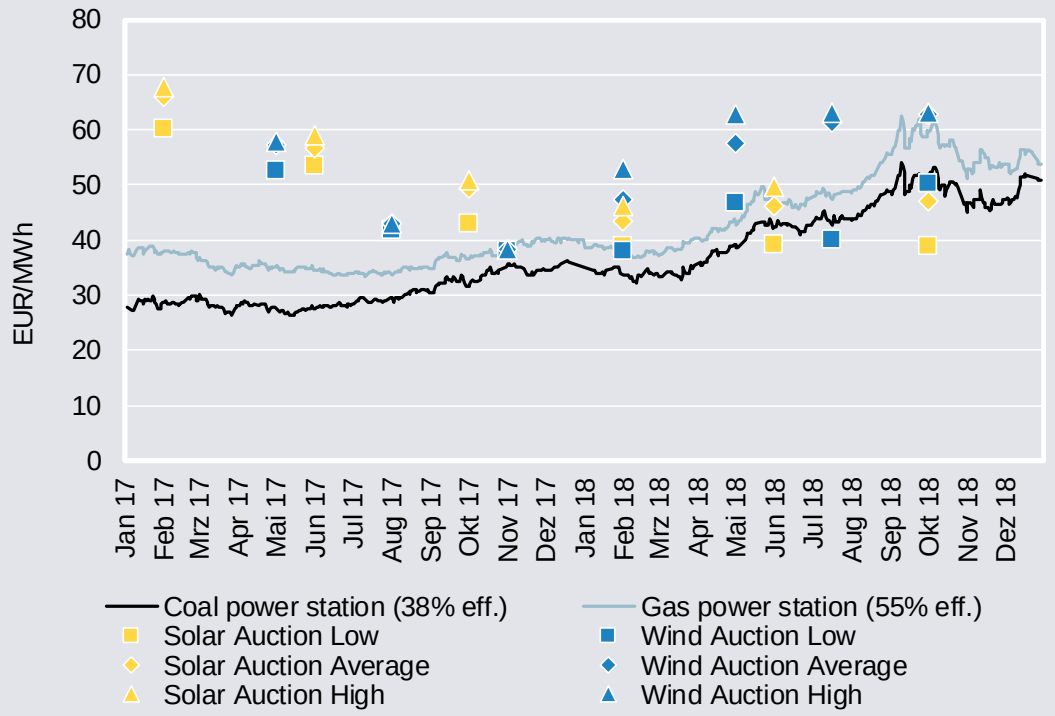
	Wind			Solar		
	Installed end–2017	Installed end–2022	Additions 2018–2022	Installed end–2017	Installed end–2022	Additions 2018–2022
Poland	5.8	6.4	0.6	0.3	2.4	2.1
Czech Republic	0.3			2.0		
Bulgaria	0.7			1.0		
Greece	2.7	4.0	1.3	2.6	4.2	1.6
Romania	3.0	3.5	0.5	1.4		
Slovenia	0.003			0.258		

WindEurope actuals and forecast; SolarPower Europe actuals and forecast

Wind and solar now competitive with existing coal and gas plants.

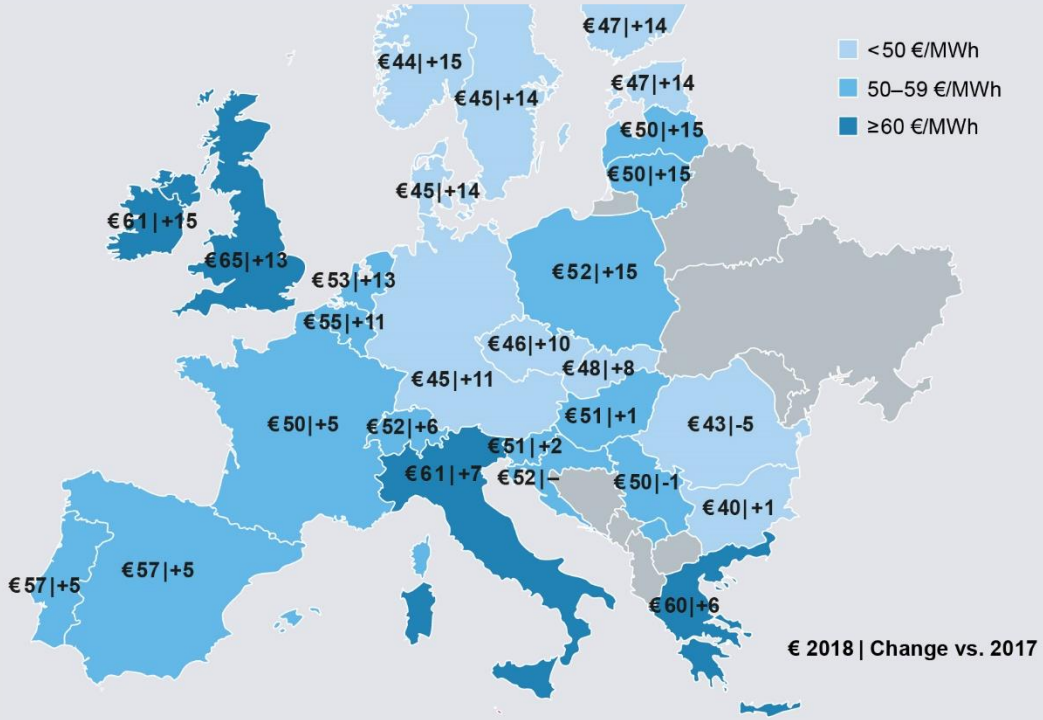
Coal price +15%, gas 30%, CO_2 170%.

