

Review of Electricity Market Arrangements

October 2022

ABOUT THE ALDERSGATE GROUP

The Aldersgate Group is an alliance of major businesses, academic institutions, professional institutes, and civil society organisations driving action for a sustainable and competitive economy. Our corporate members, with a collective turnover in excess of £550bn, operate across the economy and believe that ambitious and stable low carbon and environmental policies make clear economic sense for the UK.¹

We develop independent policy solutions based on research and the expertise and diversity of our members. Through our broad membership, we advocate change that delivers benefits to an ever-growing spectrum of the economy.

EXECUTIVE SUMMARY

The Aldersgate Group recognises the importance of reviewing current market arrangements to ensure that the UK can achieve its critical objective of having a fully decarbonised power grid by 2035. Achieving this target – which is supported by a wide cross-section of the business community - is essential to put the UK on track to achieve its carbon budgets, strengthen the UK's energy security and improve the affordability of energy supplies to domestic and industrial consumers.

As the UK progresses towards a zero-carbon grid by 2035, the electricity system will drastically change. Some of these changes are already visible: in comparison to times of previous electricity market review, where relatively few fossil-powered plants dominated the system, we now have thousands of generators, from wind farms in the North Sea to solar panels on residential roofs. Electric vehicles on people's driveways are also now capable of providing system balancing services, expanding the role of consumers in electricity markets and creating opportunities to lower bills through greater system digitalisation.

Many of these changes present significant benefits. For example, renewables are now the cheapest power generators, and many are insulated from the volatility of global fossil fuel markets, giving the UK cheaper power, greater energy security, and lower emissions. Building these plants and their associated infrastructure also offers industrial opportunities, highlighting the need for electricity market reform to be developed in tandem with a robust UK industrial policy.

However, a transition to renewable generation also raises some challenges. Renewable assets, while generating power at low or zero cost, require large upfront investment, meaning capital costs will become an increasingly large proportion of total system costs. This will require electricity market structures that provide adequate support for the upfront financing costs of generation infrastructure, whilst also providing support for wider system costs, such as greater investment in flexibility and balancing.

Generally, renewable assets are also less flexible than some other types of power generation, and cannot be relocated to areas of high demand as easily as some other power generation assets such as gas plants. For instance, wind turbines need to be situated in locations with optimum wind conditions. Electricity market reform will therefore need to focus on how to create effective signals for flexibility and the co-location of renewable generators with long-term electricity storage options and/or areas of high demand, where feasible.

¹ Individual recommendations cannot be attributed to any single member and the Aldersgate Group takes full responsibility for the views expressed.

Meanwhile, the current marginal pricing approach has created a situation in which gas generators, often the most expensive power generators, are setting the price of electricity up to 84% of the time,² despite making up less than half of all power generation. Wholesale market reform, and in particular the creation of a Green Power Pool of long-term, tradeable zero carbon electricity contracts, should be taken forward to address this imbalance, in order to harness the benefits of low cost renewable power – for businesses and households alike. The Aldersgate Group, which has investigated the potential of a Green Power Pool for many years with UCL,³ will be publishing more thoughts on the characteristics of a Green Power Pool this Autumn.

As electricity market reform is complex, and many of the options suggested in this consultation present a significant divergence from current arrangements, it is essential that Government further engage with sector stakeholders to fully understand the breadth of impacts of the reforms under consideration, and carefully design the new market arrangements.

OBJECTIVES AND CONSIDERATIONS FOR REFORM

Objectives and assessment criteria for reform

The Aldersgate Group agrees with both the identified issues of current arrangements in Chapters 1-4, and the desired outcomes for the future system: a net zero wholesale market, mass low carbon power, flexibility, capacity adequacy, and operability. We also agree with the criteria for assessing packages of reform: least cost, deliverability, investor confidence, whole system flexibility and adaptability.

However, more clarity is needed on the criteria used to assess reform options, how they will be balanced against one another, and which will take precedence in decision-making.

In particular, the 'least-cost' criterion should be further developed to provide greater clarity and avoid unintended consequences. It is currently unclear as to whether this refers to long- or short-term costs. If the focus is on reducing short-term costs, this could be detrimental to delivering long-term benefits in terms of savings, emissions reductions and greater energy security.. For example, anticipatory investment into grid infrastructure now could reduce curtailment costs that consumers would otherwise have to shoulder in the longer term, should the future electricity system prove unable to facilitate mass renewable power, or vehicle-to-grid (V2G) arrangements.⁴ Similarly, in part due to its regulatory mandate, Ofgem has often prioritised cost-effectiveness over decarbonisation and/or long-term price reductions, leading to suboptimal resource allocation under previous price control reviews.

