

Do current EU energy and climate policies tackle coal?

Executive Summary

In July 2014, Sandbag released a comprehensive report called “Europe’s Failure to Tackle Coal”¹ looking at how the European Air Quality Directive and the Emissions Trading Scheme are having a limited impact on coal generation. This briefing expands the picture to look at how the other elements of the EU’s climate and energy package: the Efficiency Directive and the Renewables Directive are impacting coal.

We present a scenario where, without major policy reform, coal remains substantially untouched by the current policy package.

To recap on the problem of coal’s CO₂ emissions:

- CO₂ emissions from coal generation in 2013 still accounted for at least 20% of total EU GHG.
- From 2008 to 2013, coal emissions fell only 2%, whilst all other generation fell by 33%.
- 64% of coal’s CO₂ emissions are from just 3 countries – Germany, UK and Poland.

EU Air Quality Directives are not guaranteed to reduce coal’s CO₂ emissions

- Coal power stations that need to still close under the Large Plant Combustion Directive accounted for only 2.3% of 2013 of coal emissions.
- Very few coal power stations are likely to close under the Industrial Emissions Directive. However, there is up to 40GW of plant that might decide to opt-out, but at the moment virtually all is pencilled to opt-in, unless the political landscape changes.
- Future restrictions of non-CO₂ pollutants under BREF regulations (Best Available Techniques Reference document) have the chance to really reduce unabated coal once and for all – but are under threat as politicians continue to pander to aggressive lobbying.

EU Energy Efficiency Directive is not yet predicted to decrease electricity consumption

- Despite the recent passing of the Energy Efficiency Directive the European Commission is still forecasting (small) electricity consumption growth of 0.2%/year rise in 2010-2020 and 0.7%/year rise in 2020-2030.
- In the scenario in this briefing we work on these EC assumptions.
- However, it should be noted that electricity consumption fell by 0.9%/year in 2010-2013, and we believe electricity consumption could continue falling from 2013 to 2030, if efforts to increase energy efficiency continue.
- We will explore the implications of this scenario in future briefings on the EU climate and energy policy package.

About Sandbag

Sandbag is a UK based not-for-profit organisation campaigning for environmentally effective carbon markets and focusing on the EU Emissions Trading System (ETS).

Our campaigns are supported by in-house research that monitors the environmental robustness of the caps, the distribution of allowances, and how key sectors, installations and companies in the scheme are affected.

The International Centre for Climate Governance [ranks Sandbag in the top twenty climate think tanks in the world.](#)

For more information visit our website at www.sandbag.org.uk

¹ Europe’s failure to tackle coal <http://www.sandbag.org.uk/blog/2014/jul/23/Europes-failure-to-tackle-coal/>

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EU Renewables Directive is not significantly impacting coal generation even by 2030

- Sandbag has embarked on modelling of the generation mix by country by year to 2030 to see the impact of renewables. It assumes aggressive renewables build through to 2030.
- The results are:
 - **Coal generation is forecast to fall only 23% from 2013 to 2030.**
 - This is barely more than a 1%/year fall in coal generation, despite the backdrop of massive investment in renewables.
 - Most new renewable generation will be at the expense of gas and increasing electricity consumption; only 25% of renewable generation from 2013 to 2030 will offset coal generation.

EU Emissions Trading Scheme will not constrain coal generation before 2030.

- Sandbag models the EU ETS surplus, based on the generation modelling in the previous section. The modelling is based on a 40% 2030 target, but no additional ETS reform beyond that.
- The results are:
 - **Even with this high level of coal generation, the ETS still has a surplus of 2.1bt in 2030.**
 - This is likely to result in prices of less than €10/tonne until at least 2030.
 - **This would not constrain coal generation before 2030.**

Conclusion

In contrast to the recommendations of the recently published New Climate Economy report into the economics of tackling climate change,² the EU climate and energy policy package is not stopping the building of new coal nor is it delivering an accelerated phase out of existing coal.

The scenario in this briefing illustrates this point but it is by no means a worse-case scenario – it still assumes aggressive renewables growth through to 2030, and it assumes a 40% GHG target for 2030 – both of which are not yet guaranteed. It is, however also true that if demand for electricity continues to fall, rather than rise as the Commission currently predicts, then coal is likely to be constrained, delivering even greater corresponding surpluses into the Emissions Trading Scheme in 2020 and 2030. We will explore this scenario in more detail in subsequent briefings.

