

## Review of the third GB capacity auction

ELECTRICITY MARKET REFORMS

JANUARY 2017

*On the 9th December 2016 National Grid published the results of the third T-4 Capacity Market auction for delivery in 2020/21. Here, we examine the results, and comment on potential areas for concern going forward.*

### Overview

- The auction cleared at a price of £22.50 per kW, higher than last year's price of £18.00 per kW.
- The total amount of de-rated capacity procured in the auction was 52.4GW, higher than in any previous Capacity Market auction.
- Two new 300MW gas plant won 15-year contracts, which gives some encouragement for future auctions.
- 5.7GW of coal plant won contracts and so will stay on the system until at least 2021, meaning there may be more questions around the government's plans to remove all coal-fired power stations by 2025.
- As in the two previous auctions, a large number of new-build small-scale diesel and gas engines cleared, totalling 1.3GW.
- There was the largest uptake of Demand Side Response (DSR) and battery storage technologies to date, with 1.4GW and 0.5GW of contracts, respectively (though this is still only around 4% of the total capacity procured).

Tom Porter

Partner

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*The lower than anticipated clearing price is good news for consumers. However, many generators face an uncertain future, with almost 10GW of existing capacity having missed out on a contract.*

**£22.50/kw**

Clearing price of the Capacity Market auction for winter 2020/2021.

# £14

Average increase to annual household bills required to provide contracts.

# 5.3GW

of installed CCGT and Coal capacity missed out on a contract.

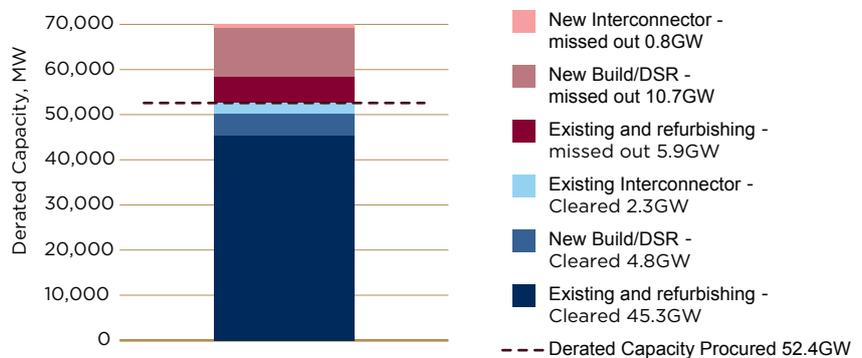
### Headlines

On the 9th December 2016 National Grid published the results of the third T-4 Capacity Market auction, resulting from the government's Electricity Market Reform programme designed to ensure that there is sufficient generation capacity available in coming years to meet the demand for electricity.

The headline figure was the clearing price of £22.50/kW (in 2015/16 prices) which will be paid to all successful participants for providing available capacity in winter 2020/21. This is slightly lower than many expected, but nonetheless above last year's clearing price of £18.00/kW. The cost of providing these capacity payments will be charged back to consumers through their electricity bills with the total cost of contracts awarded in these auctions expected to be £1.18bn in 2020/21, and add about £14 to the average annual household bill.

The low clearing price is good news for consumers and is a result of significant competition between generators. This competition has meant that only two new gas plant, both approximately 300MW – an OCGT at Spalding and a CCGT at Kings Lynn – have secured contracts, and 5.9GW of existing capacity has missed out. In contrast, almost 1.5GW of small-scale new build capacity (excluding storage and DSR) received contracts, despite warnings from Ofgem over removing some of the benefits for embedded generators.

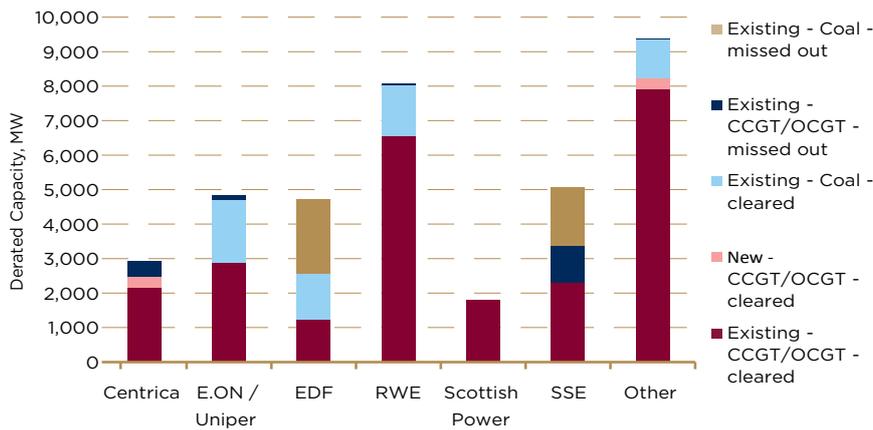
As well as the capacity from small-scale generation, battery storage units won just over 500MW of contracts and DSR made up a further 1.4GW of capacity. In combination with the successful EFR auctions earlier this year, the much anticipated future for battery storage has clearly taken an important first step.



