



ECONOMIC CONSULTING ASSOCIATES

Market Brief

Putting out the fire: The difficulties facing new CCGT plants in the UK

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In November the UK government announced its target of closing all coal fired generators by 2025, becoming the first major economy to put a date on shutting coal plants.

Instead, the country will look to nuclear and natural gas-fired power plants to complement variable renewable energy. The decision should have a significant impact in efforts to reduce emissions, but will increase the strain on gas-fired plant in a way that could have unintended consequences for efficient market design and the cost of system operation.

More renewables and less coal puts a strain on gas fired generators

High levels of penetration by renewables forces new load shapes and an increased premium on flexible and dispatchable plants. The increased need for flexibility of output, fast-start and rapid ramping capability alongside declining load factors as renewables penetration increases, and the overall lower load factors that result, change the composition of the “residual” generation mix required.

Solar by its nature can only be generated during the daytime, while the UK has an evening peak. Therefore just at the time there is an acceleration in demand, solar output slows down. More solar therefore results in a steeper afternoon-to-evening ramp rate to be met by flexible generators.

Wind generated electricity has the potential to exacerbate this issue. Output between wind generators is correlated meaning that, as their penetration grows, the total variability of output also

increases. In a perfect storm event, a decline in solar output as night falls would combine with a drop in wind speeded to procedure very major and rapid declines in generation.

Less certainty and higher costs for gas generators

In the absence of large volumes of hydro power, the required flexibility around shoulder periods must be met by thermal capacity – in the UK this will mean gas. Furthermore lower load factors mean the fixed costs of such plant would have to be recovered over shorter periods of higher prices with increased uncertainty on volume and price. This issue is compounded by the added operational costs imposed by more intermittent dispatch.

Increased revenue uncertainty and a reliance on politically challenging price spikes, has led to concern over insufficient investment in the required firm generation to meet peak demand. The UK’s capacity market is intended to meet this potential “missing money” gap.

However, the current market structure focuses solely on capacity – namely having enough to meet peak – not the optimum portfolio of plants for managing shoulder periods such as those in the evening transition. As a result, the UK’s capacity market is achieving the paradoxical outcome of low prices which do not support new capacity investment at a time when warnings of system inadequacy are growing.

In the first UK capacity auction only 5.3% of allocated capacity was 'New Build'. As existing plants are price inelastic the clearing price is driven by these new bidders. Last year, Carlton Power's Trafford CCGT, a 1520 MW project in Manchester, received a 15 year agreement at the low clearing price of 19.40 £/kW. An annual capacity payment this low barely covers the direct fixed costs of a new CCGT.

So what can be done to ensure the various markets give the optimal generation mix?

While increased use of demand response and storage can contribute, for the immediate future the UK will continue to be reliant on gas-fired generation to provide flexibility. Creating incentives for new CCGT capacity to cover shoulder periods will either require shaking up the capacity market or an ever-increasing reliance on ancillary services procurements, such as National Grid's Short-Term Operating Reserve.

Amendments to the capacity market appear the currently favoured approach, retaining more of the appearance if not necessarily the reality of the vaunted competitive power market. However, the options under discussion seem to lack elegance and may create further distortions.

Firstly you could change what the capacity market is trying to procure. The current UK capacity market targets capacity to meet peak demand. Instead the market could procure firm capacity, with minimum technical criteria regarding operational flexibility. This will tend to reduce the weight placed on low carbon

capacity and increase the requirements for new gas-fired capacity.

A second option would be to simply disaggregate the capacity market. This may be done by ring-fencing a proportion of the auctions for specific generation types or separate existing and new capacity into separate pots.

Alternatively, purchases through ancillary services contracts could be further increased. But this introduces new distortions in the energy market. Potentially, much capacity could shift across to the ancillary services market, severely reducing liquidity and the usefulness of the energy market. While the energy and ancillary services markets could be integrated, this would itself imply major changes in market design.

What options are available to assist CCGT plants once they enter the market?

None of the above approaches appear particularly satisfactory. Instead, the ideal solutions are those *within* the energy market:

- Increasing system flexibility through measures such as demand side participation and shorter gate closures.
- Flattening supply and demand curves by further strengthening interconnectors between systems to increase geographic diversity.

But the mid-term potential of these neat solutions is likely to remain limited and the less desirable routes appear unavoidable. In the energy policy balancing act between efficient markets and emissions reductions, the UK government may have just lent more towards the latter than it realises.



Economic Consulting Associates was established in 1997 to provide economic and regulatory consulting services to industry and government. Our senior staff have many years' experience of carrying out economic, market and policy analyses in the electricity, natural gas and water sectors.

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