The message, however, is clear: the European Energy and Climate Package is not working to price coal out of the market and the Commission's logic of relying on the ETS to constrain emissions is failing to prevent lock-in to high carbon infrastructure.

The next Energy and Climate policy will be seen to fail if it does not address this issue. Solutions include:

- Substantially tightening limits for non-GHG pollutants from 2020.
- Regulating the carbon intensity of electricity supply through performance standards
- Continuing with aggressive energy efficiency policies to ensure electricity consumption falls.
- Ensuring the EU ETS is strengthened – through approving the Market Stability Reserve, but also through cancellation of permits to erase the legacy surplus and a tightening of the cap going forward.

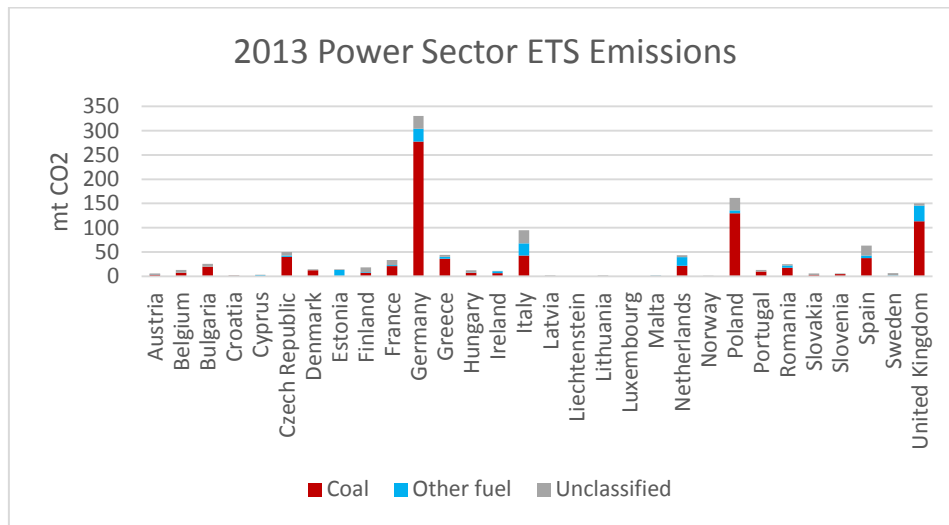
² The New Climate Economy Report, Stern (2014) <http://newclimateeconomy.report/>

Section 1: The problem of coal's CO₂ emissions

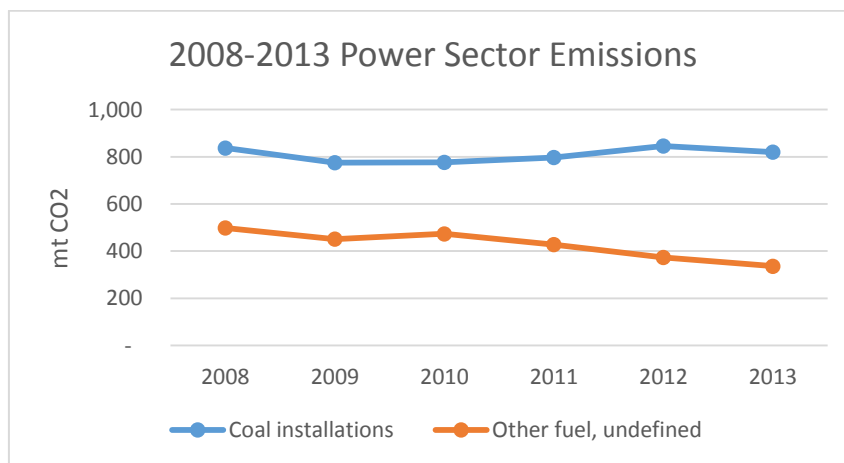
Sandbag has produced a database, identifying all installations in the Emissions Trading Scheme that are in the power sector³. Power sector emissions, by this definition, account for 60% of total ETS emissions. Then Sandbag classified the fuel input type of power sector installations through mostly official national lists of power stations, but also through research; Sandbag has identified fuel type for installations comprising 84% of all ETS power sector emissions.

Identified coal installations account for 807mt of emissions in 2013. This is 71% of all power sector emissions, 43% of total ETS emissions, and approximately 20% of total EU28 GHG emissions⁴.

64% of coal emissions are from only 3 countries – Germany, UK and Poland.