In this briefing, we look at who has won Capacity Market contracts and which major plant did not, as well as analysing the potential implications for the GB electricity market.

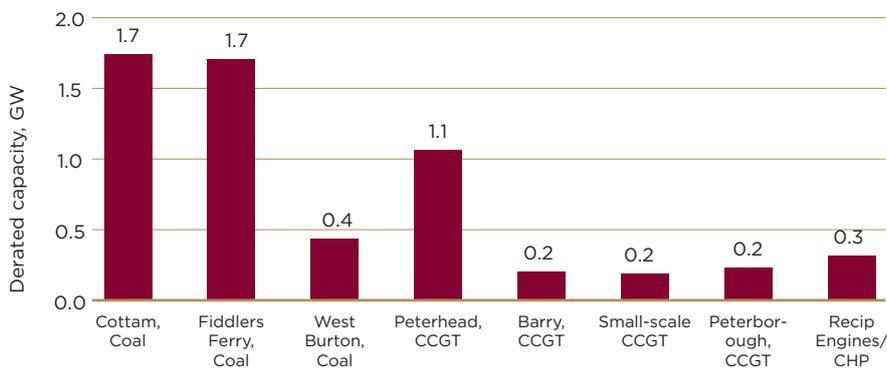
### Analysis of auction results

The chart below shows the results for the existing Gas and Coal units across the major operators.



With a number of large existing coal and CCGT units owned by the “Big 6” missing out on contracts, this auction should lead to further diversification in the ownership of the generation fleet.

Unlike in last year’s auction, where SSE’s Fiddlers Ferry plant missed out, there were no large plant with a 2019/20 contract that failed to win a Capacity Market contract (Cottam initially had a 3 year contract covering the 2018 to 2021 period but pulled out of this earlier in the year). However, there were a number of existing plant that participated and failed to secure a contract:



The majority of the 3.9GW of coal capacity that missed out on a contract looks likely to close before 2020/21. However, 5.4GW of derated coal capacity is set to stay on the system. The government plans to force all coal off the system before 2025 – if all the coal plant contracted in this auction remains operating until then, it could lead to a very significant one-off new build requirement.

Of the eight large new build gas plant (>600MW) that prequalified for the auction, none secured a contract. Judging from the supply curve published by National Grid, it appears that these larger gas plant dropped out at a price below £35/kW.

### Participation of small-scale generation

In the current T-4 auction, we have again seen success by small units. 1.3 GW of new-build small-scale diesel and gas generation has secured 15-year contracts, up from 1 GW in the last T-4 auction held in December 2015. These small-scale generators (< 100 MW) can connect directly to the distribution grid, allowing them to receive the so-called “embedded benefits”.

The most important of these relates to running at the time of system peak (the triad) and in doing so helping energy suppliers avoid Transmission Network Use of Service (TNUoS) charges levied on peak demand. A significant proportion of the TNUoS demand charge – the TNUoS demand residual – reflects the sunk costs of the transmission network, over and above National Grid’s estimate of forward looking incremental costs. To give an idea of scale, the current TNUoS demand residual is £45/kW which is more than double the 2016 T-4 auction price. It is forecast to increase to £72/kW by 2020/21. The current regime means that embedded generators benefit by an amount much greater than the transmission investment they help to save.

This arrangement arguably distorts the competitive playing field, by giving distribution-connected generators a non-cost reflective cost advantage relative to transmission-connected plant in the capacity auction. It also means that the tariffs of other network users have to go up to make sure National Grid recovers its allowed revenue.

In previous briefings, we commented on this issue and in March 2016, BEIS’ consultation on CM reform recognized that current charging arrangements may be over-rewarding embedded generators resulting in “inefficient outcomes in the CM”<sup>1</sup> and urged a review.<sup>2</sup> Ofgem issued an informal consultation on the issues in the summer, and then in the week before the recent T-4 auction, on 2 December 2016, they issued an open letter re-iterating their concern with the rising TNUoS demand residual payment for embedded generation. Ofgem, noted that they will be making a

<sup>1</sup> DECC. Consultation on further reforms to the Capacity Market. 16D/027. 1 March 2016.

<sup>2</sup> Furthermore, BEIS suggested it would be appropriate to set binding emission limit values on relevant air pollutants from diesel engines by January 2019. In November 2016, Defra commenced a consultation on proposals to introduce tight limits on NOx emissions from small scale generation (i.e. with a capacity of 1-50MWth) requiring any new generator winning a CM contract starting in December 2016 to comply with a limit of 190mg/Nm<sup>3</sup> from 1 January 2019. The proposed legislation is likely to affect diesel generators, as well as less efficient gas engines with higher NOx emissions.

