

UK REVIEW OF ELECTRICITY MARKET ARRANGEMENTS: STARTING GUN FIRED ON MULTI- YEAR REVOLUTIONARY REFORM?

18 August 2022 | UK

Legal Briefings - By **Paul Butcher, Silke Goldberg and Sarah Pollock**

As energy prices soar and security concerns mount, the UK Government is exploring options to radically overhaul the country's electricity market

On 18 July 2022 the Government released a consultation on options for all non-retail electricity markets in Great Britain: the wholesale market, balancing mechanism and ancillary services. Everything is on the table from the most radical to the incremental. Investors and market participants should pay attention.

Days after the new Energy Security Bill was introduced to Parliament, on 18 July 2022, the Department for Business, Energy and Industrial Strategy (**BEIS**) launched a review of Great Britain's (**GB**) electricity market design to ensure it is fit for purpose. Russia's invasion of Ukraine provides BEIS policymakers with a more urgent framing for the energy trilemma they have been grappling with: the transition to a cleaner energy system, the challenges of soaring energy costs and the need to ensure security of supply by reducing the UK's exposure to volatile global markets.

As we explained [here](#), the Energy Security Bill was the most wide-ranging reform of the UK's energy market for several years. However, the [Review of Electricity Market Arrangements \(REMA\)](#) consultation, the first step in the REMA programme anticipated in April's [British Energy Security Strategy](#), may mark the beginning of reforms that go well beyond anything seen since the 2001 introduction of the New Electricity Trading Arrangements (**NETA**). This is not something that existing or potential investors should ignore.

Revolutionary or merely incremental - this is a process for investors to keep a close eye on and consider engaging with

The proposals range from the incremental to the truly revolutionary with limited steer at this stage on Government thinking. Ensuring that investors remain confident in the GB market throughout the transition is a key priority for Government. The proposals could impact on all investors in the GB electricity market and they will want to carefully assess the implications and consider [responding to the consultation by 10 October 2022](#). The Government's response is anticipated this winter and thereafter any specific reform packages will be subject to further consultation.

As well as providing feedback, investors and other market participants will wish to begin considering the potential implications for their existing and proposed arrangements, including for:

- existing and new power purchase agreements or other long-term agreements linked to the wholesale electricity market, including existing and new rounds of contracts for difference (**CfDs**), in relation to key provisions such as pricing, change in law and termination;
- trading strategies;
- the business models for generators and power purchasers.

New Market Realities - New Market Design?

The last review of the electricity market, Electricity Market Reform (**EMR**), was in 2013, almost a decade ago - to bring forward more low carbon generation investment alongside new 'on-demand' generation capacity to maintain security of supply via the introduction of Contracts for Difference (**CfD**) and Capacity Market regimes respectively.

These were additions to the underlying wholesale market arrangements introduced by the 2001 reforms which remained broadly unchanged. At the time of the 2001 reforms about [2.5%](#) of the UK's electricity was from renewables. By 2021 the figure was just under 40%. This is set to increase rapidly further as the UK seeks to meet its commitment to [decarbonise the power system by 2035](#) with an end to unabated fossil fuel generation by that date.

REMA is therefore seeking views on proposals to change the current market design to reflect a radically different market compared to the arrangements which have been in place since the opening of the electricity market to bilateral trading in 2001

How revolutionary are the proposals?

In our more detailed overview below, we consider the key challenges and proposed reforms respectively for the five elements of market design as structured in the consultation. However, to give an idea of the scale of change that is on the table, below we pick out a few of the more radical proposals and touch on them briefly:

- **splitting the wholesale market into a separate new market for 'as available' power to run alongside an 'on-demand' power market** (the latter operating in the same way as the current integrated market)

The idea would be that the new 'as available' power market would replace future rounds of CfDs with a pricing mechanism based on average rather than marginal costs. An obvious advantage in current conditions, amongst others that BEIS mentions, is to decouple electricity prices from soaring gas prices. This is also the driver for similar proposals made by the Greek Government to EU energy ministers on the 26 July 2022. If implemented, such a change would, on its own, be the most fundamental energy market reform since 2001. However, it raises many, so far, unanswered questions, such as how would the 'as available' price be derived in practice and how would balance be achieved across the two markets?