Coal and gas costs (year-ahead) vs German renewables auctions



Bloomberg 2017/18, Bundesnetzagentur 2017/18; Sandbag calculations

2018 wholesale electricity prices (average day-ahead)

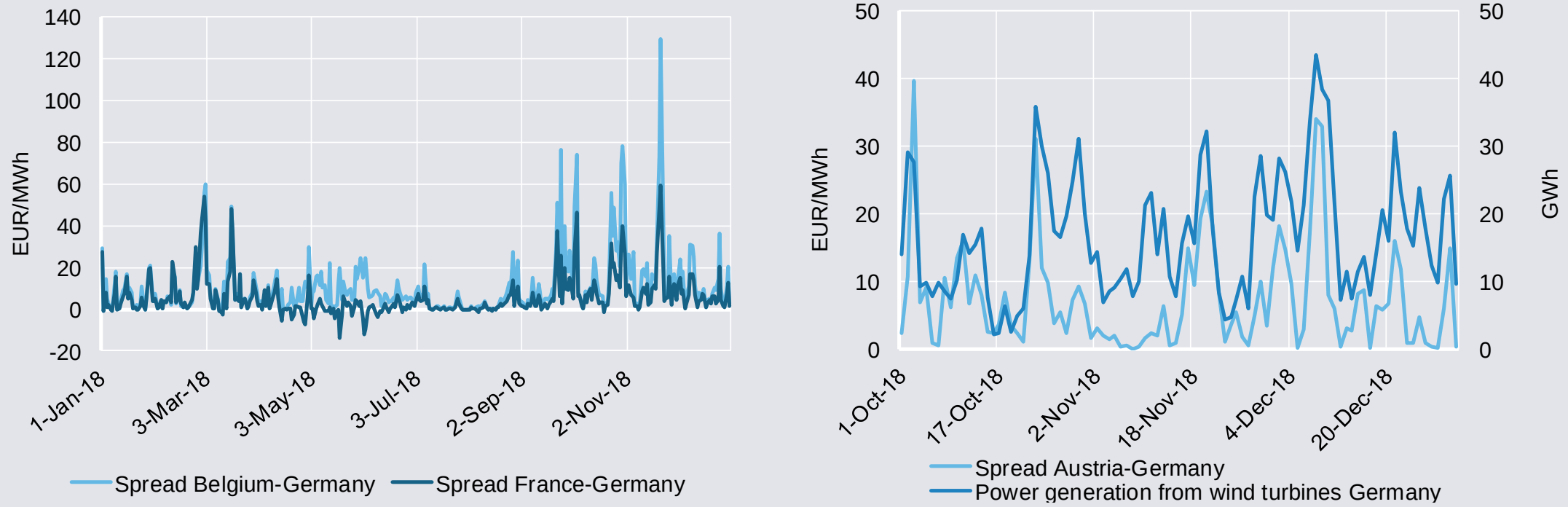


ENTSO-E

Power price movements:

- **Belgium:** Nuclear outages cause price spikes
- **Germany/Austria**: price zone split

Price spread for day-ahead electricity (left); Price spread for day-ahead electricity after AT-DE grid split, vs German wind (right)