Power sector CO₂ emissions *excluding coal* decreased 33% from 2008 to 2013, as renewables generation substituted gas generation and overall electricity consumption fell. However, over the same time, coal's CO₂ emissions fell only 2% from 2008-2013. Coal power station utilisation actually increased, as capacity dropped more than 2%.



³ This uses the European Commission's NACE codes. Sandbag has changed its definition to include CHP units in power sector. Sandbag classified the following NACE codes as power sector: 35.00, 35.10, 35.11, 35.13, 35.14, 35.30. Also included are 15mt/year of emissions from other installations, mostly with undefined NACE codes.

⁴ Based on EC statement that the ETS is responsible for 45% of total EU GHG emissions.

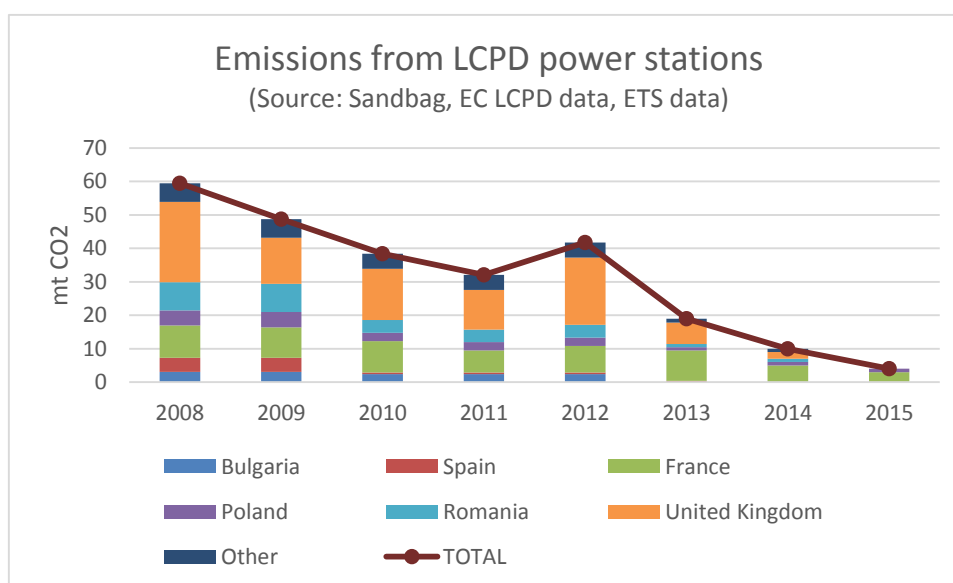
Section 2: EU Air Quality Directives are not guaranteed to reduce CO₂ emissions from coal...

In July 2014, Sandbag released a comprehensive report called “Europe’s Failure to Tackle Coal⁵” looking at how European air quality legislation is having a limited impact on coal generation. This section cites evidence from that report.

Large Combustion Plant Directive legislation

There was 35GW of power stations that chose not to comply with LCPD, and so have to close by December 2015. However, much of this capacity was low load-factor plant, often oil back-up generation, and plant that would have shut on economics alone, regardless of LCPD.

By 2013, most of this capacity had shut. Sandbag estimated that in 2013, only 19mt of the 820mt (2.3%) coal emissions were from LCPD opt-out coal stations, compared to 60mt in 2008.



Industrial Emissions Directive legislation

The previous Sandbag report highlights a few issues around the IED that means not many coal power stations will opt-out and close by 2023.

The biggest impact of IED is to force the use of additional equipment to meet tight NO_x emissions limits. However, when this is done, the power station can run without constraints.

Notably:

- Cheaper NO_x abatement techniques mean IED compliance is less costly than anticipated.
- Derogations, especially in Poland, will allow delayed, and therefore cheaper, compliance.

⁵ Europe’s failure to tackle coal <http://www.sandbag.org.uk/blog/2014/jul/23/Europes-failure-to-tackle-coal/>

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The country that might have the most opt-outs – the UK – is mostly driven by a national carbon tax (the Carbon Price Floor or CPF), rather than by IED directly. Although the Capacity Mechanism partially offsets against this by providing a capacity fee to most fossil plant, the UK Government has U-turned on the biggest incentive to keep coal open, which was proposed to give 15 year capacity payments to power stations that undergo major refurbishment.⁶

The following table shows Sandbag’s bottom-up research findings for how coal capacity in different countries is expected to comply:

