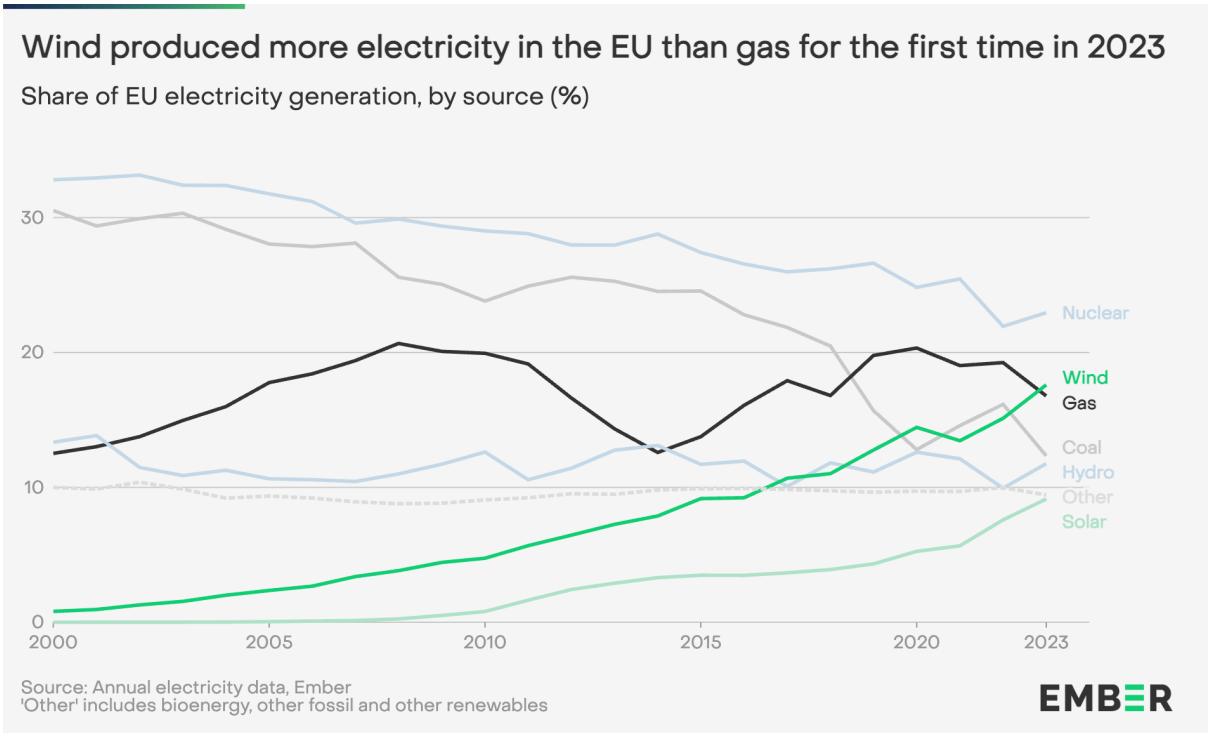
Record fall in EU power sector emissions, with unprecedented collapse in coal and gas power

Renewables grew as wind produced more EU electricity than gas for first time in 2023

[Brussels, 7 February 2024] An unprecedented collapse in EU coal and gas electricity generation in 2023 led to a record drop in power sector emissions, according to the European Electricity Review published today by think tank Ember. The EU's shift away from fossil fuels was evident with record drops in coal generation (-26%) as well as gas (-15%). This led to the largest decline on record for EU power sector emissions too (-19%), as wind and solar grew and electricity demand fell. Renewables continued to increase as wind power generation (18%) overtook gas (17%) for the first time in 2023.

"*The EU's power sector is in the middle of a monumental shift*," said Ember's Europe programme director, Sarah Brown. "*Fossil fuels are playing a smaller role than ever as a system with wind and solar as its backbone comes into view.*"



Record low fossil fuels as wind and solar keep climbing

Fossil generation plummeted by a record 19% in 2023, accounting for less than a third of EU power for the first time. Coal fell by 26% to its lowest ever level at 333 TWh, or 12% of the EU's electricity generation. Coal's decline did not result in a rise in gas, which instead fell by 15%, the largest annual reduction since at least 1990 and the fourth consecutive year of gas generation decline.

In contrast, wind and solar combined achieved their highest ever year-on-year increases in both generation and installed capacity, at 90 TWh and 73 GW. Together they produced a record 27% of EU electricity in 2023 — above a quarter for the first time. Wind generated 18% of EU power, or 475 TWh, equivalent to France's total generation demand. Solar continued its strong growth to generate 9% EU electricity (246 TWh). Overall renewables rose to a record 44% share of EU power in 2023, as hydro power also recovered from lows in 2022.