- **Bringing in locational pricing, either zonal or nodal**

The current wholesale market gives a single GB price with long term locational price signals provided by network charges. Locational pricing would enable wholesale prices to reflect local conditions in real time, potentially both for demand and supply.

With nodal pricing, sometimes called 'locational marginal pricing' (**LMP**), the wholesale price in each relevant location (the 'node') reflects the costs of physical constraints (capacity and losses) and is usually achieved using central dispatch to manage the complexity of balancing across many nodes. With a zonal market the network is divided into clearly defined zones which each have a single price so that the costs of physical constraints as between zones is reflected, but constraints within the zone are ignored.

Zonal pricing would be simpler than nodal pricing to transition to from the current market design, and so less risk of disrupting market participants and delaying investments. However, zonal pricing would by definition offer less granular locational signals than nodal.

- **A supplier obligation to procure low carbon electricity to replace CfDs (and provide wider incentives) with a decentralised approach**

In place of CfDs this would place an obligation on electricity suppliers to procure low carbon electricity with a legally binding trajectory of maximum carbon intensity to deliver full decarbonisation by 2035. The decentralised approach would allow maximum flexibility and innovation in how decarbonisation occurred including via demand side flexibility and outright reduction. However, the most radical aspect of the proposal might also be its most challenging – the suitability of modern day electricity supply companies for such an enhanced role.

- **Equivalent Firm Power Auction consolidating the support of Capacity Market and CfDs**

This approach would consolidate the Capacity Market and CfD regime support schemes and give the market a greater role in determining the capacity mix with a technology neutral approach. A central body would determine the:

- de-rating factors for individual technologies to reflect the quantity of additional 'on-demand' (ie firm) power required for the 'as available' technology to provide the system with the same level of security of supply as firm power;
- amount of capacity to procure, and hold auctions to find the lowest cost way to ensure security of supply.

OVERVIEW OF KEY ASPECTS OF THE CONSULTATION TO BE AWARE OF

CONSULTATION STRUCTURE

The 130 page consultation is structured around each of the five elements of market design and what the future electricity system needs to deliver for them:

- a new **wholesale market** designed for net zero
- delivering **mass low carbon power**
- delivering greater **system flexibility**
- securing **capacity adequacy**
- ensuring **system operability**

In this hub we review each element, firstly in relation to the key challenges BEIS has identified that it needs to meet and then we look at the key proposals under consideration for each element to meet these challenges (including some options that relate to multiple elements).

KEY CHALLENGES THE CONSULTATION IDENTIFIES FOR EACH ELEMENT OF MARKET DESIGN

A NEW WHOLESALE MARKET DESIGNED FOR NET ZERO

The growth of renewables is leading to a growing mismatch between current trading arrangements, designed for fossil fuelled plant, and the challenges that variable and unpredictable ('as available') renewables present. BEIS have identified key challenges reforms should meet, including:

- **Generation with the highest marginal costs currently set prices for the whole market**

As the GB wholesale market is based on marginal pricing, the price for the whole of GB reflects the value of the final, most expensive, unit of electricity at all times. As gas generation currently provides the 'on-demand' flexibility this often means prices being set in line with gas prices which reflect the marginal costs of such generation - but have little relation to actual system costs.

- **Price cannibalisation: as capital costs become an increasing proportion of system costs, a pricing system based on marginal costs ceases to be fit for purpose**

As renewables become an even greater proportion of total generation the Government anticipates that there will increasingly become times, particularly when wind or solar conditions mean renewables generation peaks, when wholesale prices fall towards zero or negative – as the marginal costs of renewables set wholesale prices.

