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Insights from the UK coal phase out experience

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Introduction

- Historical importance of coal to UK
- UK as first country to commit to coal phase out
- UK offers practical experience of how government policies have interacted with and influenced decisions taken by private companies (and their responses / tactics)
- Gives insight into potential policy instruments applicable in other contexts / countries + challenges of some options eg CCS



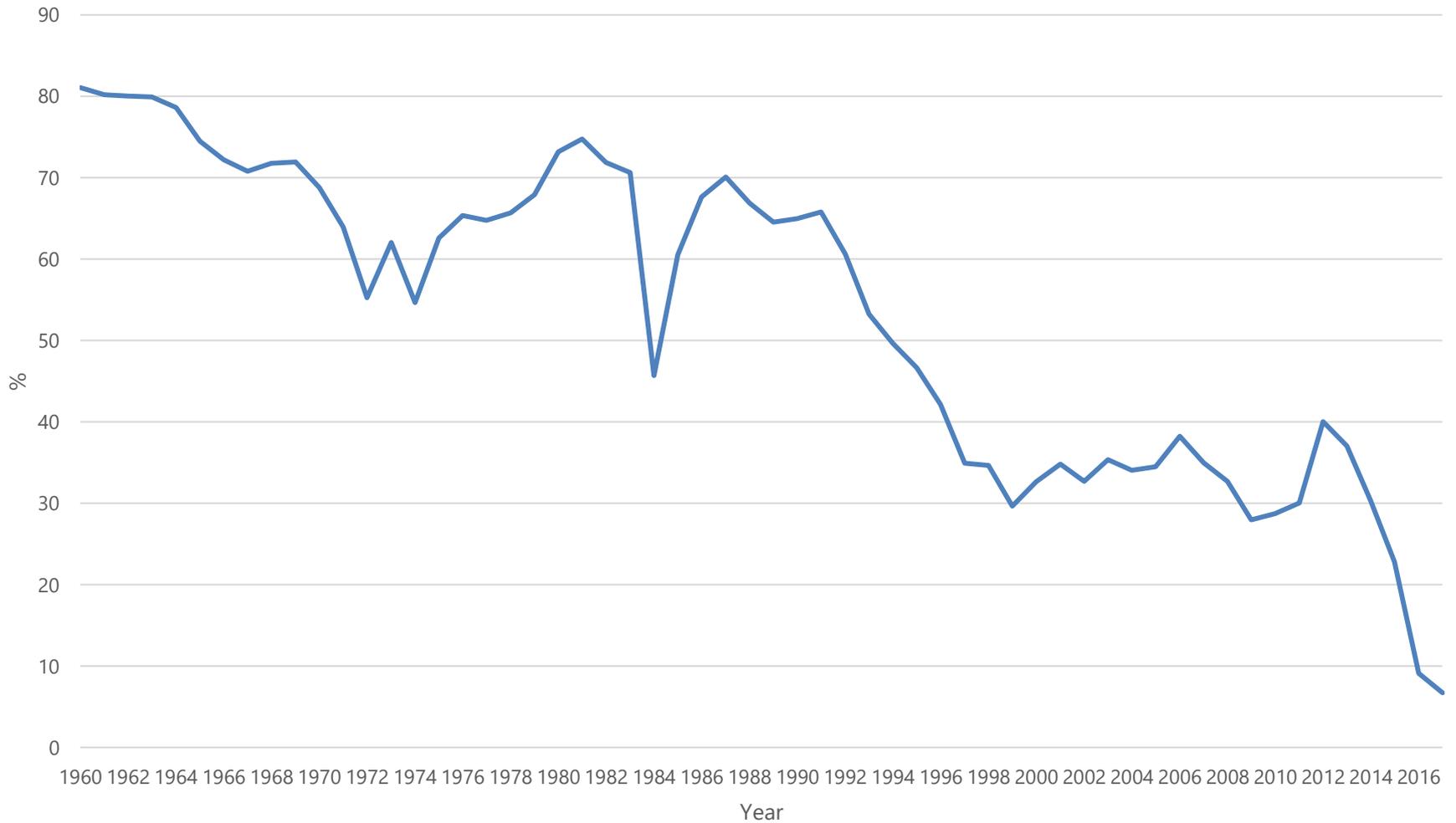
Introduction (continued)

- Key insight is that in UK, the preference of utility companies has been for:
 - 1. Continued operation.
 - 2. Closure.
 - 3. Conversion.
- [It should be noted that this is in context of a relatively older coal power plant fleet than present elsewhere.]

