

Nuvve is an aggregation company whose mission is to lower the cost of electrical vehicle (EV) ownership while supporting the integration of renewable energy sources, such as wind and solar. Nuvve's Grid Integrated Vehicle platform, GIVE™, transforms EVs into grid assets when those vehicles are charging, while guaranteeing the expected level of charge at the time the owner or driver needs it for transportation. The aggregation of thousands of parked and plugged in EVs into a virtual power plant using the GIVE platform allows Nuvve to provide EV drivers with significant benefits, while also participating in electricity markets with a power capacity and capability comparable to traditional generators.

V2G technology enables the temporary use of EV batteries as a grid resource that is equivalent in function to stationary energy storage systems, but potentially at a lower cost due to the multiple value streams captured from the resource. V2G can provide ancillary services to the grid, such as frequency regulation and voltage control, while meeting the EV charging energy (transportation fuel) needs of drivers and reducing emissions. V2G can provide a full suite of grid services via the orchestrated charging and discharging of vehicle fleets, unlike V1G (managed charging) or other load management technologies which are limited by their unidirectional energy flow and cannot discharge energy to a customer's site or to the grid.

1. Do you agree that residual charges should be levied on final demand only?

Yes. However, as a vehicle-to-grid (V2G)¹ aggregator, we would add that EVs used for V2G should be treated as small-scale storage, i.e. generation, and be exempt of residual demand charges on the energy consumed by the vehicles for later export to the system (i.e. for provision of services to the TSO or DSOs). This behind-the-meter use case is an essential component to the larger goal of a smart, flexible energy system.

Our aim is to transform EVs into distributed energy resources (DERs) that provide value to the whole energy system at multiple levels / for multiple market actors: TSO, DSOs, end users (of the vehicles, or of the sites that host V2G charge points), and furthering UK policy goals in the energy and transportation areas (by supporting renewables integration both on the grid and behind-the-meter, by optimising marginal CO₂, etc.). Nuvve aims to address the needs of each of these actors as both operating constraints and optimisation opportunities, balancing each depending on the use and business case.

Where our V2G EVs participate in SO markets and services (such as FFR where we anticipate to start participating via a market access provider as soon as March 2019, a first in the UK with V2G EVs), we would request more clarity on when and how EVs will obtain exemption, similar to transmission- and distribution-connected storage resources, of the residual transmission and distribution charges levied on final demand?

It is not clear from Ofgem's Charging Futures note on storage² whether the exemption applies to bi-directional EVs as storage. With the current charging framework, behind-the-meter EVs may be charged twice, which is a significant barrier to our business

¹ V2G refers to the ability of an electric vehicle and charging station to both charge and discharge the vehicle battery in response to requests or price signals, functioning in a manner similar to stationary battery storage

² http://www.chargingfutures.com/media/1126/cf_storage-charging-summary-note-feb-2018.pdf

7. Do you agree that our leading options will be more practical to implement than other options?

The leading options are practical but constitute only the beginning of major reforms that will be required to properly value and enable behind the meter resources such as solar pv, storage (including V2G), and responsive loads to participate in localized and system-level markets for flexibility. Lack of recognition of both behind-the-meter storage and the dual nature of V2G-enabled EVs as a storage resource and an end use load will inhibit market development and stunt the development of a smarter, more flexible energy system.

8. Do you agree with the approaches set out for banding (either LLFC or demanding for agreed capacity)? If not please provide evidence as why different approaches to banding would better facilitate the TCR principles.

9. Do you agree that LLFCs are a sensible way to segment residual charges? If not, are there other existing classifications that should be considered in more detail?

Nuvve has never accessed information about LLFC definitions. From discussions and interactions during the CFF, it appeared that LLFCs are fairly complex not only to Nuvve but to other market actors.

With respect to the fairness criterion and in particular simplicity, transparency, and justifiability, could Ofgem publish a comprehensive explanation of LLFCs, and the methodology behind them, to help market participants understand LLFCs in the context of the TCR? In the absence of this, Nuvve's current view is that LLFCs are an intransparent, complex choice of classification system of users setting the fixed charges.

10. Do you agree with the conclusions we have drawn from our assessment of the following? a) distributional modelling b) the distributional impacts of the options c) our wider system modelling d) how we have interpreted the wider system modelling? Please be specific which assessment you agree/disagree with.

In Nuvve's view, the key weakness with the methodology of whole system modelling is that it has attached too little value to low carbon technologies and flexibility. This is apparent from the results: the analysis has generated an economically efficient lowest-cost future system, but that involves new build of lots of CCGT peaker plants and the charging reform does not increase the penetration of renewables or distributed, local flexibility providers (including V2G) in any way relative to business as usual (the FES scenarios). We believe that this is not good enough: the charging reform should aim to increase renewable capacity build as well as support investment in flexibility from distributed resources, in line with other government policy goals (renewables targets, Smart Systems and Flexibility Plan, V2G, Open Networks, etc.). The weight attributed by the methodology to affordability in the future system is clearly higher than the weight attributed to decarbonisation in the future system. One direct example is the impact of the TCR on behind-the-meter solar PV: the TCR increases the charges for solar PV. While the TCR is addressing a distortion, it also has the consequence of reducing the incentive for users to invest in on-site solar and thereby contribute to a low-carbon, more localised and flexible energy system. This negative impact should be counteracted or balanced in some other way in the system to maintain the same incentive levels for users to invest in on-site solar. The same reasoning goes for on-site storage and energy efficiency; these technologies are important contributors to low-carbon energy networks of the future.