- **Lack of investment signals for low carbon flexibility**

In parallel, as renewables becomes a higher proportion of total generation, there will be less and less time for 'on-demand' generation to recoup their costs. The Capacity Market was designed to address this dynamic (albeit at a time when the issue was much less acute than it will be), but not to value low carbon technology as the UK moves to net zero and has not sufficiently encouraged technologies, such as storage and demand side response, that can respond to dynamic system demands. The Government is also keen that system reforms avoid a significant increase in Capacity Market (or its successor) costs.

- **Lack of sufficiently granular temporal or locational price signals**

Better price signals are needed to encourage new flexible generation and response in the most appropriate locations on the network to meet demand, and reduce system costs. Half-hourly trading also limits the opportunity to provide real time signals to reduce demand/increase generation to meet the in-moment system needs, meaning that flexible generation and consumption are undervalued.

- **Limited visibility of generation and demand at the distribution level**

The increasing amount of generation going straight into the distribution network , as well as behind-the-meter generation, has not been matched with greater coordination between the distribution networks and the System Operator.

DELIVERING MASS LOW CARBON POWER

Meeting decarbonisation targets will require the system to deploy renewable capacity faster than ever before and expand emerging low carbon flexibility technologies. BEIS have identified key challenges that reforms should meet, including:

- **CfDs have potential drawbacks**

Due to the phenomenon of price cannibalisation BEIS does not consider that wholesale market revenues alone (as currently structured) could be sufficient to finance the levels of low carbon investment necessary. However, while BEIS considers that the CfD regime has been highly effective at delivering the required extra support, they acknowledge that the regime has its limitations, including that CfD contracts:

- limit exposure to market signals for their duration;
- do not facilitate competition with low carbon 'on-demand' generation;
- do not incentivise optimising location for system needs; and
- incentivise generation whenever possible.

DELIVERING GREATER SYSTEM FLEXIBILITY

A system dominated by cheaper, 'as available' renewables will reduce costs for consumers, but creates new challenges for balancing supply and demand due to renewable intermittency and unpredictability. The Government has also identified the need for reforms to incentivise more low carbon flexibility (including generation, storage, interconnectors and technologies to shift or reduce demand). In the medium term, the Government of course anticipates high carbon technologies will have a continuing role in ensuring security of supply whilst low

carbon alternatives mature and the necessary infrastructure for hydrogen and Carbon Capture, Usage and Storage (power CCUS) is built. Note that the consultation does not consider the support mechanisms needed for 'first of a kind' technologies such as power generation with power CCUS.

BEIS have identified the following key challenges:

- a lack of sufficiently granular time- and location-based operational signals to incentivise flexible asset operation;
- insufficient investment signals;
- reliance on infrastructure that is not yet in place (ie a hydrogen network and CCUS); and
- limited signals for flexible assets to hold back energy for periods of system stress.

SECURING CAPACITY ADEQUACY

Enhanced capacity is a pre-requisite for increased security of supply, but must increasingly be implemented by technologies that support decarbonisation. BEIS have identified the following key challenges to meet:

- **Lack of investment signals for low carbon flexibility**

See the detail under the same heading (in the 'a New Wholesale Market designed for Net Zero' section above.

- **The Capacity market was not designed to value low carbon technology and locks in unabated assets**

ENSURING SYSTEM OPERABILITY

The key challenge, as GB moves to a net zero electricity system, is that most ancillary services are currently provided by fossil fuel generators.

KEY POLICY PROPOSALS THE CONSULTATION IDENTIFIES FOR EACH ELEMENT OF MARKET DESIGN

The consultation proposes a broad range of options grouped around the outcomes for each of the five elements of market design that the Government wants to achieve as well as two options that cut across multiple elements. Many are alternatives, while others could work with each other in different combinations. Future consultations must propose an overall package (or alternative packages) of reform. There is limited steer at this stage on Government thinking.

A NEW WHOLESALE MARKET DESIGNED FOR NET ZERO: POLICY PROPOSALS

The Government are considering the following potential approaches to address the challenges for a new wholesale market designed for net zero. As with the other elements of market design, BEIS is open to other suggestions from respondents and acknowledges that much further evidence gathering and analysis is required before the options could be progressed.