	GW*	TNP	Status of IED compliance
Germany	46	N	BDEW estimates only 4.3GW is not IED compliant ⁷ , running on limited hours from 2016. However, this could be even lower – the 2009 ordinance ⁸ forced all plant to comply at similar levels to IED.
Poland	25	Y	Out of 25GW of coal plant, the system operator say only 6.6GW to will shut 2012-2020, which includes LCPD which had to close already ⁹ .
Great Britain	20	Y	Only 6GW of 20GW is expected to be definitely IED compliant. A massive 14GW is as yet undecided. See deep-dive below.
Italy	11		Enel says all 8.7GW of coal plants are already IED-compliant ¹⁰ . Remaining 2.3GW is not clear.
Spain	10	Y	3.5GW is or planning to be compliant. 6.2GW is uncertain.
Czech Republic	7	Y	All plant investing to become compliant. CEZ is planning for all its 7GW coal plant to be compliant ¹¹ , and each plant is at various stages of financing / investment. Subsidies issue?
Netherlands	5	N	All plant is compliant, although 2.5GW of old coal plant is shutting by 2017 as part of a Government agreement ¹² . This leaves only 2GW of old coal running past 2017, although new 4GW online in 2014-15.
Romania	5		3GW will be open after LCPD shut-downs, mostly lignite which is not currently compliant. Not clear on IED plans.
Greece	4		Seemingly mostly complying. PPC own all 4.4GW of lignite, and they indicated back in 2010 that they would invest to make sure almost all complied with IED ¹³ .
France	2	N	Only EDF’s 1.2GW Cordemais will comply. All other 4.7GW of coal plant will shut by 2016 (mostly LCPD opt-out).
Austria		N	Austria expected 100% compliance ¹⁴ .

*GW = Gigawatts of open coal power stations in 2014, excluding LCPD opt-out.

⁶ Old coal subsidy to be closed by UK government (The Guardian)

<http://www.theguardian.com/environment/2014/aug/01/old-coal-subsidy-loophole-to-be-closed-by-uk-government>

⁷ [https://www.bdew.de/internet.nsf/id/A4D4CB545BE8063DC1257BF30028C62B/\\$file/Anlage_1_Energie_Info_B_DEW_Kraftwerksliste_2013_kommentiert_Presse.pdf](https://www.bdew.de/internet.nsf/id/A4D4CB545BE8063DC1257BF30028C62B/$file/Anlage_1_Energie_Info_B_DEW_Kraftwerksliste_2013_kommentiert_Presse.pdf)

⁸ <http://www.bmub.bund.de/en/service/publications/downloads/details/artikel/thirteenth-ordinance-on-the-implementation-of-the-federal-immission-control-actordinance-on-large-combustion-plants-and-gas-turbine-plants-13-bims/>

⁹ http://issuu.com/polishmarket/docs/ca_o_maj_2013/67

¹⁰ “Enel’s Italian plants safe from IED”, Argus Media, 22-Jan-2014

¹¹ <http://www.arena-international.com/Journals/2014/03/05/r/v/j/CEZ-Zizka-IPS-Munich.pdf>

¹² <https://www.acm.nl/en/download/publication/?id=12082>

¹³ <http://www.dei.gr/Images/TSADARI.pdf>

¹⁴ <http://www.argusmedia.com/Power/~media/CE1CCE67FB4C4101A7D176BAB6863F9B.ashx>

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The uncertainty on how many plant will opt-out of IED is up to 40GW of coal plant (out of a total about 150GW). This was calculated by Sandbag in its previous report.

Power stations waiting for more clarity on political decisions that will impact the investment decision. Specifically, (a) ETS reform proposal in autumn 2014; (b) 2030 package in autumn 2014; and (c) ongoing discussions on best available technology.

Therefore, how many closures may occur due to IED is by no means decided.

Best Available Technology legislation

Limits on other pollutants may also be tightened as early as 2020. This could include further restrictions on NO_x, mercury, dust and water quality.¹⁵

However, in the past, these have led to only a fraction of the coal closures forecast, because (a) aggressive lobbying by utilities mean that the proposals are weakened at every opportunity; and (b) industry finds cheaper-than-expected ways to reduce pollutants when the limits are eventually set.

Therefore, it is by no means clear how successful this will be.

¹⁵ BREF documents for Large Combustion Plants <http://eippcb.jrc.ec.europa.eu/reference/lcp.html>

Section 3: **EU Energy Efficiency Directive** is not yet predicted to decrease electricity consumption

The European Commission is still forecasting (small) electricity consumption growth of 0.2%/year rise in 2010-2020 and 0.7%/year rise in 2020-2030.

