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Re: Future Charging and Access programme: consultation on supplementary analysis to November 2018 minded-to decision on the Targeted Charging Review

Thank you for the opportunity to provide comment on the on the *Supplementary information and analysis to November 2018 minded-to decision on the Targeted Charging Review.*

The proposed reforms to Embedded Benefits set out in the TCR will be extremely harmful to our industry, and will significantly delay the economic viability and deployment of subsidy-free solar in GB, whilst severely undermining investor confidence in the broader UK clean energy sector. We remain concerned that the incomplete and overly simplistic impact assessment approach taken by Frontier Economics overstates the potential benefits of reform whilst disregarding the profound impact that these reforms would have on solar deployment levels. Unfortunately, these concerns have not been addressed in the supplementary analysis.

Capacity Market (CM) sensitivity analysis

It is deeply regrettable that this supplementary analysis does not address our primary concern with the modelled Impact Assessment for the proposed reform to non-locational Embedded Benefits, namely that non-CM capacity build is treated as exogenous within the model. Simply put, it is not credible that there would be no difference in the assumed levels of PV deployment in Frontier Economics' Baseline (No CM) and Residual, TGR & Full BSUoS Reforms (No CM) scenarios, as the authors suggest.

As we noted in our response to the *Targeted Charging Review: minded to position and draft impact assessment* (4 February 2019), the authors of the IA incorrectly assumed in their analysis that non-Capacity Market build (e.g., most renewable generation that is supported through other subsidy schemes) would be constant across the scenarios considered. The authors further acknowledge that they "do not take into account the effect that future changes to the market structure may have on the behaviour of market participants."

Over the course of our engagement with Ofgem and with the Frontier Economics modelling team during the TCR consultation process, it has repeatedly been suggested to us that higher CM clearing prices and Contract for Difference strike prices would insulate solar PV from the full impact of foregone BSUoS revenue. This suggests a troubling lack of understanding of the derating factors that would apply to solar, if it were allowed to participate in a hypothetically re-instated CM, and a failure to account for the Government's stated policy that there should be no further support for established onshore renewable technologies.

Following the closure of the Renewable Obligation mechanism (effective 31 March 2017), there has been zero subsidy support for new-build large-scale solar in the UK. First and foremost, it must be emphasised that the 885 large-scale solar installations that received RO accreditation faced vastly higher capital costs than are achievable today. It is of course clear that these are irretrievably sunk costs, financed on the basis of specific assumptions regarding a project's future revenue stream.

Outside the solar industry, it is perhaps less widely known that a large-scale PV plant's operational costs, which have decreased far less than CAPEX and which now appear to have stabilised, are also either fixed (e.g. land leases, 10-15 year inflation-indexed maintenance contracts), already increasing (e.g. insurance), or unpredictable but prone to increase (taxes, network charges).

On the revenue side, it is widely expected that solar will face a steadily growing capture price discount as a consequence of the increasing share of zero-marginal-cost variable generation (Fig. 1). Aurora Energy Research forecast that this price cannibalisation discount for solar PV will have grown to approximately 9% below the average wholesale price by 2040.

As they are all distribution network-connected, Britain's large-scale solar PV plants are at present subject to completely uncompensated curtailment for network balancing, maintenance and infrastructure upgrades at both Transmission and Distribution levels. The STA estimates that these network outages amount to approximately 1% of foregone generation on average across the sector each year, but this is far from uniform, with some sites subjected to weeks or months of outages at the height of summer (the network operators' preferred season for planned maintenance).