# 1.3GW

of new-build small-scale diesel and gas generation received a 15-year contract.

decision on proposed modifications to the regime in the first half of 2017, and urged CM participants to expect the lowest possible value (i.e., zero) for the TNUoS demand residual proposed in the modifications under consideration.

The success of embedded generators in the recent T-4 auction, over and above the previous T-4 auction, could then be considered surprising in light of Ofgem's clear guidance to stakeholders on the revenue streams they can expect from the TNUoS demand residual payment. In the past, these revenue streams have clearly represented a significant part of the business case for smaller units, to the point that one of the arguments made for "grandfathering"<sup>3</sup> of these embedded benefits for committed plant is that these are needed to secure the business case for the investment.

In our view, there are (at least) two possible explanations of the outcome of the recent auction.

The first is that some bidders have either not seen or have discounted Ofgem's advice, and have factored embedded benefits at the current levels into their bids. This may be a particular risk for developers of smaller units who may not have followed all developments to what is a fairly arcane aspect of industry charging arrangements. We note that there are indications that sites with connections to the distribution grid previously intended for solar projects may have bid into the auction as small-scale reciprocating engines so as to have an option to develop them. If this is the case, and if the embedded benefits are removed, attention may again focus on the penalties for reneging on a capacity agreement. These were toughened after the first and second auctions as a result of decisions related to larger plant<sup>4</sup> - we may soon see a further test of whether they are now tough enough. If they are not, it will clearly place pressure on the T-1 auction.

The second possible explanation is that bidders have seen Ofgem's advice, factored it in, and still see a positive business case for the capacity at the clearing price. This may appear an unlikely outcome, as it would imply fairly dramatic reductions in the effective capital and operating costs of small plant relative to most estimates. But if it is true, and there are no other material distortions, then maybe the authorities should be content. Sometimes markets don't deliver what politicians want them to! But if they are competitive and there are no material market failures or distortions, then the outcome is likely to be preferable to the solution which is "politically" right. It is worth noting, though, that if this is the explanation, calls from small plant investors for grandfathering to ensure they can continue to justify committed investments may seem somewhat hollow.

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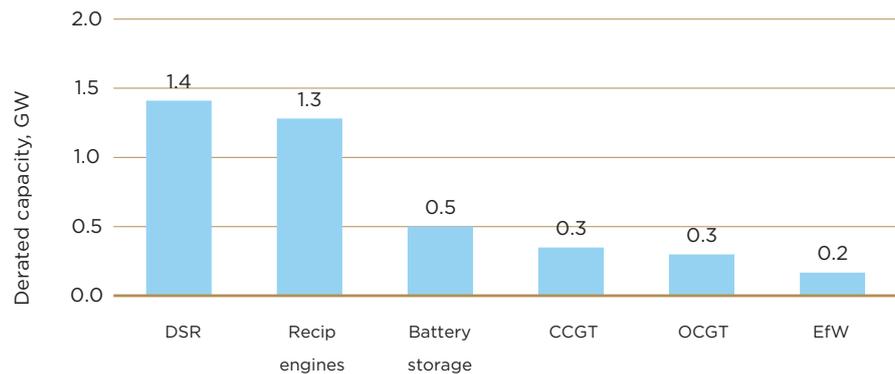
<sup>3</sup> Continuing to pay the benefits on existing or committed plant.

<sup>4</sup> Trafford, the only new large gas plant to have been purchased through the capacity auction, announced on December 20 2016 that it was reneging on its CM contract

### DSR and Battery storage

DSR providers were awarded 1.4GW of capacity, approximately three times the capacity awarded in last year's auction (0.5GW).

#### New build and DSR capacity securing contracts



The participation of DSR in the auction is a positive factor, as it enhances competition and can provide genuine security of supply benefits. It is unclear how much of the DSR is “true” demand reduction and what proportion is generation located behind the meter, which would most likely be made up of more gas and diesel engines. Additionally, only 44MW of the cleared capacity is “proven” DSR (from one provider, Flextricity Ltd.), meaning the vast majority of the successful capacity must undergo tests to verify the actual level of load that can be reduced.

# 8.9%

Percentage of total capacity awarded to storage facilities and DSR providers

Incentives for “behind the meter” generation present one of the challenges associated with Ofgem's ongoing review of network charging arrangements. While the changes being considered by the industry would reduce the incentive to build smaller units connected to the distribution system, they would not affect incentives for on-site generation (i.e. generation behind the customer's meter). If such generation (be it new capacity or an existing stand-by unit) were run at times of system peak, even under the modified arrangements the supplier would still avoid the full amount of the TNUoS demand residual. The same is true of genuine load reduction. Without making other changes, the risk is therefore that the proposals on the table solve a distortion to competition between distribution and transmission connected generation, but in doing so create one between grid connected and behind the meter capacity.