It will also be necessary to understand whether the 'least cost' criterion will be considered primarily in relation to energy generators, grid infrastructure, or energy consumers; and how a balance will be struck when 'least cost' cannot be delivered across all categories.

For these reasons, market reforms must be underpinned by an approach that prevents one objective from taking precedence over others, with a broader regulatory framework focused on decarbonising the grid and making it more agile and flexible, with the least-cost criterion being one of many equally important criteria.

Retail market impacts

² UCL-ISR (Commissioned by the Aldersgate Group): [NECC Working Paper #1, "The Role of Natural Gas in Electricity Price-Setting in Europe"](#).

³ Grubb. M, Drummond. P, UCL, Aldersgate Group, 2018-21. Our initial proposal for a Green Power Pool in [UK Industrial Electricity Prices: Competitiveness in a Low Carbon World](#) (2018), and further recommendations on both the Green Power Pool and wider electricity market reform in [Delivering Competitive Industrial Electricity Prices in an Era of Transition](#) (2022).

⁴ With adequate smart infrastructure, electric vehicle charging points will be able to communicate with the grid via households' energy suppliers. EV owners can then automate the charging of their car batteries when there is surplus renewable power available, and offload electricity when there is too much.

It will be important to consider arrangements in the retail market that interact with wholesale market arrangements, and where there could be barriers to the delivery of a zero-carbon electricity system by 2035, for example the role of smart tariffs as a measure to facilitate greater flexibility of electricity demand.

Similarly, the nature of the FSO's role as a trusted and expert body at the centre of the UK's gas and electricity systems will be crucial in coordinating and ensuring strategic planning of market arrangements. Support for the FSO's role as outlined in the Energy Bill should be continued to ensure the coordination and efficacy of the total package of electricity system reforms against key objectives.

Engagement with electro-intensive sectors, and industries looking to electrify

The value of system-related services like demand-shifting and frequency support is rising, whilst the cost of providing such services from industrial energy users is declining. UK industry in 2019 accounted for 27% of electricity consumption.⁵ Significant parts of such demand could, in principle, have some flexibility, associated with inbuilt storage (e.g., thermal), more flexible cogeneration of heat and power, and/or other flexibilities (e.g., in scheduling of manufacturing activities). With Capacity Market prices increasing as new-build generation and storage capacity is incentivised, the value of these services would be much enhanced.

However, the Capacity Market was designed with a view to support new generation capacity, with demand-side response, so far, only accounting for a small proportion of contracted capacity. The government is taking steps to improve demand-side participation in the Capacity Market, and is committed to allowing demand-side response to bid for 15-year agreements and to reduce the minimum capacity threshold from 2MW to 1MW.²³ By ensuring that the capacity market (and other electricity service markets) is efficient and fit for purpose for demand-side response, the government could encourage industrial participation in these mechanisms, and help industrial consumers to realise the economic value of these services to both reduce overall system costs and offset the cost of their electricity consumption. This would also help reduce potential reliance on fossil fuel capacity for backup generation, reducing the CO2 intensity of contracts awarded under the Capacity Market.

As part of its electricity market reform, Government should engage with electro-intensive sectors and energy intensive industries looking to electrify processes as part of their decarbonisation pathway (such as the steel sector). On the one hand, Government must endeavour to fully understand the impacts of different reforms on these sectors; on the other, Government should seek to better understand how these sectors can play a larger role in mitigating the challenges identified in this consultation (for example, through the potential use of triads to reduce total demand, or V2G connections for greater system flexibility and balancing).

The role of Hydrogen

The Review of Electricity Market Arrangements should also seek to better understand the role of hydrogen in the UK's electricity system. The production of electrolytic hydrogen could provide a valuable mode of storage for surplus power, dispatchable power at times of peak demand, and a means to mitigate curtailment/constraint costs incurred when asking renewables not to generate during moments of high production and/or low electricity demand.

Government should seek to better understand how to effectively integrate hydrogen into the UK's electricity system in order to create effective price – and thus investment – signals, but also to pursue the co-location of hydrogen plants with renewable generators (this can also help to progress towards the UK's aims for 10GW of low carbon hydrogen by 2030).