- **Splitting the market into a separate new market for 'as available' power to run alongside an 'on-demand' power market (the latter market continuing as now)**

The proposal would see the wholesale market for 'on-demand' power continue as now (ie marginal pricing). However, a separate market for 'as available' wholesale power would be created. This would set prices based on long term average costs (ie taking into account capital as well as marginal costs). How a price would be derived for the 'as available' market in practice and how balance would be achieved across the two separate markets remain fundamental open questions.

The advantage would be to reduce price volatility and price cannibalisation – encouraging renewables investment based on the (new) 'as available' wholesale electricity market. The CfD regime currently achieves an analogous revenue outcome for the relevant 'as available' low carbon power. This change would instead embed this into the structure of the wholesale market itself without the need for future CfD rounds while also extending it to demand response. For demand response it would give consumers exposure (via their supplier) to the benefits of lower costs of the 'as available' power bundled with the negatives of variability. Therefore, consumers that could flex their demand could buy a higher proportion of their electricity from the 'as available' market (eg by only charging electric vehicles with 'as available' power). Inevitably this would favour more sophisticated consumers. However, the consultation notes that much of the benefits of incentivising such consumer responses will be delivered by the move to half-hourly settlement for consumers through the implementation of the [Market-wide Half Hourly Settlement \(MHHS\)](#) programme.

A less fundamental variant would be for the System Operator to manage a pool for renewable power operating voluntarily alongside the existing wholesale market: in effect, a centrally co-ordinated power purchase agreement market.

- **Bringing in locational pricing, either zonal or nodal**

The current wholesale market gives a single GB price with long term locational price signals provided by network charges. Locational pricing would enable wholesale prices to reflect local conditions in real time, potentially both for demand and supply.

With nodal pricing, sometimes called 'locational marginal pricing' (**LMP**), the wholesale price in each relevant location (the 'node') reflects the costs of physical constraints (capacity and losses) and is usually achieved using central dispatch to manage the complexity of balancing across many nodes. With a zonal market the network is divided into clearly defined zones which each have a single price so that the costs of physical constraints as between zones is reflected, but constraints within the zone are ignored. If a supplier buys electricity that is generated in a different zone than the electricity is supplied, then the supplier will pay the difference (reflecting the costs of physical constraints as between zones).

BEIS identifies various challenges including that the potential benefits of locational pricing would be reduced in the real world, eg due to the fact that the location of a lot of planned renewables is dictated to a high degree by where generation is best (the most windy or sunny), the fact that to prevent unacceptable impacts on certain consumers in practice consumer exposure to such pricing might have to be limited.

Zonal pricing would be simpler than nodal pricing to transition to from the current market design, and so less risk of disrupting market participants and delaying investments. In addition, given that nodal pricing is not a model being targeted by the EU, its adoption by the GB market would negatively impact GB/EU electricity trading. However, zonal pricing would by definition offer less granular locational signals than nodal.

- **Reorienting the market towards the distribution networks**

The consultation references three theoretical approaches that have been proposed, albeit not tried anywhere yet. BEIS' view is that the increasing importance of generation and demand within distribution networks means it is worth looking into distribution network led reforms notwithstanding the inherent complexity of such approaches and related deliverability concerns.

- **Moving to pay-as-bid rather than pay-as-clear pricing**

This would mean that the wholesale market would pay the price bid by each accepted bidder rather than all accepted bidders receiving the highest price paid for any accepted bid. To avoid gaming (with bidders bidding based on what they anticipate the highest bid price will be rather than based on their own costs) there would have to be limits on the prices that generators of particular types could bid. The consultation references marginal costs as being what these limits would be based on, but as it implicitly concedes, this would mean amplifying the price cannibalisation issue. Average costs might therefore be more appropriate. In any event, moving away from the current market system puts much greater pressure on central regulation to make the right design decisions to ensure efficiency is maintained.