% share of UK electricity from coal

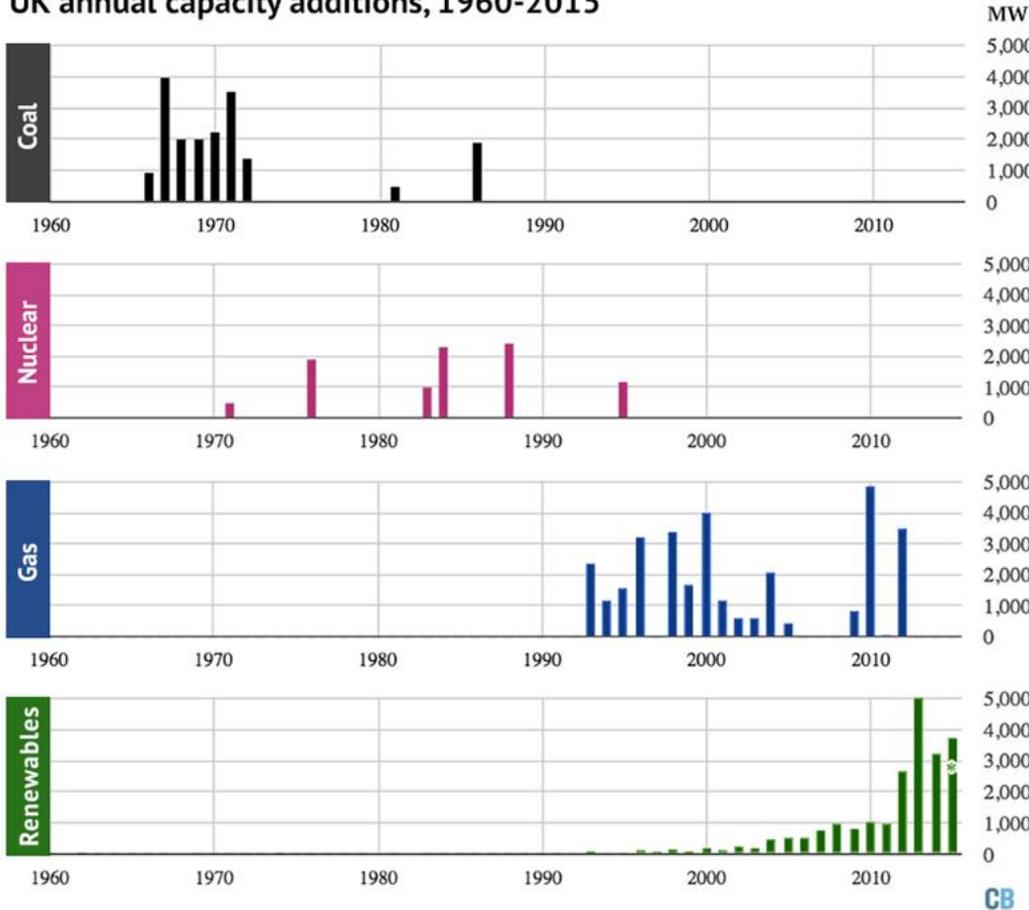


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Phases of investment in generating technologies

UK annual capacity additions, 1960-2015



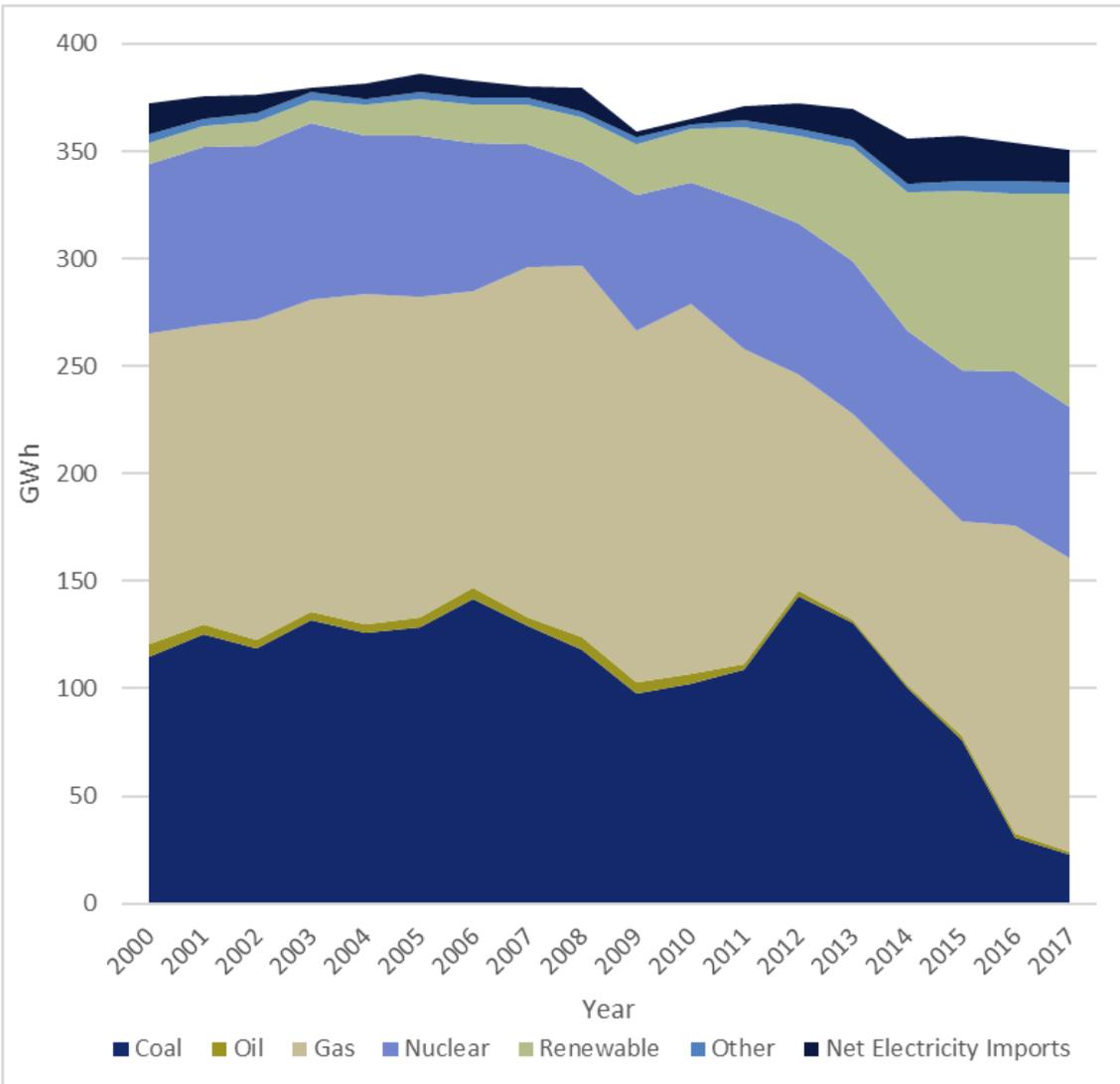
UK coal power plants mainly from late 1960s and early 1970s. Most recent 3 units from 1986.