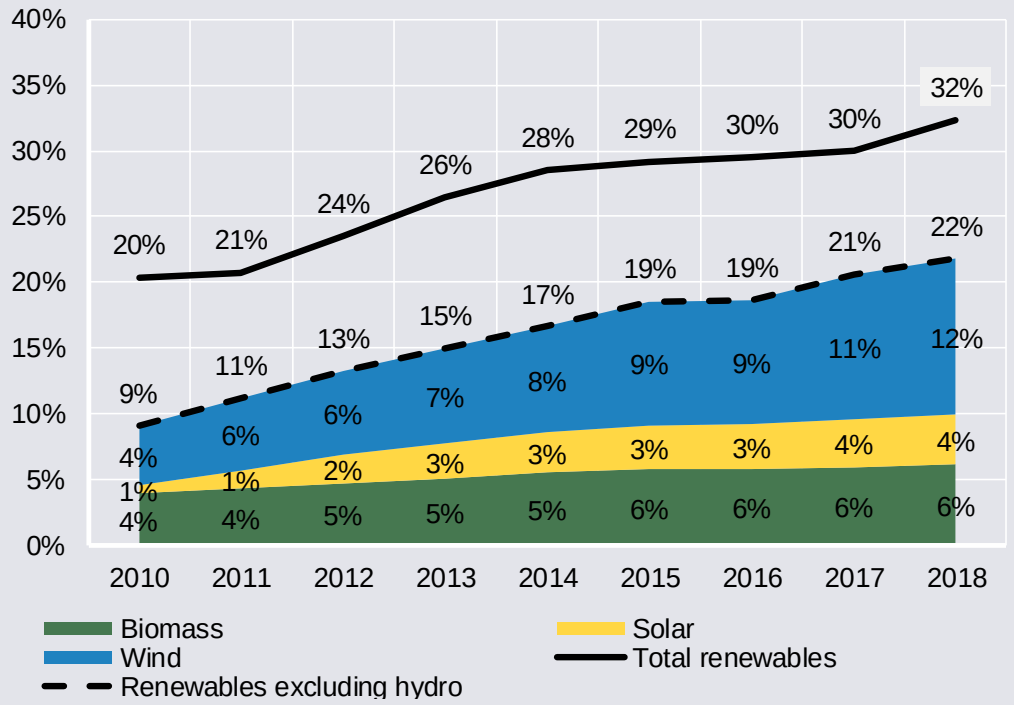
ENTSO-E

Solar is the next big thing!

Installation rate +61% in 2018 to 10GW

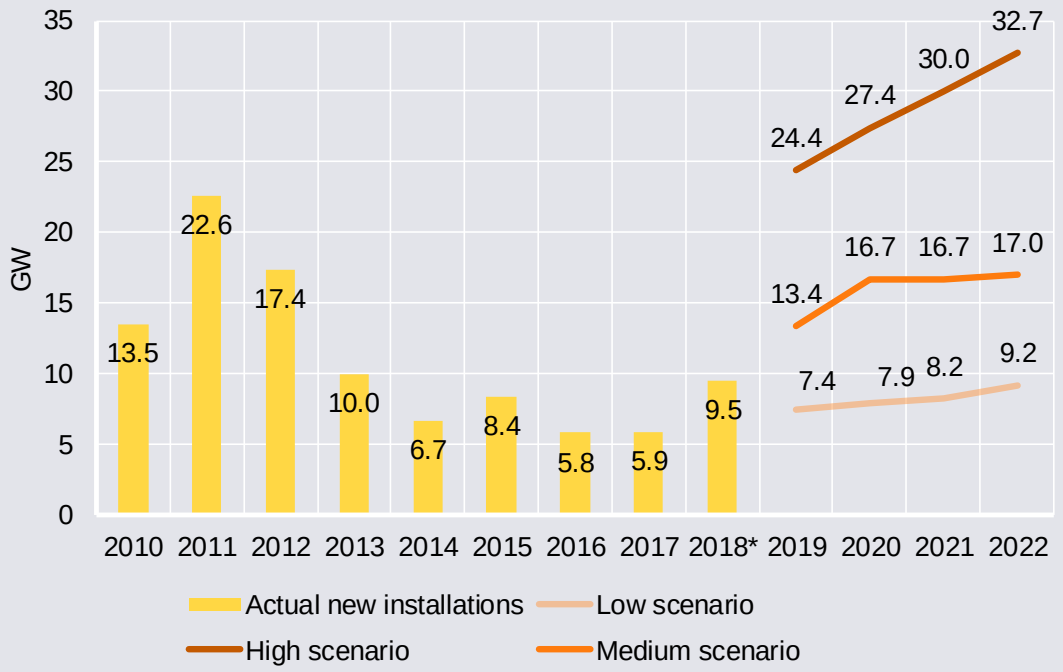
Could it triple in 3 years to 30 GW per year?