- **Evolving the status quo with incremental reforms of parameters such as gate closure**

This approach would involve adjusting some of the parameters of the existing market (eg changes to dispatch arrangements from self-despatch to central dispatch (dispatch controlled by the System Operator), changes to settlement periods and gate closures to increase the granularity of market responses (eg via the MHHS programme), and changes to the Balancing Mechanism (eg improved locational signals)).

DELIVERING MASS LOW CARBON POWER: POLICY PROPOSALS

The following approaches are being considered to meet the challenges of delivering mass low carbon power:

- **A supplier obligation to procure low carbon electricity to replace CfDs (and provide wider incentives) with a decentralised approach**

This would replace the CfD regime with something completely different in the future. Instead, this would be a decentralised market-driven approach placing an obligation on electricity suppliers to procure low carbon electricity with a legally binding trajectory to full decarbonisation by 2035 of maximum carbon intensity. This would allow greater freedom and therefore innovation in how the obligation would be met, including by incentivising demand side flexibility and outright demand reduction.

Similarly, it would enable more innovation for technologies and business models and be less exposed to the informational deficit faced by government-led decision making. The key challenge with this approach is arguably the suitability of energy supply companies for this increased role. In any event, the large-scale investment required could not rely on the level of counterparty risk associated with energy supply companies and so there would have to be intermediaries to pool risk with a likely role for the Government or the System Operator.

- **The current CfD scheme as amended for the latest round**

From allocation round 4 (July 2022) generators will no longer be offered CfDs which pay when wholesale prices are zero or negative. This helps deal with perverse incentives to generate during over-supply. However, as periods of zero or negative prices become more common this might have increasing impacts on price cannibalisation and dissuade investment.

- **CfD variants with increased price exposure**

This option could be achieved via shorter CfD contract periods or, for example, via having a CfD strike range rather than a single price.

- **A revenue cap and floor**

Under this approach, analogous to the system for interconnectors, generators would be guaranteed a minimum revenue in each period (floor) and above a certain amount (a soft cap) much of the excess would be paid back, but with residual incentives. Generators would be able to compete across each of the existing markets (wholesale, capacity, balancing and ancillary services). The floor revenue would be set competitively.

The consultation also proposes such an approach could be used for flexible assets (perhaps including 'on-demand' low carbon generation, storage as well as demand side response). In the long run it might be possible for 'as available' generators to compete against such flexible assets for the floor price and so also help with the creation of greater system flexibility.

- **CfDs based on deemed generation**

Under this approach generators would be paid based on their potential to generate in a particular period rather than on their actual generation.

DELIVERING GREATER SYSTEM FLEXIBILITY: POLICY PROPOSALS

The following approaches are being considered to meet the challenges of delivering greater system flexibility:

- **Introducing flexible auctions within the Capacity Market**

This approach would hold additional auctions to procure low carbon capacity with specific flexible characteristics (eg faster response times; ability to sustain capacity over prolonged periods, proximity to constraints). The risks are that this adds complexity and relies on getting difficult centrally made decisions right about the parameters of the auctions. The various approaches in the consultation to reforming the Capacity Market have been informed by the [Capacity Market 2021: call for evidence on early action to align with net zero](#) consultation.

- **Introducing multipliers to the clearing price within the Capacity Market**

Instead of additional auctions for these specific flexible characteristics, existing auctions would apply multiples to the clearing price for low carbon capacity that met the additional flexible characteristics. Similar downsides to the additional auctions apply.

SECURING CAPACITY ADEQUACY: POLICY PROPOSALS

The following approaches are being considered to meet the challenges of securing capacity adequacy:

- An optimised Capacity Market

This option echoes the two Capacity Market approaches described in the 'Delivering greater system flexibility' for separate auctions and introducing multipliers to the clearing price above. However, the difference under this section is that it would directly target generators with low carbon or new build characteristics.

- A strategic reserve

This approach would involve central procurement for GB capacity (or potentially demand side response) which would not participate in the normal market and be an extreme scenario backstop.