This is taken from their latest 2013 used in their PRIMES model to forecast future electricity consumption in the document “Energy Trends to 2050”¹⁶.

However, electricity consumption fell by 0.9%/year in 2010-2013, and Sandbag believes there is hope that electricity consumption could fall from 2013 to 2030.

Electricity consumption could continue falling primarily driven by substantial efficiency improvements in all electrical appliance – especially refrigeration, lighting and ICT; (b) smart metering roll-out reaching 72% of EU households by 2020; and incentives to invest on the basis of energy audits which are being required for all large companies and encouraged for all smaller companies. The Commission’s projections, however, do not at present show this.

We will explore scenarios based on different demand assumption in future briefings.

¹⁶ Page 35 http://ec.europa.eu/energy/observatory/trends_2030/doc/trends_to_2050_update_2013.pdf. Sandbag apply to each country by taking each country’s 2000-2012 electricity growth rate (averaging 0.9%/year), and subtracting to get the EC growth rates (i.e. 0.7%/year for 2013-2020 and 0.2%/year for 2020-2030).

Section 4: **EU Renewables Directive** is not significantly impacting coal generation even by 2030, whilst coal is cheaper than gas

For this section, Sandbag has undertaken extensive modelling to predict coal and gas generation to 2030.

Forecast of renewable generation

Sandbag has analysed industry association data for 2013 and their recent forecasts to 2020. The forecasts give a growth rate of 51TWh/year from 2013 to 2020, which should be sufficient to hit the EC's 2020 renewable targets. **Sandbag extrapolates this same 51TWh/year growth rate to 2030.** However, this growth in renewables from 2020 to 2030 is by no means certain, and is subject to big downside if renewables policy is limited past 2020.

Electricity modelling assumptions

Sandbag have prepared a country-by-country forecast of coal generation going through to 2030, using a set of simple, transparent, realistic assumptions:

- **Renewables rises by 51TWh/year from 2013 to 2030.** This assumes the EU hits its 2020 renewables target, then policies are in place to continue building renewable through the 2020's at the same pace. (54TWh/year was added from 2010 to 2013)
- **Use 2013 data as a baseline;** i.e. country-level generation data from ENTSO-E.
- **Electricity consumption rises in line with European Commission PRIMES forecast.** This is 0.2%/year 2013-2020, 0.7%/year 2020-2030¹⁷. **Note, Sandbag believes electricity consumption may actually fall, which substantially impacts the results; however, most analysts are still forecasting electricity consumption to rise, which is why this report uses the EC forecast.**
- **Nuclear - nuclear phase-out plans as announced**¹⁸.
- **No new coal capacity built.** However, only coal plant to close is 6GW of UK opt-out of IED; 2.5GW Netherlands; all France except Cordemais. All other coal is assumed to comply with IED.
- **Gas is more expensive than coal, as in 2013.** Assumes coal generation is capped at no more than 2013 levels for each country. Assume substantial UK coal-gas switching due to UK Carbon Price Floor.

Results for Fossil generation

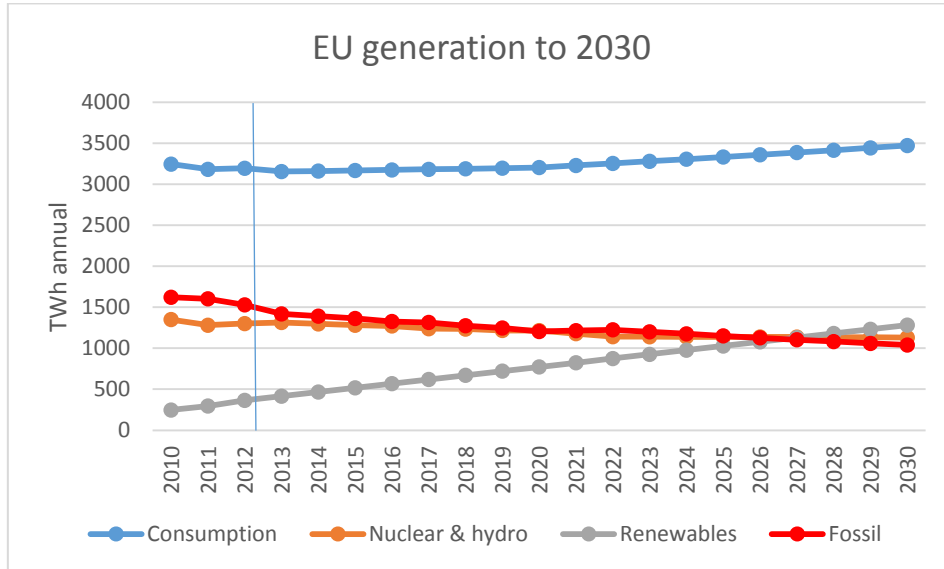
EU fossil generation is forecast to fall 27% from 2013 to 2030. This is a fall of 378TWh.