Gas capacity built alongside privatisation in 1990s.

Significant growth in RES in 2010s

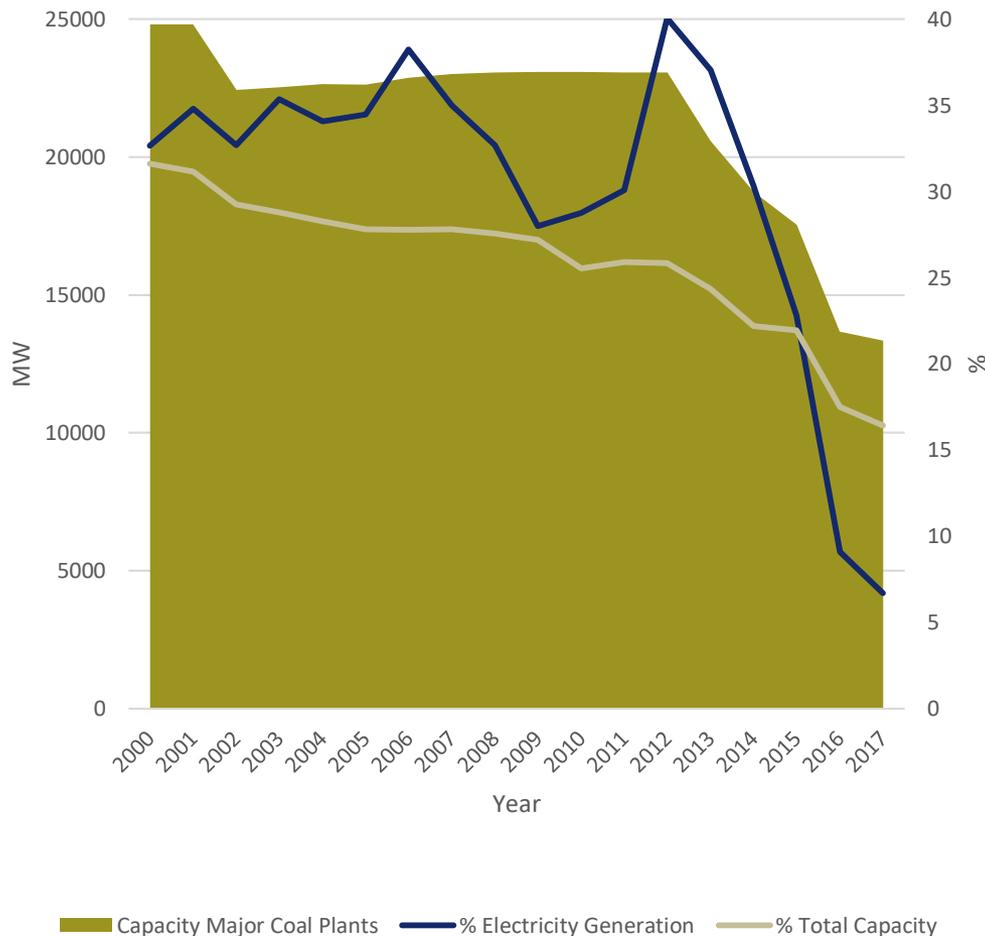
Intention of utilities and government had been for new generation of coal plants to be built ~2010. Civil society pressure + Climate Change Act + CCS requirement resulted in no new coal being built.