⁵ UCL (commissioned by the Aldersgate Group) *Delivery Competitive Industrial Electricity Prices During an Era of Transition* (2021)

A NET ZERO WHOLESALE MARKET

Reforming the wholesale market

This consultation puts forward a comprehensive range of reforms that all represent a significant departure from current arrangements. The Aldersgate Group therefore recommends implementing any significant changes with an evolutionary approach in order to ensure that the transition to a more effective system does not have any destabilising effects. Given the complexity and scope of the options presents a significant resource requirement for stakeholders, such an approach would also assure reasonable time for interested parties to understand and feedback on minded approaches. As the consultation process evolves, we would encourage Government to form a cross-sectoral steering group with industry and market participants, in order to refine the options currently on offer and, where possible, limit the number of additional proposals being put forward.

The impact of marginal pricing: a case for split markets

Due to the current marginal pricing approach of UK electricity markets, gas sets the price for power 84% of the time, despite currently being the most expensive form of power generation and accounting for less than half of all power generation. Decoupling gas and electricity prices should therefore be prioritised to lower bills for consumers and businesses, but also to increase the business-case for electrification across the economy: key to reducing emissions and increasing energy security (due to reduced demand for imports of fossil fuels).

As renewable power generation displaces fossil fuels in the UK's energy mix and becomes sufficient to meet total demand, marginal pricing raises further challenges. When renewables meet total demand, the wholesale market price reduces to the short-run marginal cost of renewable power generation, which can reach zero or even negative prices as the sun and wind are free resources. The marginal pricing approach therefore means that renewable generators who are not on a CfD with a fixed strike price (which represents the majority of renewable generators) would raise insufficient funds to cover the large capital costs incurred when building new plants.

CfDs provide a valuable tool for insulating the price of renewable power from the volatility of global gas markets, and the Government is right to investigate how to move more existing and future generators onto these contracts. However more information is urgently needed in order to understand how this will be done, and over what timescale, as well as how long these measures will likely remain in place. This can provide greater certainty to the sector, while also ensuring that any unintended impacts are understood ahead of time.

A Green Power Pool

As previously documented in two reports from UCL supported by the Aldersgate Group,⁶ the Aldersgate Group recommends that the Government take forward the Green Power Pool (GPP) approach to decouple gas and electricity prices, mitigate the impacts of marginal pricing on the cost of renewable power, and protect against further price volatility.

CfDs already procure growing electricity volumes at declining costs – but the mechanism is complex because the power is sold into the wholesale market and is not directly available to consumers. Without changing the basic financial principles that underpin investor confidence, the government could consider targeting support to the most vulnerable consumers by making the relatively cheap (“CfD-derived”) power available directly to key groups. More specifically, CfD-derived electricity could be offered to two particular groups of high political and welfare concerns:

- industrial consumers whose international competitiveness is directly threatened by the differential between GB/EU prices compared to countries where electricity prices are directly regulated: in GB,

⁶ Grubb, M, Drummond, P, UCL, Aldersgate Group, 2018-21. Our initial proposal for a Green Power Pool in [UK Industrial Electricity Prices: Competitiveness in a Low Carbon World](#) (2018), and further recommendations on both the Green Power Pool and wider electricity market reform in [Delivering Competitive Industrial Electricity Prices in an Era of Transition](#) (2022).

one obvious definition would be those already eligible for compensation for the GB's carbon floor price;

- special-purpose windows for suppliers to market power to vulnerable domestic consumers – groups already targeted for previous government supports, or otherwise defined for this purpose.

In both cases the price to these consumers would necessarily be regulated to reflect the generation plus add-on costs, not linked to the wholesale market. This would be entirely independent of modest reforms to CfD contracts already being considered.

However, there is a need for close consultation on this to avoid any unintended consequences. For example, it will be necessary to understand how a GPP would affect investor confidence, and how adequate liquidity can be built into a GPP.

Should the GPP be implemented, a voluntary, evolutionary approach should be taken (as with any option presented in this consultation), using the existing CfD mechanism to gradually expand the GPP. For example, the Low Carbon Contracts Company (LCCC) could sell CfD-derived electricity directly to off-takers, rather than into the wholesale market, beginning with specific sectors, such as an energy intensive industry (e.g. steel) to provide a testbed for the approach (as discussed above). This would not only limit risk, but provide greater understanding of how participants in the GPP value flexibility and where there is potential for demand-side response.

As stated above, the Aldersgate Group, with UCL, is soon to publish a Working Paper outlining the way in which a Green Power Pool could function and best be implemented in practice. We will share this with BEIS and the consultation team in the near future, and are happy to provide more information in the meantime.