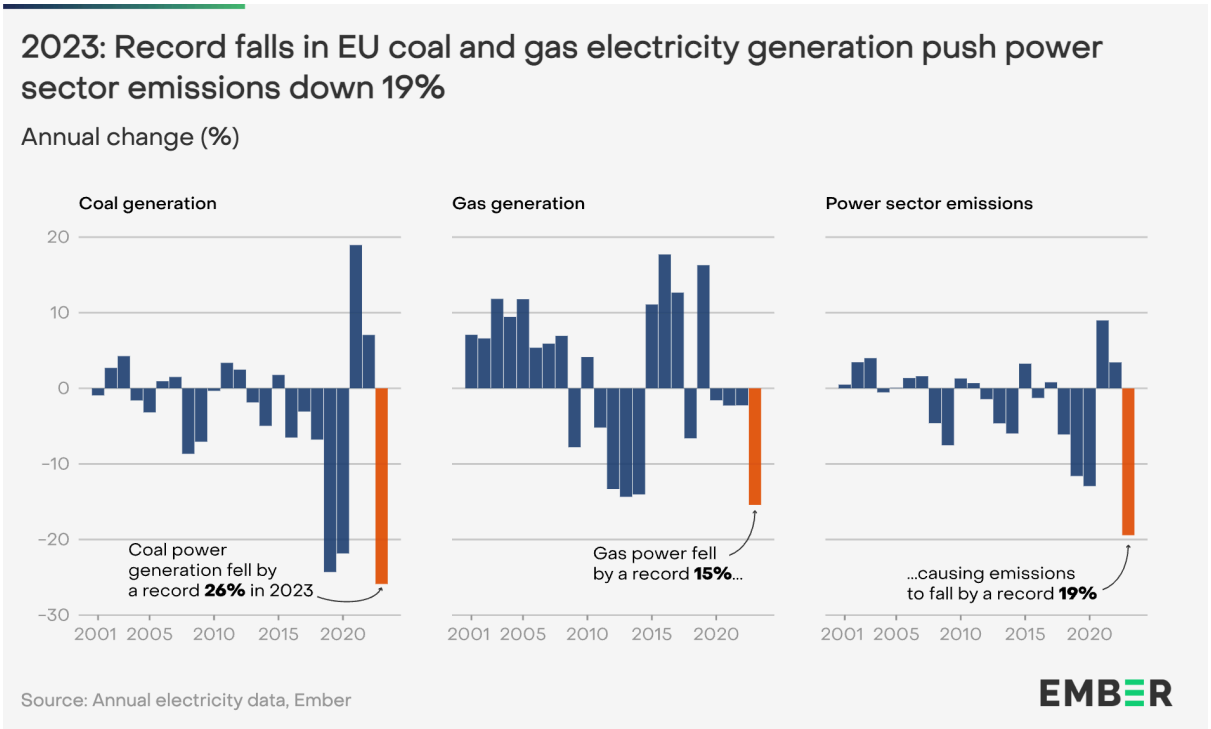
In addition to clean growth, falling electricity demand also contributed to the drop in fossil fuel generation. Demand fell by 3.4% (-94 TWh) in 2023 compared to 2022. This marked a 6.4% (-186 TWh) fall from 2021 levels when the energy crisis began, with just over a third (38%) attributed to a reduction in industrial electricity consumption. This rate of demand fall is not expected to be repeated in the coming years as electrification increases.

"*As electrification takes off through more heat pumps, electric vehicles and electrolysers, the EU will enter a new era of rising electricity demand,*" said Ember's global global insights director Dave Jones. *"Renewables will need to keep pace with that demand increase in order to deliver the emissions cuts needed for a safe climate.*"

The EU is moving towards a clean system, but faster rollout needed for EU targets
To meet EU targets, wind and solar growth needs to be accelerating. The REPowerEU plan foresees 55% of power from wind and solar by 2030, nearly doubling from 27% in 2023. Solar grew by a substantial 56 GW of additional capacity in 2023, compared to 41 GW in 2022. But it failed to match its 2022 year-on-year generation growth. And while wind generation growth was strong in 2023 at 13%, it needs to increase by 15% every year until 2030 to meet REPowerEU targets.

Ember's analysis showed the EU continued its shift towards a system powered by wind and solar as 24% of hours in 2023 saw less than a quarter of electricity coming from fossil fuels, a major step up from just 4% of hours in 2022. Accordingly, there was increased attention on system-wide enablers for wind and solar growth in 2023, such as grids, storage and demand side response.

"*The energy crisis and Russia's invasion of Ukraine did not lead to coal and gas resurgence — far from it*," said Ember's Europe programme director, Sarah Brown. "*Coal is nearing phase-out, and as wind and solar grow, gas will be next to enter terminal decline. However, it is not time to get complacent. The EU needs a laser focus on rapidly deploying wind, solar and flexibility to create a system free of fossil fuels' risks.*"



Martin Hojsík MEP, Vice President of European Parliament (Renew Europe, Progressive Slovakia) said:

> "Europe's economy is transitioning from fossil fuels to clean power in front of our eyes. While some countries are racing to deploy more wind and solar as a social and economic opportunity, others, particularly in Central and Eastern Europe, are lagging and stand to miss out. The continent's competitiveness is on the line. The EU must ensure a just transition to clean power as a whole and quickly, not only to reap the benefits of the energy transition, but also to shield itself from security risks related to imported fossil fuels."