UK generation by source



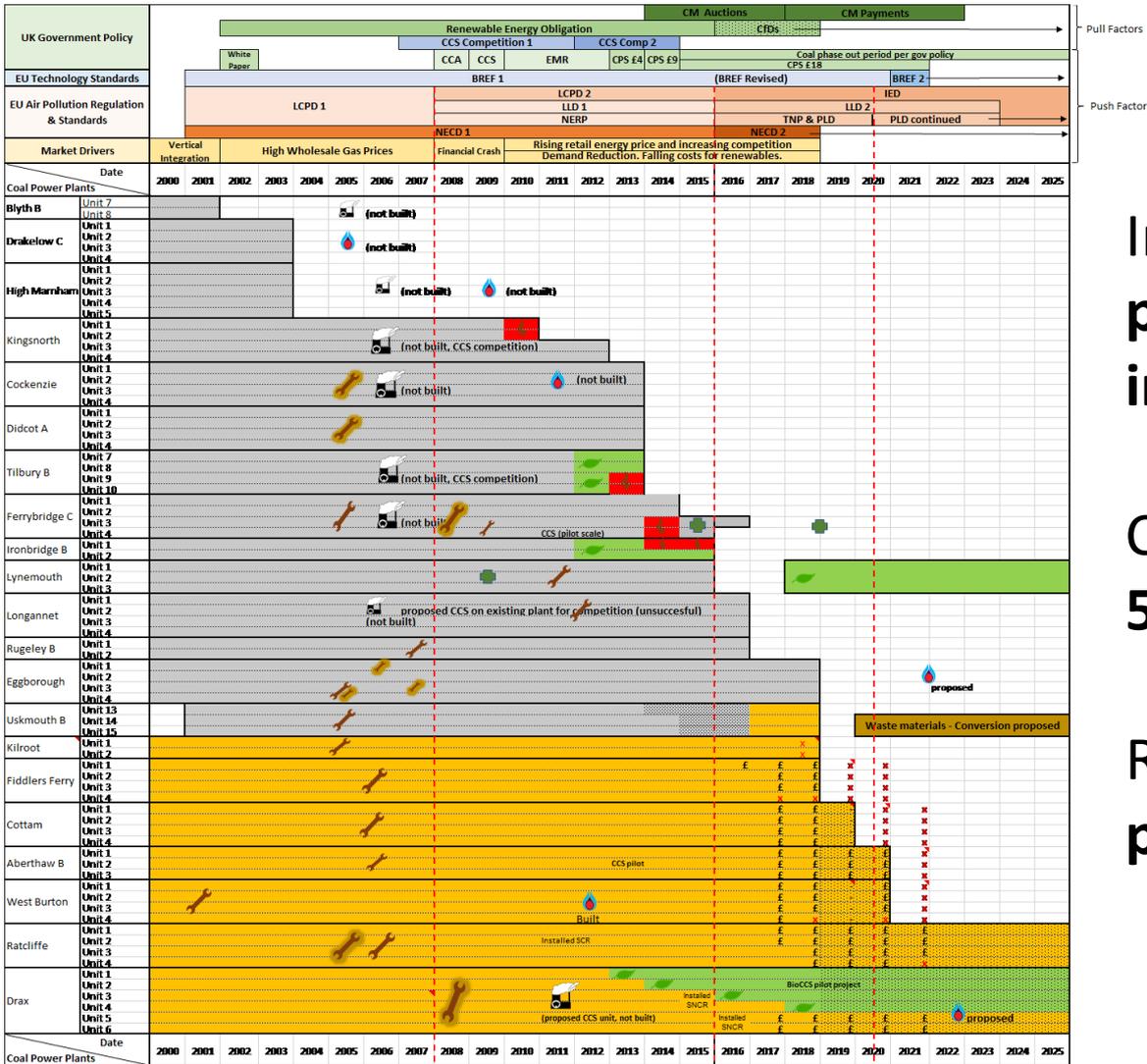
- Overall reduction in demand continued post-recession due to energy efficiency gains.
- Reduction in coal has occurred in parallel (and impacted by) the growth in renewables – particularly solar during middle 6 months of the year.
- Existing gas capacity has seen higher load factors, but very limited additions of new capacity – and significant reduction in forecasts of new capacity.
- Interconnection has assisted transition.