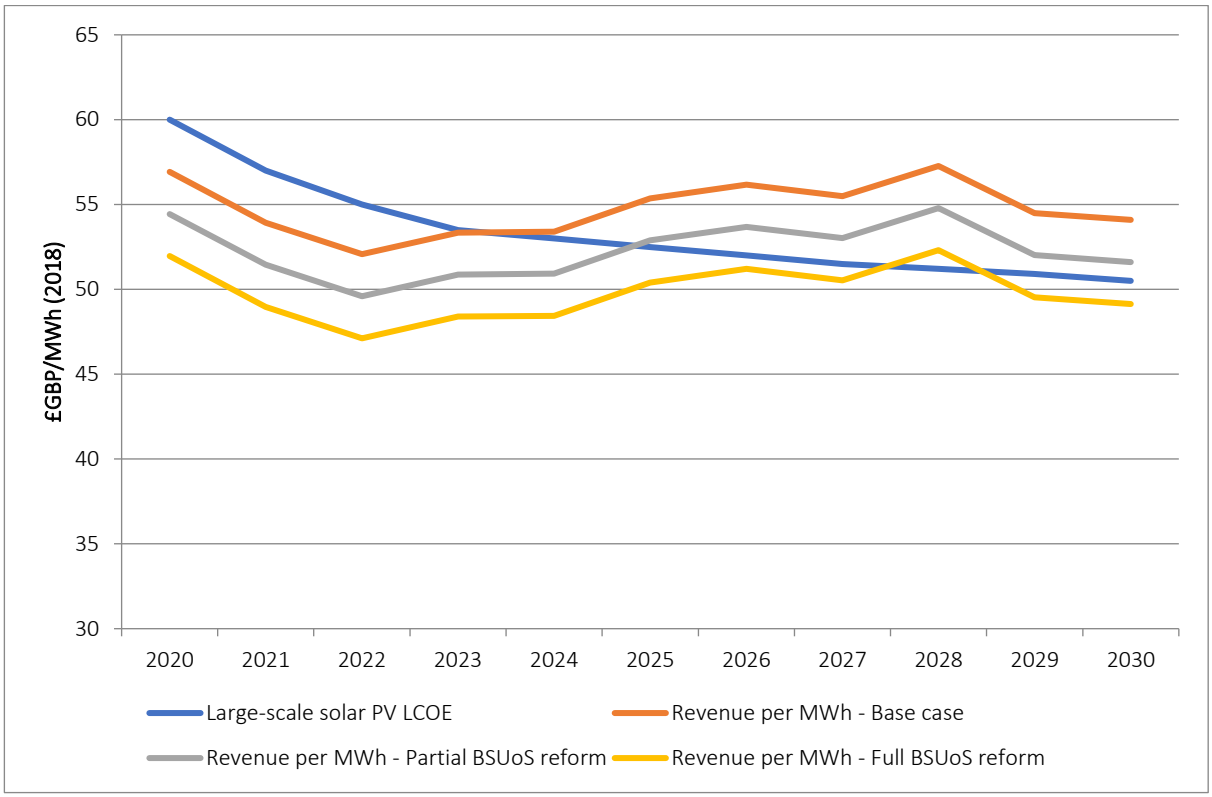
RO support notwithstanding, existing large-scale solar sites face mounting challenges to their profitability, and increasing risk of curtailment as a result of aging network infrastructure and increasing shares of variable generation. It is thus by no means guaranteed that owners of these assets will be able to absorb the impact of Full or even Partial BSUoS reform and remain profitable. Moreover, these companies would be the most capable of delivering new, subsidy-free solar projects, given their significant expertise, and the revenue they would lose as a result of BSUoS reform would significantly hinder their capacity or inclination to develop new subsidy-free assets.

The full or partial loss of BSUoS benefit would also have a significant impact on investors' decision-making in terms of whether to maintain or decommission existing ROC-accredited assets at the end of the accreditation period. Over the next 15 years, RO accreditation for 70% existing large-scale solar will expire. In the years leading up to that expiration the owners of accredited sites will face difficult decisions on whether to upgrade the existing equipment and continue generating zero-carbon, zero-marginal cost electricity, or sell off their increasingly valuable grid connections and other assets. Repowered assets are the most affordable clean energy generation, and to lose them would mean higher costs of energy decarbonisation for consumers. We would refer you to the excellent work of our colleagues in RenewableUK on this important topic (Repowering onshore wind farms – a vital move to bridge the UK's looming energy gap – 25 April 2019)

We concur with the view taken by Aurora Energy Research that implementation of Full BSUoS reform will delay deployment of subsidy-free onshore renewables by at least five years, and it would have been extremely useful for this Supplementary analysis to have addressed Aurora's own analysis. This is illustrated in the figure below, which compares the projected average LCOE of fully merchant solar PV, which we have here forecasted based on extensive consultation with our members, to a no-reform base case as well as Partial and Full reform scenarios.