Walburga Hemetsberger, CEO of SolarPower Europe said:

> “We can’t afford to be complacent about growth. 2023 brought a new solar record, but integrating solar into the system is still more of a challenge than it needs to be. Policymakers and system operators must work to ensure that the grid is ready to absorb solar generation, maximise the potential of grid-intelligent solar, and ultimately decarbonise the system.”

Kathrin Gutmann, campaign director at Beyond Fossil fuels said:

> “Even in an energy crisis, coal's presence in the EU’s energy mix plummeted by 26%, and Spain and Slovakia accelerated their coal exits by 5 and 6 years respectively. Crucially, this did not result in an increase in fossil gas, thanks to remarkable growth in renewables. To solidify 2023’s transformative shift towards sustainable power, we need even more governments to commit to phase out coal by

2030, and fossil gas by 2035, and simultaneously accelerate the integration of renewables and their supporting infrastructure."

Pieter de Pous, Programme Leader at E3G said:

> “The EU led a big push last year at COP28 to commit the world to phase out fossil fuels. These 2023 power market data show this wasn’t just talk with the EU making very significant progress at home in moving to a fossil free power system with cheap renewables eliminating demand for coal and gas, permanently. This should build confidence among EU leaders to continue hitting the accelerator when it comes to adopting more ambitious climate goals for 2040 and work with its global partners to share the benefits of moving to clean energy.”

—Ends—

Notes to the editor
The European Electricity Review analyses full-year electricity generation and demand data for 2023 in all EU-27 countries to understand the region’s progress in transitioning from fossil fuels to clean electricity.

Media pack - press release, report PDF, data sets, graphics

The report will be published online on 7 February 2024 here:
https://ember-climate.org/insights/research/european-electricity-review-2024/

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About Ember
Ember is an independent, not-for-profit climate and energy think tank that produces cutting-edge research and high-impact, politically viable policies that aim to accelerate the global transition to clean electricity.

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Data tables

Chart 1: Wind produced more electricity than gas for the first time in 2023
Share of total EU generation (%)

Year	Coal	Gas	Nuclear	Hydro	Wind	Solar	Other

2000	30.52	12.52	32.8	13.35	0.81	0	10
2001	29.38	13.02	32.94	13.84	0.95	0.01	9.87
2002	29.92	13.76	33.15	11.48	1.29	0.01	10.39
2003	30.32	14.96	32.4	10.88	1.55	0.01	9.87
2004	29.13	15.99	32.38	11.27	2.01	0.02	9.2
2005	28.04	17.77	31.76	10.64	2.36	0.05	9.36
2006	27.85	18.42	31.19	10.57	2.68	0.09	9.21
2007	28.11	19.4	29.59	10.44	3.39	0.13	8.93
2008	25.58	20.67	29.89	11	3.83	0.25	8.79
2009	25.05	20.08	29.37	11.72	4.44	0.51	8.83
2010	23.81	19.94	29.01	12.62	4.75	0.8	9.07
2011	24.92	19.15	28.81	10.57	5.68	1.64	9.23
2012	25.58	16.63	27.97	11.42	6.46	2.43	9.53
2013	25.28	14.34	27.96	12.76	7.26	2.9	9.49
2014	24.53	12.59	28.78	13.11	7.88	3.31	9.81
2015	24.56	13.76	27.41	11.71	9.17	3.49	9.9
2016	22.8	16.08	26.56	11.95	9.23	3.48	9.91
2017	21.86	17.91	25.98	10.07	10.68	3.67	9.85
2018	20.48	16.81	26.2	11.82	11.02	3.91	9.75
2019	15.69	19.78	26.62	11.14	12.77	4.33	9.65
2020	12.8	20.33	24.83	12.61	14.45	5.26	9.72
2021	14.58	19.03	25.45	12.12	13.46	5.67	9.7
2022	16.16	19.25	21.94	9.94	15.12	7.59	9.99
2023	12.34	16.78	22.95	11.76	17.6	9.14	9.44

Chart 2: 2023: Record falls in EU coal and gas electricity generation push power sector emissions down 19%

Annual change in electricity generation by source, and power sector emissions (%)

Year	Coal	Gas	Emissions
2001	-0.93	7.08	0.49
2002	2.7	6.6	3.45
2003	4.26	11.83	3.99
2004	-1.6	9.45	-0.53
2005	-3.18	11.79	0.07
2006	0.94	5.37	1.36
2007	1.5	5.91	1.6
2008	-8.66	6.94	-4.61
2009	-7.06	-7.79	-7.53
2010	-0.33	4.14	1.3

2011	3.37	-5.19	0.69
2012	2.47	-13.32	-1.43
2013	-1.86	-14.35	-4.63
2014	-4.96	-14.03	-5.97
2015	1.77	11.09	3.26
2016	-6.51	17.71	-1.27
2017	-3.07	12.66	0.8
2018	-6.78	-6.61	-6.1
2019	-24.3	16.29	-11.6
2020	-21.84	-1.58	-12.93
2021	18.95	-2.27	8.98
2022	7.06	-2.25	3.43
2023	-25.88	-15.42	-19.42