Coal power plant capacity and generation have both fallen since 2012



- Reductions in capacity primarily as a result of decisions taken under Large Combustion Plant Directive (air quality).
- Spike in generation to 2012 reflects use of available operating hours prior to introduction of carbon price support
- More rapid fall in generation than capacity reflects carbon price impact + growth of Renewables (esp solar) + capacity payments

Review of UK coal power plants



In 2000: **21 power plants, 76 units, 33GW installed capacity**

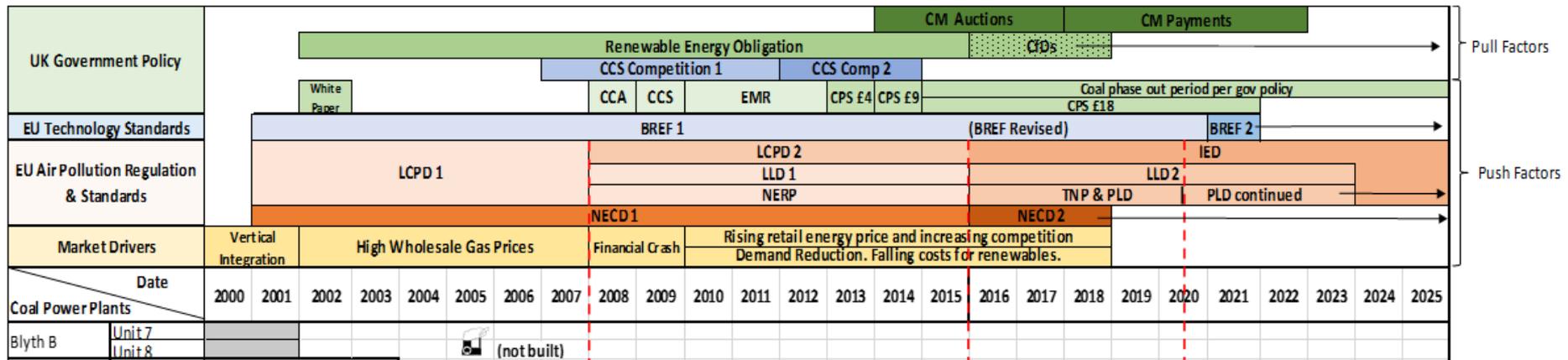
Closed: **13 power plants, 50 units, 21GW**

Remaining: **8 power plants, 26 units, 12GW**

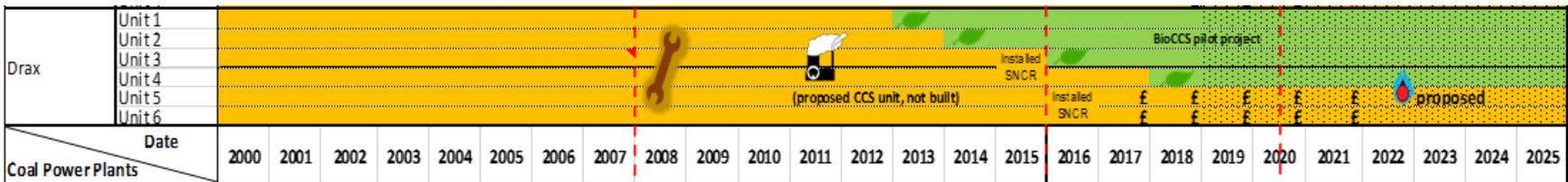
Study reviewed Push and Pull factors



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Analysis looked at each coal power plant in operation since 2000 and the timings of its decisions to continue operations / close / convert.





Three waves of closures

Wave 1 – early 2000s

- Three coal plants closed in the period 2001-03, primarily for commercial reasons.

Wave 2 – 2010-15

- Seven coal plants closed during this period (plus Uskmouth, which subsequently reopened under different ownership). The primary driver for most of these closures was the decision to take the Limited Life Derogation (LLD) (of maximum 20,000 hours operation) rather than upgrading to meet the pollution standards.

Wave 3 – 2015-2018+

- In the current wave of closures, three power plants have closed so far due to the combination of worsening plant economics and impending retrofit costs under the new IED if they were to continue operation.

Pollution controls AND Carbon pricing



- We found that there was a particularly important influence from the Large Combustion Plant Directive and Industrial Emissions Directive. These provided market-wide timeframes for decisions on whether to install pollution control equipment (in order to continue operating) or instead to pursue a pathway to retirement.
- Carbon prices and the impact on the economics of generation were more relevant for determining how much each power plant operated.



Options not taken...

- Initial instinct was to pursue new coal, but none built
- This incorporated consideration of CCS, including two government competitions for funding:
 - CCS technically deliverable
 - But difficult and expensive
 - Alternatives easier and cheaper
- Parallel shift to consider new gas CCGT, but majority not built and projections falling
- Increasing market focus on flexibility



UK conversion experience

- Drax – large scale conversion, 4 units to biomass, prior experience of co-firing, supply chain.
- Lynemouth – smaller scale to biomass, had been autogenerator for Rio Tinto Alcan, now EPH. Has subsidy contract.
- Uskmouth – plant closed & reopened several times. Now pursuing conversion to waste pellets. Part of industrial group = internal PPA contracts.
- Tilbury & Ironbridge previously pursued biomass conversion ahead of full decision on future of plants, but serious fires damaged units and led to closure.