Renewables share (as % of gross electricity production; EU-28)



EUROSTAT data to 2016; own calculations for 2017 and 2018

New solar PV installations (annual, EU-28)

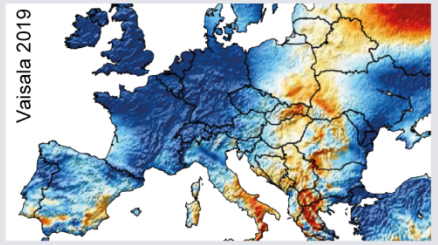


SolarPower Europe 2018; *latest forecast from SolarPower Europe

Solar outperformed during the 2018 summer heatwave, when coal, nuclear, wind and hydro all stumbled

Wind

Wind generation during the heat-wave was low because the high pressure weather in July and August acted as a wall, stopping the wind from blowing in from the Atlantic to north-western Europe.

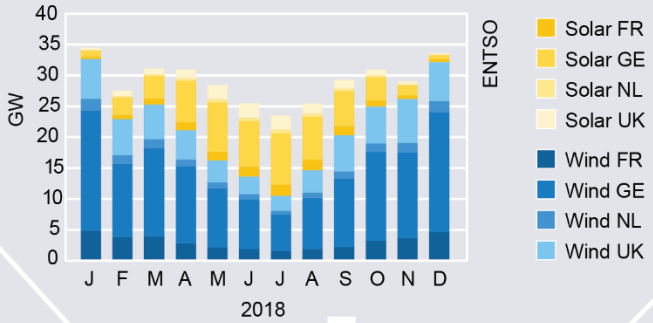


July 2018 wind speeds, anomalies to July averages for long-term average

+20% +10% 0% -10% -20%

Wind & solar

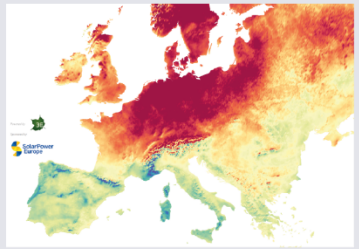
Monthly wind and solar in 2018 in France, Germany, the Netherlands and the UK



Solar replaced wind during the heatwave

Solar

The high pressure led to minimal cloud cover across NW Europe. This meant solar was the only generation over-performing during the heatwave.



Jan–Dec 2018 solar radiation, anomalies to averages for the period 2004–2018

3E data services

+10% +7.5% +5% +2.5% -2.5% -5% -7.5% -10%

Nuclear

Water-cooled plants had to be shut down temporarily to protect rivers.

There were 4 complete shut-downs in France (Saint-Alban-1 1335MW, Bugey-2 & -3, 910MW, Fessenheim-2 920MW), one in Sweden (Ringhals, 900MW), plus numerous plants trimmed their output across Europe.

Demand

The heatwave led to high demand for air conditioning. Poland reached its highest ever demand in summer on June 4th of 23.2GW.

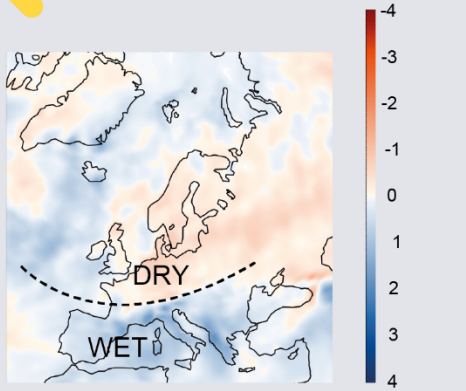
The Potsdam Institute predicted that peak demand in many European countries will shift from winter to summer, as air conditioning rises, due to higher penetration and due to climate change.

Effects of the 2018 heatwave

Hard coal

From August to November 2018, 12 plants in Germany along the Rhine alone reported supply shortage problems, because the Rhine levels was too low to import coal by barge.

There were also problems with cooling water: Karlsruhe-7 (Germany, 505 MW) had to shut down because they were prohibited to empty their warm cooling water in the Rhine.



Jan–Dec 2018 precipitation (mm/day), anomalies to averages for the period 1981–2010