Addressing this problem would need yet a further change, such as recovery of residual charges on a different charging base (such as annual consumption or even a pre-determined measure of connection capacity), or making amendments to metering regulations to require that significant behind the meter generation is separately metered and registered.

<sup>5</sup>Including for example in relation to tax exemptions associated with financing small and large plant.

One positive result from the auction was the emergence of battery storage. 501MW of capacity secured contracts, the first time any batteries have even competed in the Capacity Market. This, in combination with the results of the 2016 tender of National Grid's new Enhanced Frequency Response product, marks a significant step forward in the progress of this technology in the UK. The aggregate capacity awarded to storage facilities (including pumped storage) and DSR providers totals 4.6GW, which makes up a significant 8.9% of the total capacity.

The success of storage capacity may lead to a further question in relation to penalties. Capacity with CM contracts is required to contribute throughout a system stress event (as well as demonstrating capability through the year upon request). For a generation unit, this implies being available and generating. In contrast, in order to avoid penalties, a storage unit must have sufficient filled storage capacity to last through the likely duration of such an event.

The capacity auction is only concerned with derated injection capacity. For a storage unit, the volume of storage (and hence the maximum duration of delivery) is a commercial decision, balancing among other things capital cost, views on the probability and duration of a stress event, and the penalties for non-delivery. Investors may decide only to invest in small storage volumes if, for example, penalties are low or stress events in which they are required to inject to the grid over a long duration are viewed as unlikely. As the importance of storage grows, policy makers may need to consider whether the non-delivery penalty regime is sufficient to ensure their desired security of supply standard is not undermined by such commercial decisions.

### **Supplementary auction for 2017/18**

This winter we will see two capacity auctions: the T-4 auction just gone, and a supplementary auction for capacity delivering in 2017/18. An important question is therefore whether the T-4 auction provides useful information for participants in the T-1 auction.

The T-1 auction is targeting 53.6 GW of capacity, though could procure as much as 54.6GW if the price is very low. We would expect all the plant with a 2018/19 contract (excluding Trafford), Carrington and the interconnectors to bid with a price of near to zero, as they are committed to staying open. This provides about 50.8GW of derated capacity, assuming that all the new small-scale capacity with 2018/19 contracts is confident it can deliver in time.

*Dan Roberts*

**Director**

Frontier Economics

*Battery storage has taken off, which is a big step forward. Policymakers may need to think about whether a MW of battery always provides the same security as a MW of generation or DSR.*

The remaining 2.8GW-3.8GW of derated capacity will come from a combination of:

- New DSR of which 1.1GW has prequalified.
- Further new small-scale gas or diesel.
- The large existing units that did not secure a 2018/19 contract. These large units include Barking, Barry, Corby, Deeside, Eggborough, Killingholme, Peterborough and Peterhead.

Given the limited volume of new entry capacity it may well be that the bidding behaviour of the existing units will drive the auction clearing price. If there is sufficient appetite, and positive wholesale market outlooks, we could see a lower clearing price. However, given the limited number of participants we may see more aggressive bidding strategies this time around.

### About LCP

LCP's Energy Analytics practice has been at the heart of Electricity Market Reform (EMR) analysis since the first design proposals. We provide analytic and consulting services that support the industry in understanding the impacts of these significant reforms to the GB power market. We also provide some of the key tools in the industry, including the Dynamic Dispatch Model that is used by DECC and National Grid for analysis such as the final EMR delivery plan and the setting of the capacity requirement for the first capacity auction. More widely we support our clients to understand how these fundamental changes to the market will affect portfolio profitability and risk over the medium to long term. We provide a range of services including asset valuation, impact analysis and strategic advice.

### About Frontier Economics

Frontier Economics is one of the largest economic consultancies in Europe with offices in Brussels, Cologne, Dublin, London and Madrid. We use economics to help clients improve performance, make better decisions and keep ahead of the competition. Our expertise is broad, covering not just micro-economics but finance, statistical modelling, game theory, market research and even the psychological side of economics.

We work with a wide range of clients from the private sector, government, regulators, other public authorities and charities. We distil complex issues to focus on what matters to our clients. We help them make credible arguments and good decisions, backed up by robust evidence and analysis. While our analysis may be complex, the advice we provide is clear, honest and delivered using plain language.



### Contact us

If you would like to discuss any aspects of the Capacity Market in more detail or any of our wider services please contact Tom Porter (LCP) or Dan Roberts (Frontier Economics) using the details opposite.

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