Alternative uses of sites

Rugeley coal plant to be transformed into a sustainable village

Energy firm plans to build 2,000 homes powered by solar panels on the Staffordshire site



▲ Super efficient homes are to be built on the Rugeley coal power plant site. Photograph: nagelestock.com/Alamy

An old coal power station is set to be transformed into a “sustainable village” of 2,000 homes powered by solar panels, in the biggest redevelopment yet of a former UK power plant.

French firm Engie said it had decided against selling off the [Rugeley site in Staffordshire](#) and would instead build super efficient houses on the 139-hectare site as part of its bid to “move beyond energy”.

Half of the energy required by the new homes will come from green sources, predominantly solar, which will be fitted on rooftops, in a field and even





Key Conclusions

Coal plant conversion has been a minority strategy:

1. The preferred option of generating companies has been **continued operation** of existing coal power plants, until this becomes uneconomic due to market performance, age of components, and / or the need for significant upgrades to meet environmental regulations.
2. In the majority of cases, coal power plants have then pursued **closure**, with consideration of new developments on site.
3. Only in a minority of cases have existing coal power plants opted for **conversion** to operate existing power plant assets using alternative fuels.
4. Operators have sought to redeploy staff to other roles within the company and / or have offered retirement and retraining.

About E3G



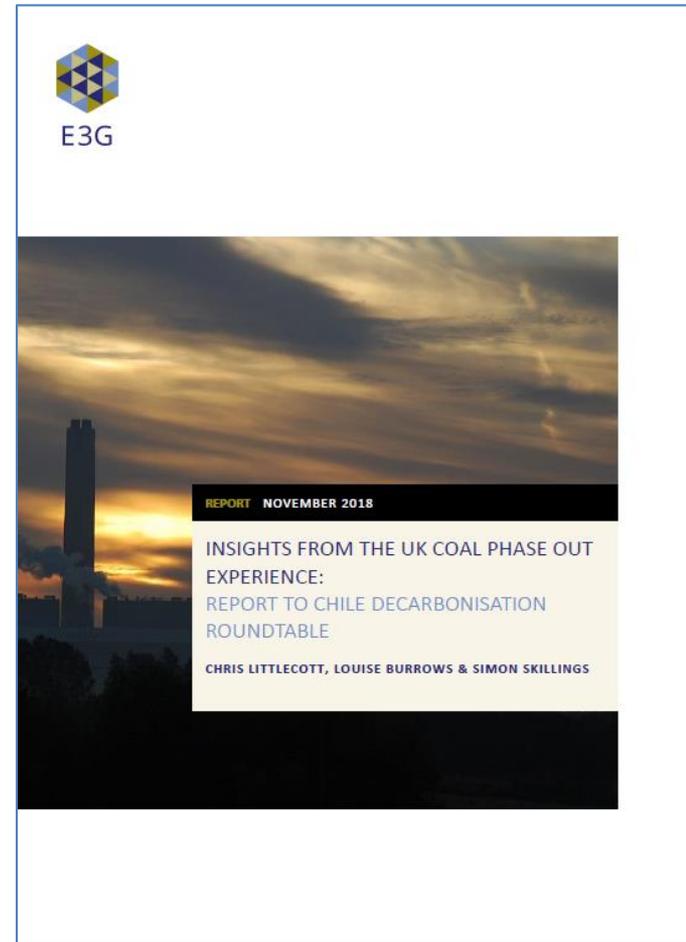
E3G is an independent climate change think tank operating to accelerate the global transition to a low carbon economy.

E3G builds cross-sectoral coalitions to achieve carefully defined outcomes, chosen for their capacity to leverage change.

E3G works closely with like-minded partners in government, politics, business, civil society, science, the media, public interest foundations and elsewhere.

In February 2018, E3G was ranked the fifth top global environmental policy think tank for the second year running.