Hydro

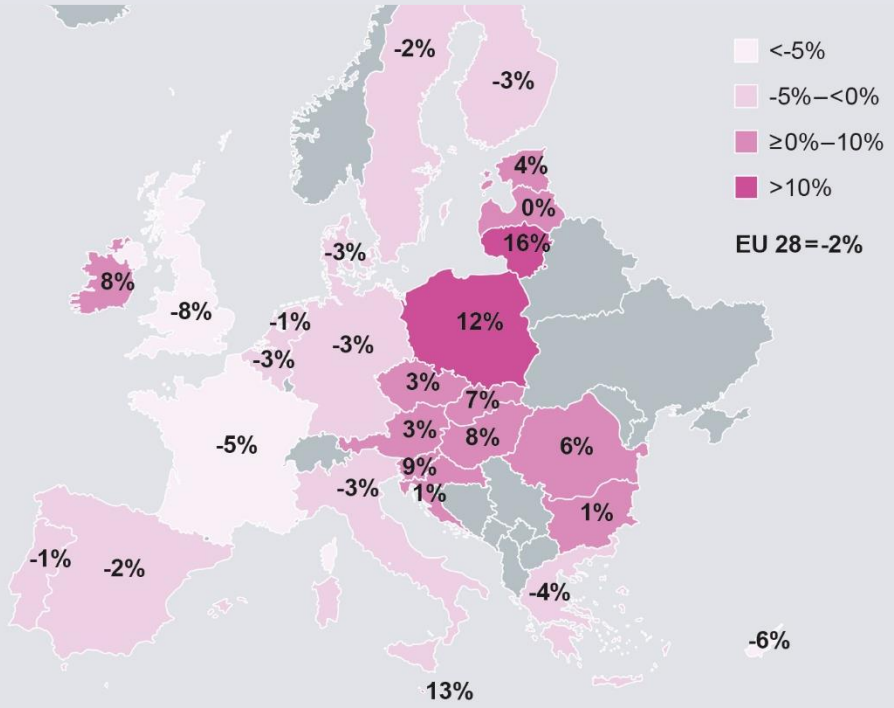
Low hydro generation in northern Europe, due to below-average rainfall throughout the year:

→ Austria: lowest in eight years
→ Sweden: lowest in six years
→ Germany: lowest this century

ECMWF Copernicus Climate Change Service 2018

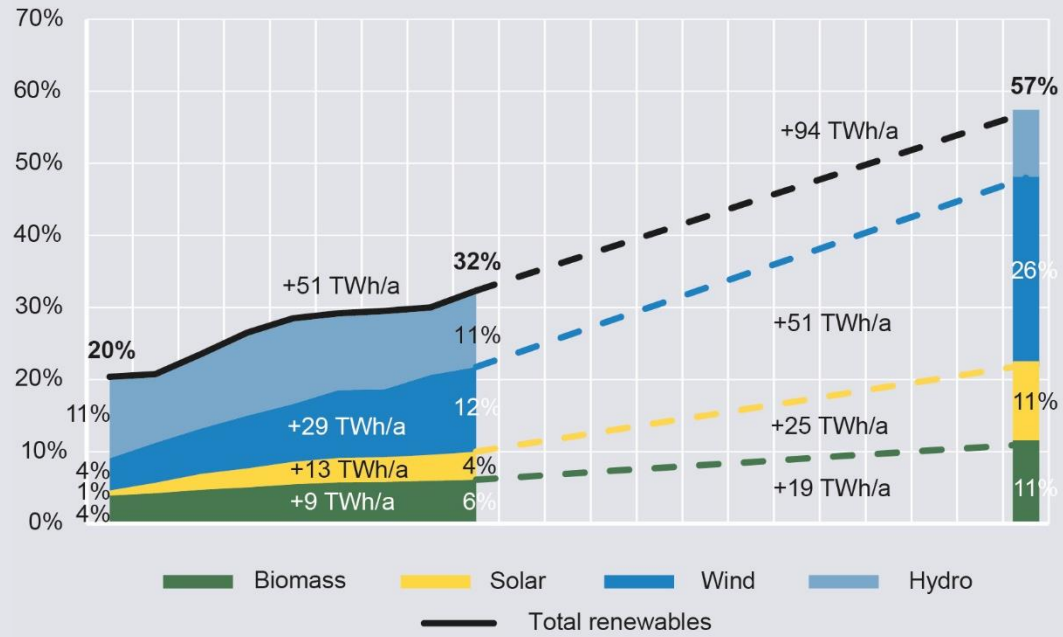
European Commission ‘Long Term Strategy’
- Electricity consumption to rise 18% by 2030?
- Renewables deployment needs to almost double?

Change in electricity consumption from 2010 to 2018



EUROSTAT data to 2016; own calculations for 2017 and 2018

2030 projection of renewable electricity share in European Commission’s Long Term Strategy



EUROSTAT data to 2016; own calculations for 2017 and 2018; 2030 projection from “Long Term Strategy”, European Commission 2018, dashed lines show projection

Thank you for your attention!

Questions or Comments? Feel free to contact us:

dave@sandbag.org.uk |
alice.sakhel@agora-energiewende.de

Sandbag is a not-for-profit climate change policy think tank based in Brussels and London.

Agora Energiewende is a joint initiative of the Mercator Foundation and the European Climate Foundation.