Pay as bid vs. Pay as clear

As recommended above, the Aldersgate Group suggests that the Government take forward the proposal for a Green Power Pool, particularly to mitigate the negative impacts of marginal pricing, such as price cannibalisation.

However, when considering pay as bid and pay as clear options, Government should acknowledge that pay as bid arrangements are unlikely to deliver substantially lower prices for consumers, and could be disruptive to the market. For example, generators will be incentivised to increase costs when auctioning, thus distorting the merit order. We could also see renewables (that generate cheaply, but need to cover capital costs, thereby bidding for a higher price), being underbid by fossil fuel plants and pushed out of the merit order. The latter would run counter to the core objectives of the proposed reforms to electricity market arrangements.

Locational pricing signals

The Aldersgate Group agrees that there is a need for more effective locational signals for generators, demand, and storage, and that current wholesale market arrangements do not send adequate signals (especially to renewable and nuclear generators) for location. We also note that National Grid ESO has expressed concerns in this area as part of its Net Zero Reform project.

The Government is therefore right to investigate how effective locational pricing signals could deliver a more efficient location of generation, storage and demand. There is also clearly merit in exploring options that could reduce the need for system-balancing and better incentivise demand-side responses by exposing consumers to a form of locational pricing. However, it is important that the potential introduction of some form of locational pricing does not lead to disincentivising investment in the additional low-carbon infrastructure which the UK urgently needs, especially in light of the 50GW target for offshore wind by 2030. This is a concern that has been expressed repeatedly in the Aldersgate Group's engagement with a wide cross-section of industry and the investment community. Before any major reforms are made, potential changes to the CfD regime should also take into account the impacts on existing and future generators, looking in particular at whether it is feasible for these generators to respond to a locational price signal.

When it comes to nodal pricing in particular, the Government should be aware that exposing consumers to nodal pricing could have adverse distributional effects, especially at times of market constraint/volatility. For example, consumers in areas where generation is low, would face higher electricity prices and rely more on electricity 'imports', while those in areas with high generation would face lower costs. Conversely, generators operating in areas where generation is plentiful would see their income fall, while those operating where generation is low, would see an increase in profits.

In addition, a concern with a nodal pricing approach is that our future energy mix will be dominated by generation sources that have limited availability to respond to locational signals. For instance, renewable forms of power generation need to be located where optimum wind, solar and tidal resources exist, or where planning permission can be granted. Wind in particular will need to be located far from areas of high demand, and solar generation location will also depend on availability of land (as will the location and cost of new nuclear plants). Nodal pricing is better suited for fossil-dominated generation, where location is less dependent on factors beyond market prices.

Even assuming that future renewable generators could respond to nodal prices and be located in the areas that provide the best overall system outcomes, consideration will need to be given to how locational pricing will impact existing generators. In this regard, it is important that inflexible locational price signals do not simply add additional costs to existing or future generators without creating additional benefits to the wider electricity system.

More generally and for offshore wind in particular, locational pricing options will need to be considered alongside Crown Estate leasing rounds and spatial constraints in the North Sea, which are likely to limit the location options available for the industry.

MASS LOW CARBON POWER

Supplier obligation

Following its stakeholder engagement on both the demand and supply side, the Aldersgate Group is inclined to argue that supplier obligation should not be considered. In the current supplier landscape, and to mitigate risks for developers and investors in particular, a significant degree of hedging would need to be done by intermediaries to overcome risk levels. This would lead to increased costs for developers and investors, and therefore ultimately consumers. In conversation with members, stakeholders in the power sector have warned that supplier obligation could have an extremely destabilising effect. Moreover, due to a current lack of liquidity in the market at present, it is likely that delivering supplier obligations would be extremely difficult.

Central contracts with payment based on output

The Aldersgate Group suggests that central contracts based on output should continue. CfDs have been successful in providing investor confidence, and have played a central role in growing the wind sector, lowering prices, and encouraging innovation. A move away from this system would have to be carried out very cautiously, and orchestrated in a way that avoids big gaps in investment and a scenario in which developers and the related supply chains divert their investments to other jurisdictions. Not only would this be damaging to the UK's electricity markets, energy security and decarbonisation ambitions, it would have a negative impact on domestic supply chain growth and job creation. In this regard, electricity market reform should consider its impact on the UK's industrial policy to avoid unintended consequences.