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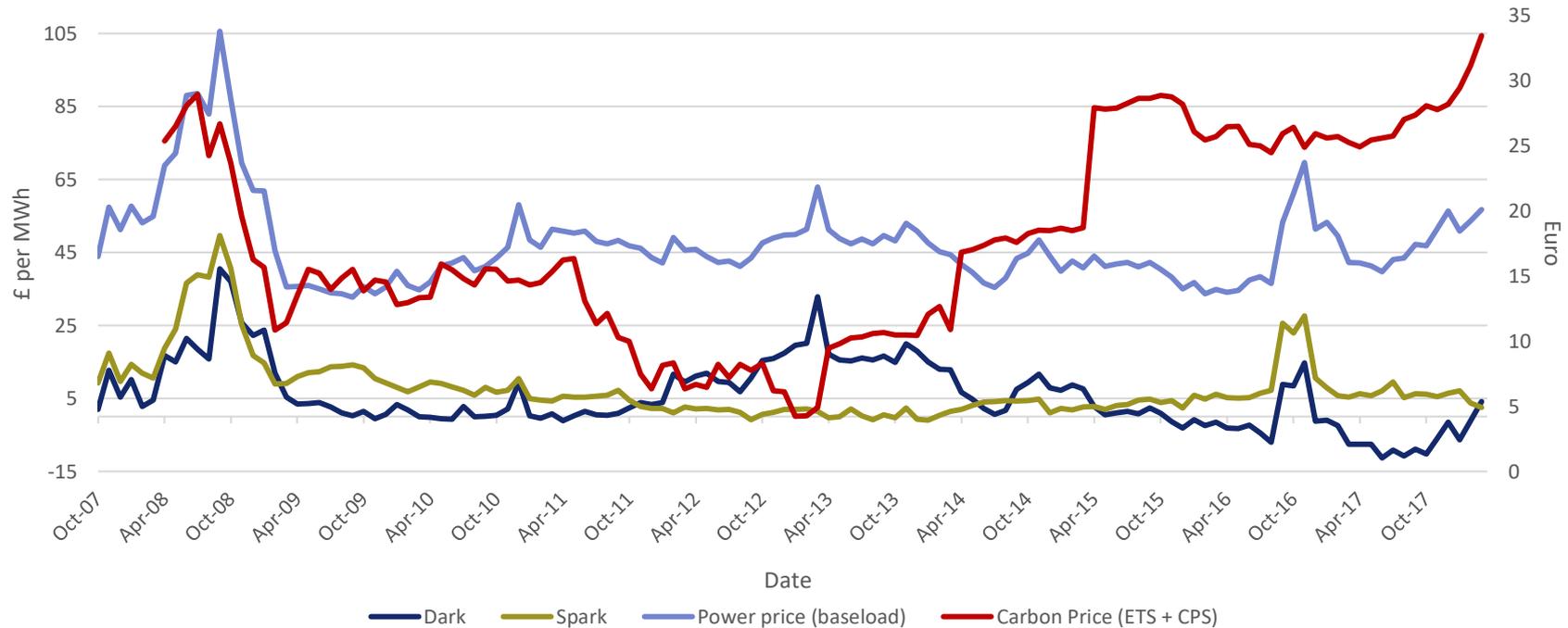


Additional slides



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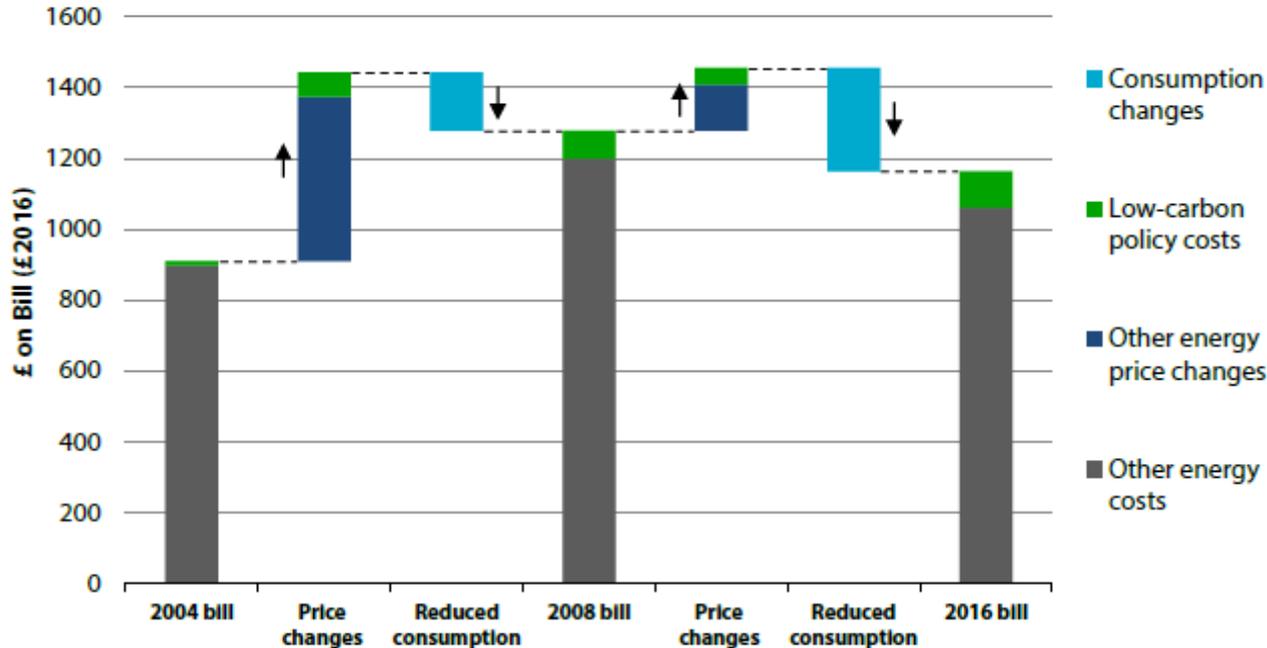
Carbon Prices impact on profitability and coal vs gas competition



Increased carbon prices have made coal more expensive and favoured gas generation.