¹⁷ Page 35 http://ec.europa.eu/energy/observatory/trends_2030/doc/trends_to_2050_update_2013.pdf.

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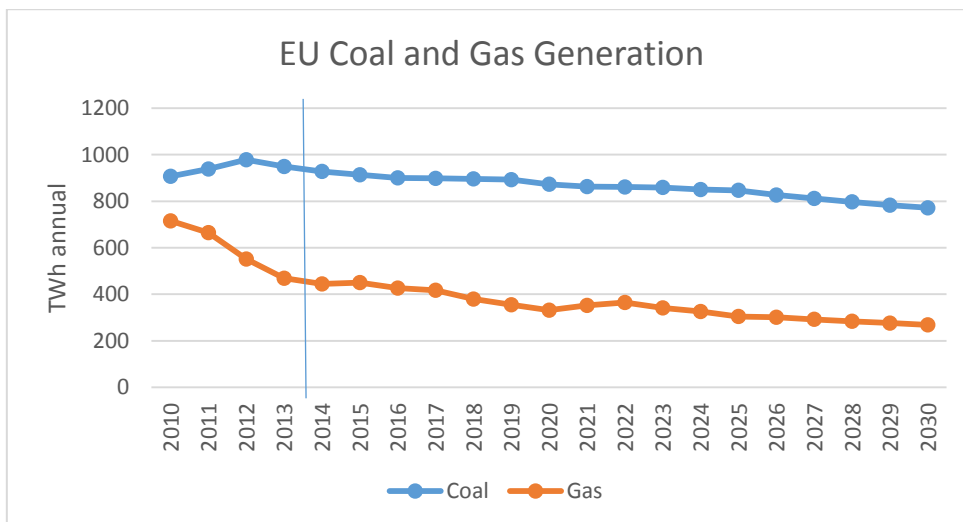
¹⁸ Sandbag assumes complete nuclear phase-out for Germany by 2022 as planned, closure of Fessenheim in 2017, the closure of impacted Belgian units at Doel and Tihange in 2014, and Wylfa closure in 2014. Other than that, nuclear generation other than that is held at 2013 levels – further nuclear closures are presumed to be met with new-build (therefore Flamanville and Olkiluoto are not explicitly included).

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Results for Coal generation

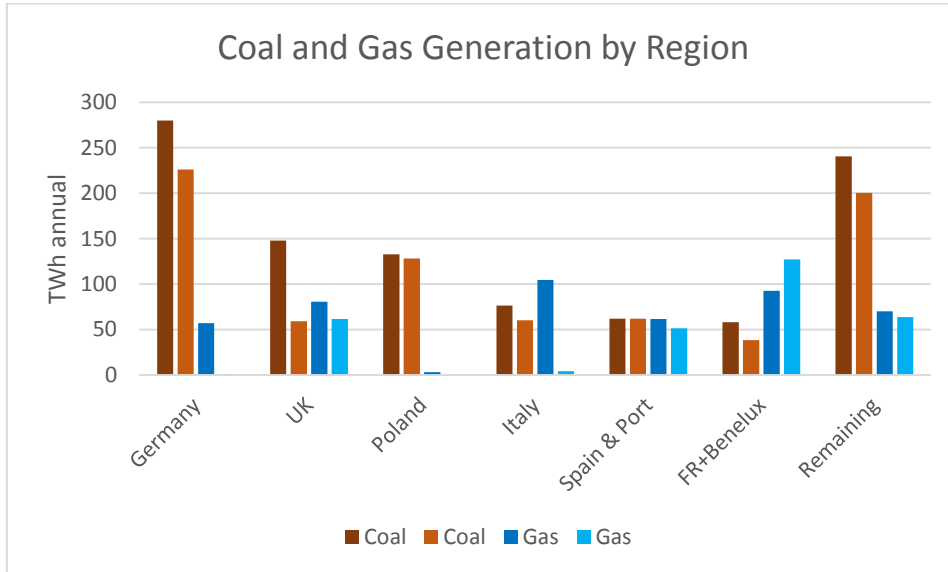
EU coal generation is forecast to fall by 23% from 2013 to 2030. This is a fall of coal generation of 218TWh; gas generation is forecast to fall by 160TWh.