Central contracts with payment decoupled from output

Central contracts with payment decoupled from output could potentially provide effective market signals without completely moving away from existing market arrangements. In the case of interconnection, a cap and floor option was effective without the requirement for large top up payments. This option could also incentivise flexibility and whole-system services through increased participation in all markets, including ancillary, balancing, and capacity markets. This said, the impact

of these contracts could be different for renewable generators, and will likely do nothing to mitigate issues related to price cannibalisation.

Recognising the need for greater price exposure for renewables, the Aldersgate Group recommends that while central contracts with payment based on output should continue, the Government should also further investigate the potential benefits and impacts of contracts with payment decoupled from output – in particular, how variants of CfDs with a price strike range or cap and floor models could be potential alternatives.

This said, any modifications of the current CfD mechanism should take an evolutionary approach – as opposed to a full overhaul – given the impacts such an overhaul could have on investment and our ability to meet the 50GW target for offshore wind by 2030.

DELIVERING FLEXIBILITY

Greater flexibility will be needed to deliver a net zero electricity system by 2035, however current market arrangements are unlikely to deliver the technologies needed at the appropriate pace.

Creating effective investment signals for low carbon flexibility

At current, there are inadequate investment signals for low carbon flexibility (where it is possible). In particular, a lack of price exposure for renewables with a fixed strike price in their CfD contract lack any real-time incentive to act more flexibly where possible.

The government must therefore focus on how revenue streams can be made available for flexible assets, and how to better reward other flexibility solutions such as demand reduction, storage and interconnection. This can also be achieved through wholesale market reforms (such as the creation of a Green Power Pool), but there is also a need to ensure instruments like the Capacity Market place adequate value on the system benefits afforded by flexibility.

Beyond market arrangements, the Government must seek to de-risk investment in flexibility in order to bring more flexible capacity online – the revenue cap and floor model for interconnection is a useful example in this sense, and should be extended to other flexibility solutions. Some flexible assets such as long-term storage, have long wait times for generating returns, so a cap and floor mechanism could be particularly useful in creating an effective investment signal in this instance.

As highlighted above in regards to reforming CfDs to create locational pricing signals for renewable generators, it is vital that any reforms carried out to create greater price exposure (to encourage low carbon flexibility) factor in the extent to which renewable generators are actually able to generate flexibly. Any price incentive that cannot be responded to will simply add cost without benefit to the wider system. In this sense, a price incentive to locate storage near generation could be most effective in the case of some technologies (such as wind power).

Operational signals

Operational signals through reformed markets will be unlikely to bring forward enough flexibility for the UK's 2035 commitment, and further support will be needed as we deploy more variable power. There is also a need to consider flexibility duration (for example, on storage), as at current, long-term storage requires greater focus on innovation and the de-risking of early investment. Operational signals would therefore not suffice.

Government should explore the role of the FSO/ESO in advising on the future system needs as regards flexibility, in order to ensure that investment can be planned appropriately and ahead of time, given high capital costs.

Reforming the Capacity Market for flexibility

The capacity market is not currently capable of driving adequate investment in low carbon flexibility, especially as de-rating factors reduce the capital available for upfront investment in flexible low carbon power generation.

Split auctions could be useful in bringing forward different, valuable technologies which would not otherwise be able to compete under current capacity market arrangements, given their different costing profiles, and technologies that could better integrate renewables in order to provide additional system services.

This said, attention is needed as regards overcomplicating capacity market arrangements, and the potential of damaging liquidity through a split auction proposal.

Reforming the Capacity Market to ensure capacity adequacy

The Aldersgate Group agrees that the Government should continue to consider how to optimise the capacity market, as it was not established with net zero in mind, and currently excludes – or limits – the role of low carbon technologies and solutions that are needed to provide capacity in a low carbon system – such as long-duration electricity storage and demand-side response.

It will be crucial as the UK's electricity system evolves, that the structure of the capacity market does not lock-in unabated fossil-fuel plants, and encourages a mix of low carbon generation plants, storage and demand side response solutions. Doing so can support the UK's energy security, while also enhancing our ability to meet our net zero commitments in a cost-effective manner that also supports the roll-out of cheaper, dispatchable low carbon power.

We also agree that the Government should continue to consider options for centralised reliability, rather than pursuing de-rating factors that reduce the incentives for certain technologies to participate in the capacity market. However, the criteria for low carbon technologies participation need to be clarified in the near term to create greater understanding and confidence as regards their ability to participate.