[‘Dark’ = coal profit margin. ‘Spark’ = gas profit margin. Carbon price is combination of EU Emissions Trading System price plus UK Carbon Price Support.]

Energy Bills

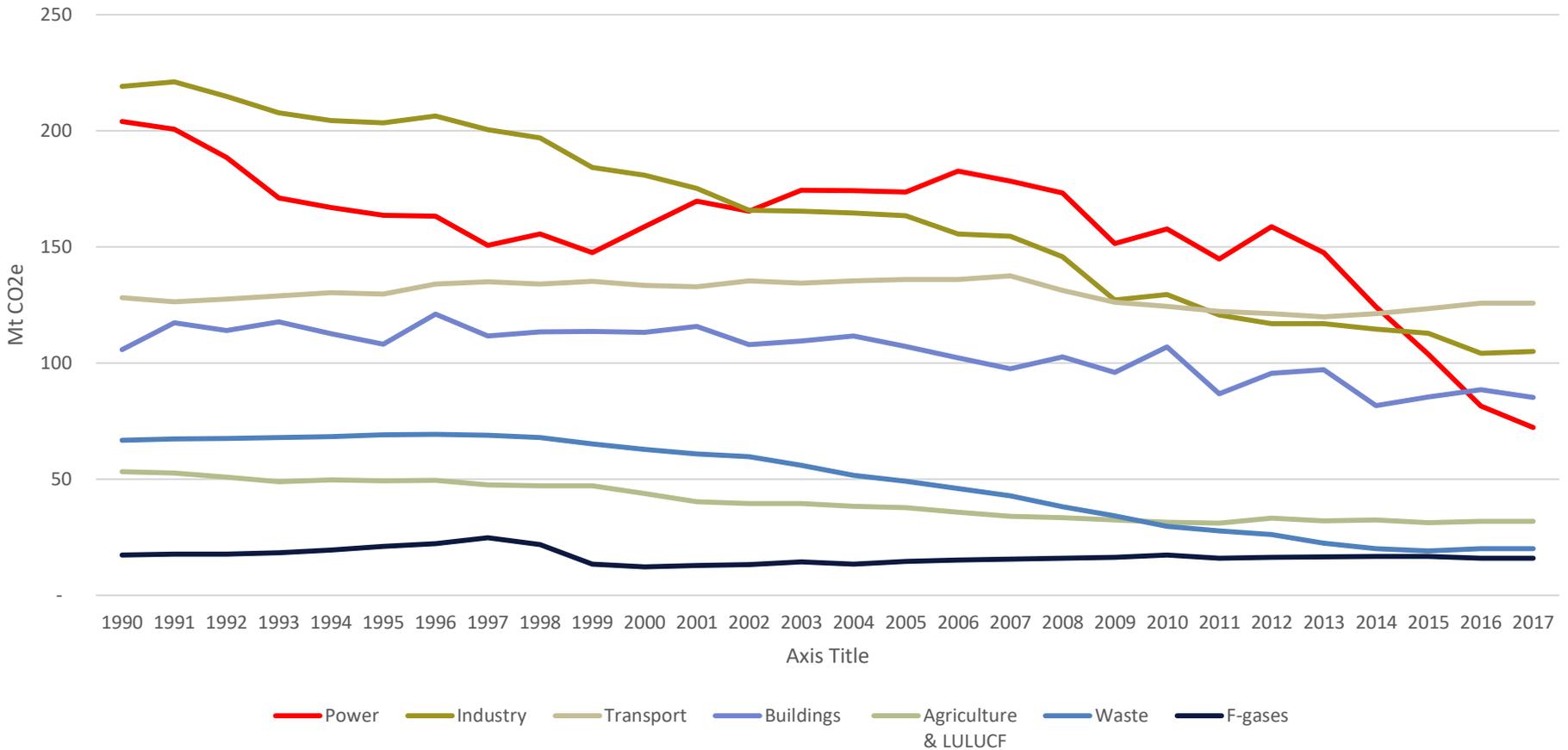


Energy costs have greater impact on bills than policy costs.

Energy efficiency and reduced consumption limit overall costs to consumers even if unit costs increase.

Source: CCC

UK emissions reductions by sector



Power sector reductions have been the big success story across UK sectors and responsible for UK leading position among G20 economies