The messages by region are as follows:

- **UK** sees a large reduction in coal generation, albeit from a very high starting point, thanks to switch to gas from the CPF.
- **Germany** sees only a small reduction in coal burn, as renewables growth does little more than offset the nuclear phase-out. Germany also exports huge amounts of coal generation through its borders.
- **Poland** – and other Eastern European countries – make few reductions in coal generation, as renewables growth only offsets against growth in electricity consumption.

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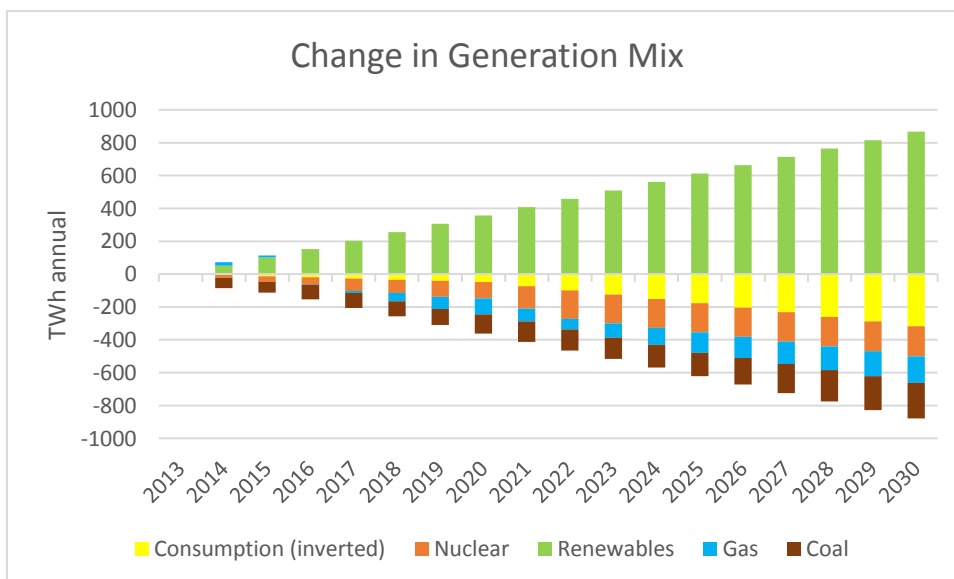
Conclusion

EU fossil generation is forecast to fall 27% from 2013 to 2030.

EU coal generation is forecast to fall only 23% from 2013 to 2030, compared to a fall of 34% of gas.

How does the increase in Renewables generation influence the remaining generation mix?

- 37% of renewable growth is offset by consumption increases
- 21% of renewable growth is offset by closing nuclear power stations
- 18% of renewable growth leads to a fall in gas generation
- **Only 25% of renewable growth leads to a fall in coal generation.**



Section 5: EU Emissions Trading Scheme is not currently impacting coal generation, and without reform, most likely will not impact coal generation before 2030.

In this section, Sandbag models EU ETS demand and supply through to 2030 to analyse the surplus.

Supply-side

Sandbag makes the following assumptions

- All 10.53bt of Phase 2 cap comes to market
- All 15.60bt of Phase 3 cap comes to market – i.e. in line with the 20% 2020 target
- All 15.50bt of Phase 4 cap comes to market – i.e. in line with a 40% 2030 target
- 1.6bt of CERs come to market 2008-2030.
- No aviation demand

Demand-side

Sandbag modelling uses the following assumptions:

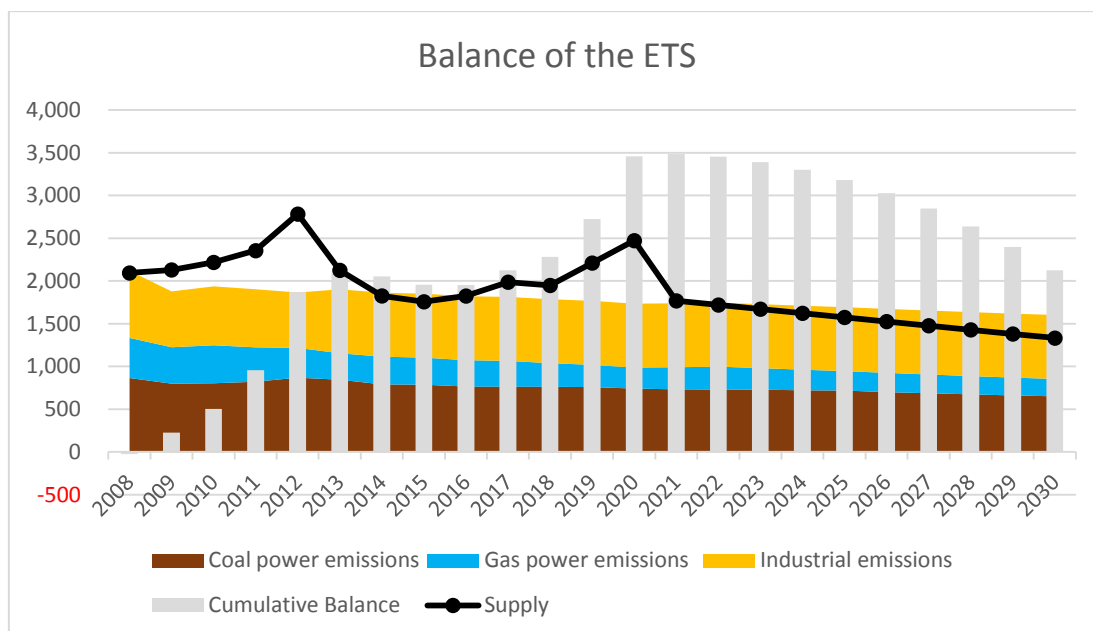
- European Commission electricity consumption growth rates.
- Use actual ETS emissions for 2008 to 2013.
- Against a 2013 baseline, assume each coal and gas ETS emissions by % fall in coal and gas generation calculated in section above.
- Assume industrial emissions remain unchanged at 2013 levels. Whilst the European Commission does not forecast ETS industrial emissions, Sandbag believes their implicit forecast across 2010 to 2030 is 0% growth. This is a critical assumption in the model.

	Supply	Coal power emissions	% coal generation, relative to 2013 levels	Gas power emissions	% gas generation, relative to 2013 levels	Industrial emissions	Total emissions	Cumulative Balance
	<i>mt</i>	<i>mt</i>		<i>mt</i>		<i>mt</i>	<i>mt</i>	<i>mt</i>
2008	2,094	866		469		784	2,120	-25
2009	2,130	801		426		653	1,880	225
2010	2,218	805		445		689	1,939	504
2011	2,355	824		402		679	1,905	955
2012	2,783	871		349		648	1,867	1,871
2013	2,125	847		309		748	1,904	2,092
2014	1,826	792	94%	324	105%	748	1,866	2,052
2015	1,758	788	93%	317	102%	748	1,855	1,955
2016	1,825	768	91%	308	100%	748	1,825	1,954
2017	1,987	766	90%	302	98%	748	1,817	2,124
2018	1,949	764	90%	277	89%	748	1,790	2,282
2019	2,211	761	90%	260	84%	748	1,771	2,722
2020	2,472	743	88%	245	79%	748	1,738	3,457
2021	1,768	734	87%	259	84%	748	1,743	3,482
2022	1,720	733	87%	267	86%	748	1,749	3,453
2023	1,671	731	86%	251	81%	748	1,732	3,392
2024	1,623	723	85%	241	78%	748	1,714	3,301
2025	1,575	720	85%	227	74%	748	1,697	3,179
2026	1,526	702	83%	225	73%	748	1,676	3,028
2027	1,478	689	81%	219	71%	748	1,658	2,848
2028	1,429	676	80%	214	69%	748	1,639	2,639
2029	1,381	663	78%	208	67%	748	1,621	2,399
2030	1,333	653	77%	203	66%	748	1,606	2,126

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Conclusion

The results are that in 2030 under these assumptions, with no additional policy or measures, the ETS is still oversupplied by 2.1bt. This is likely to result in prices of less than €10/tonne until at least 2030. Therefore, no coal-gas switching is required before 2030 and coal generation is not substantially constrained.



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- Ensuring the EU ETS is strengthened – through approving the Market Stability Reserve, but also through cancellation of permits to erase the legacy surplus and a tightening of the cap going forward.

About this briefing

We are grateful to the **European Climate Foundation** for helping to fund this work. Full information on Sandbag and our funding is available on our website (www.sandbag.org.uk).

Briefing Author: Dave Jones. Contact dave@sandbag.org.uk or on (+44) 02071 486377.

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