



Keeping the lights on: Technical solutions

NATIONAL GRID UK

A SWIFT AND SAFE TRANSITION FROM COAL TO CLEANER ENERGY

The grid operator looks back on the quiet revolution that allowed the UK's energy system to move away from coal without compromising on costs or security of supply.

Coal has been at the heart of the economy in the UK for over 200 years, but its decline has been rapid over the last decade, replaced by cheaper and cleaner sources of energy. Although some coal plants are now on standby for the 2022-2023 winter due to unprecedented problems in global energy markets, the UK remains committed to phase-out by 2024.

With coal accounting for 40% of coal power generation as recently as 2012, transitioning away from its use in power generation marks a dramatic shift and has been a major factor in the UK's success in cutting its CO₂ emissions to date. While the move away from coal has been rapid, several policy and technical tools have helped achieve a smooth transition with system reliability, performance and costs unchanged as a result.

As well as playing a vital role in connecting millions of people to the energy they use, National Grid continually seeks ways to make the energy system cleaner.

As part of planning for the phase-out of coal power stations, National Grid developed several future scenarios. These were regularly updated to allow engineers and market operators to understand the impact of these planned changes and to develop the tools to operate the power grid securely without coal. The business developed these scenarios publicly with wide involvement of industry experts and academics.

National Grid's analysis of the power market balance and investment showed that new measures would be needed to ensure confidence in future supply capacity. This led to the development of a capacity mechanism that went into operation in 2016.

Alongside this, the introduction of new rules for grid connection allowed windfarms to connect ahead of completion of wider network upgrades, accelerating the rate of connection and removing investment risk for new renewables.

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National Grid's technical analysis of the power system highlighted that new sources of voltage management and system security services would be needed to replace services delivered by coal stations. These were approved as required, forming part of the investment plan for the development of the grid.

In the end, the decline in coal-burning for electricity was much more rapid than anyone thought possible. Energy efficiency standards for electricity use slowed growth in demand and the combination of the UK carbon price, the rise of cheaper renewables, and alternative capacity from existing gas power stations meant that coal power stations ran less and less. As a result, the economics of keeping such large coal-fired facilities operating became increasingly unviable.

These rapid changes kept the UK energy industry on its toes. There was a need to quickly replace some of the services that coal power stations had provided, such as local voltage support and services that permit the grid to repower in the event of a total shutdown. National Grid accelerated and successfully delivered investment plans to ensure that coal power stations could close without affecting costs or system reliability.

Looking back, it is inspiring to remember that 15 years ago a transition that looked challenging and slow has in fact proved to be both reliable and very swift. The UK has moved on. The skilled technicians, engineers, traders and scientists employed in coal now work in a booming jobs market, using their skills to support the growth of the power grid for electrification and renewable energy. Moreover, the industries that once underpinned coal supply chains now deliver goods and technologies for offshore wind, solar and batteries as the clean energy economy grows and the power grid moves steadily to zero carbon.



Wind turbines and electricity pylons in East Sussex, United Kingdom | Source: Shutterstock