- Centralised reliability options

Under this approach the System Operator would determine the capacity to be auctioned (to ensure peak demand is met) and, in return for a reliability premium (determined through an auction), would secure the right to buy electricity from auction winning generators on the wholesale market at a 'strike price' at times of scarcity (ie when the price on the wholesale market exceeds the option strike price). When the option is exercised, the generator pays the System Operator the difference between the spot price and the strike price regardless of whether it is generating. The option could be designed to work for low carbon generation and for demand side response.

The consultation also references decentralised reliability options as not being ruled out, although are not being taken forward as a lead option. BEIS considers that a decentralised approach is something that is more likely, if at all, in the longer term.

SECURING CAPACITY ADEQUACY: POLICY PROPOSALS

The Government is considering the following options to meet the challenges of ensuring system operability:

- Continuing with the existing policy approach – which includes the [Smart Systems and Flexibility Plan 2021](#) with, amongst other things, plans for the Future System Operator to implement a single day-ahead market for response and reserve by 2023;
- Enhancing the existing approach, which could include giving the Future System Operator the ability or duty to prioritise low carbon procurement for ancillary services;
- Developing local ancillary services markets with a new role for DNOs. This is part of Ofgem's April 2022 [Call for Input: Future of local energy institutions and governance](#);
- Amending existing CfDs to remove disincentives to engaging in ancillary services (due to the loss of revenue from diverting power from the wholesale market);

- Changing the design of the Capacity Market to support low carbon ancillary services;
- If changes were made to the wholesale market which involved central dispatch (ie dispatch controlled by the System Operator), then the System Operator could co-optimize dispatch with ancillary services.

OPTIONS ACROSS MULTIPLE ELEMENTS

The Government is also considering two approaches which relate to multiple areas of market design:

- **Auction by cost of carbon abatement**

An option being considered as a potential way of structuring support for low carbon flexibility is a version of the Dutch 'SDE++' scheme. The scheme is similar to UK CfDs with the Dutch Government contracting directly with the auction winners who receive a subsidy for their assets for 15 years. However, the amount of support instead covers the difference between the base tariff awarded per tonne of avoided CO2 equivalent and an estimated market price. The advantage is that it allows the cost per CO2 equivalent to be compared across the range of competing technologies.

- **Equivalent Firm Power Auction**

This approach would consolidate the Capacity Market and CfD regime support schemes and give the market a greater role in determining the capacity mix with a technology neutral approach. A central body would determine the:

- de-rating factors for individual technologies to reflect the quantity of additional 'on-demand' (ie firm) power required for the 'as available' technology to provide the system

with the same level of security of supply as firm power;

- amount of capacity to procure,

and hold auctions to find the lowest cost way to ensure security of supply.

As originally proposed by Dieter Helm in his [2017 Cost of Energy Review](#) for the Government, to maximise efficiency, the auction would not value decarbonisation, instead this objective would be achieved by an economy-wide carbon price. However, in the current policy environment the alternative suggested by BEIS of a carbon constraint simply being added to the auction would be more likely.

The Government also notes certain drawbacks to the approach, in particular increased investor risks which might risk increased financing costs offsetting hoped for efficiency gains.

NEXT STEPS

Investors and market participants will be carefully assessing the implications of the consultation, with many planning to [make their views known by the 10 October 2022 deadline](#) given the potentially far-reaching implications. The Government's response is anticipated this winter and thereafter any specific reform packages proposed will be subject to further consultation.

This is likely to be a multi-year process. BEIS anticipates that a full delivery plan and overseeing of implementation will start from the mid-2020s. BEIS' engagement plans include dedicated workshops.

KEY CONTACTS

If you have any questions, or would like to know how this might affect your business, phone, or email these key contacts.



PAUL BUTCHER
DIRECTOR OF PUBLIC
POLICY, LONDON

+44 20 7466 2844
paul.butcher@hsf.com



SILKE GOLDBERG
PARTNER, LONDON

+44 20 7466 2612
Silke.Goldberg@hsf.com



SARAH POLLOCK
PARTNER, LONDON

+44 20 7466 2786
sarah.pollock@hsf.com

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