Under a Full reform scenario, it is doubtful that merchant large-scale solar would be viable anywhere in GB by 2030.

It is estimated that the combined BSUoS Avoidance and Payment benefits are worth approximately £4.45–£5.50/MWh to distribution-connected generation. Partial and Full BSUoS reform would therefore represent a net loss of 4 – 5% or 8 – 10% of wholesale price revenue per MWh under these respective scenarios, based on the monthly average wholesale price over the past 12 months and expected discount due to the widening PV capture price discount:



It is also important to note the impact of the perceived increase in regulatory uncertainty resulting from either BSUoS reform scenario. By reducing expectations of policy stability, Ofgem would increase the risk premium applied to merchant renewable generation projects, which would also exert a significant adverse impact on future deployment.

The loss of this volume of potential solar PV deployment would have substantial consequences for future energy prices, as well as for the Government's ability to meet its legally-binding 2030 emissions reduction commitments, which are already in jeopardy. Large-scale solar PV and onshore wind are the UK's most affordable forms of renewable energy, and in order to remain compliant with the Carbon Budget, this PV generation gap would need to be filled by costlier forms of zero-carbon generation, ultimately leading to higher costs for consumers and a more uncertain decarbonisation pathway.

Conclusions of the Balancing Services Task Force, and Ofgem's TCR Principles

Lastly, we would like to emphasise that the decisions of our members and other developers to connect solar PV at the Distribution level is in no way related to the BSUoS benefit: Obviously, owners of large-scale PV assets would prefer the physically or financially-firm connections available at Transmission level, along with the concomitant opportunities to profit from participation in network balancing. However, solar is extremely constrained in terms of where solar parks can be located by the availability of suitable land with sufficient irradiance, and financially constrained by extremely thin margins that necessitate more affordable and expedient lower-voltage connections. In exchange for the ability to connect quickly and cost-effectively at Distribution level, the solar industry accepts that its output is liable to be curtailed at any time without compensation.

We endorse the conclusions of the National Grid ESO-led Balancing Services Task Force process, to which we contributed, which found that the BSUoS charge as currently constituted is not and, practically speaking, cannot be a forward-looking charge and thus should remain a cost recovery charge. It is also worth noting that quantitative analysis conducted by NG-ESO as part of the Task Force process found no statistically significant correlation between PV output and the system balancing cost.

It is in our view useful to evaluate the conclusions of the BSUoS Task Force regarding the BSUoS charge against the three criteria for assessing "harmful distortions" as set out in Ofgem's TCR Principles (Annex 1). These are:

a. Relative impacts of reform on different user groups – The extent to which users "could and could not manage their exposure to charges"
b. Behavioural changes due to changed incentives resulting from the potential reform options
c. Wider system impacts of the reform options in the longer term

The Balancing Services Task Force process has decisively determined that market parties:

- Cannot and could not effectively manage their exposure to BSUoS, as the charge is too complex and unpredictable (Criteria A)
- Will not alter their behaviour (either dispatch or investment decisions) in response to BSUoS, as the charge is insignificant relative to other market signals (e.g. the decision to connect solar at Distribution rather than Transmission level) (Criteria B)

In terms of wider system impacts (Criteria C), full implementation of the TCR embedded benefit reforms will delay deployment of unsubsidised DN-connected renewables by 5 years or more in the case of large-scale solar PV. The impact of this on the wholesale power price will lead to additional costs to consumers of up to £7.6b over the period 2019-40 relative to the no-reform baseline (see Oxera analysis), more than outweighing any modelled consumer benefit. This is irrespective of wider-system impacts on achievement of legally-binding emissions reduction objectives, as well as in terms of impacts on investor confidence in driving forward the UK clean energy transition.

Measured against Ofgem's own TCR Principles of assessing market distortions, we therefore do not think that a Full BSUoS reform scenario can be justified.