Transmission-connected resources which have easier access to markets for compensation, and the proverbial playing field is not in fact level. Maintaining and improving the case for individual users behind the meter to invest in generation capacity, storage and other technologies should be a

model. Perhaps a methodology such as the ABSVD could be explored to exclude the energy consumed for SO market participation.

During the Charging Futures Forum, Ofgem mentioned it would publish a letter that week on how storage is affected by the TCR. We did not find this on the Ofgem TCR nor on the CFF websites.

2. Do you agree with how we have assessed the impacts of the changes we have considered against the principles? If you disagree with our assessment, please provide evidence for your reasoning.

3. For each user, residual charges are currently based on the costs of the voltage level of the network to which a user is connected and the higher voltage levels of the network, but not from lower voltage levels below the user's connection. At this stage, we are not proposing changes to this aspect of the current arrangements. Are there other approaches that would better meet our TCR principles reducing harmful distortions, fairness and proportionality and practical considerations?

4. As explained in paragraphs 4.41, 4.43, 4.46, 4.49, 4.80, we think we should prioritise equality within charging segments and equity across all segments. Do you agree that it is fair for all users in the same segment to pay the same charge, and the manner in which we have set the segments? If not, do you know of another approach with available data which would address this issue? Please provide evidence to support your answer.

5. Do you agree that similar customers with and without on-site generation should pay the same residual charges? Should both types of users face the same residual charge for their Line Loss Factor Class (LLFC)?

Yes, we understand the distributional issues that current residual charges create of imposing the bulk of the residual charges on users that do not have on-site generation or demand response capabilities, and that there needs to be a way for networks to recover their regulated revenues from all end users of the network.

However, Nuvve exists in large part to provide services to networks (in Denmark, France, and the US, TSO services such as frequency regulation are a dominant component of our business model), and we would like to emphasise the importance of designing charges that create incentives via markets and price signals to resources like ours (bi-directional EVs) to provide services.

Within the current system, V2G would respond to Triads and to high DuoS or BSuOs levels by exporting from behind-the-meter. This could be seen as capacity alleviation at peak times for networks, rather than charges avoidance that benefits specific end-users.

We would like to see forward-looking charges designed to send similar behavioural signals, to indicate when the T/D networks are experiencing capacity, congestion, constraints, and voltage issues, and enable flexibility resource behind meters to take their place as a major enabler of a smarter, more flexible energy system as aspired to by Ofgem. Specifically, we hope that forward-looking charge adjustments will be coordinated to take effect in a similar timeframe to the planned residual charges. Removal of one incentive without replacement by a new one will set back progress toward flexibility by inhibiting market for behind the meter generation, storage, smart EVs, V2G, and other sources of flexibility that need market signals to flourish.

6. Do you know of any reasons why the expected consumer benefits from our leading options might not materialise?

major pillar of system modelling rather than an assumption that some version of the status quo will remain.

11. Do you agree with our proposed approach to the reform of the remaining non-localised Embedded Benefits?

12. Do you agree with our proposal not to address any other remaining Embedded Benefits at this stage? Which of the embedded benefits do you think should be removed as outlined in xx? Please state your reasoning and provide evidence to support your answer.

13. Are there any reasons we have not included that mean that the remaining Embedded Benefits should be maintained?

14. Do you agree with our proposed approach to transitional arrangements for reforms to: a) transmission and distribution residual charges b) non-localised Embedded Benefits? Please provide evidence to indicate why different arrangements would be more appropriate.

Regarding the T&D residual charges transition, Nuvve welcomes a firm decision on what's next (e.g. fixed charges) as soon as possible, in order to plan our business model in the UK. We also believe that the timeline for the residual charges needs to be as aligned as possible the decision on forward-looking charges, since the two are complementary for Nuvve in projecting its business model in the UK. In terms of implementation, Nuvve might have a preference for later implementation of residual charge changes (e.g. phased in 2022-2023 rather than 2021). However more importantly, we want to understand the opportunities that will replace residual charges avoidance – what are the plans for the capacity market and other SO markets that we may participate in (as behind-the-meter, distributed storage resources), in lieu of the charges that disappeared (e.g. Triads).

15. Do you agree with our minded to decision set out? If not please state your reasoning and provide evidence to support your answer.

Nuvve will have to adapt its UK business plan accordingly, but as discussed we welcome the removal of market distortions as long as they are replaced with efficient markets that are accessible to us and that allocate sufficient value and to the many services we offer.

16. For our preferred option do you think there are practical consideration or difficulties that we have not taken account of? Please provide evidence to support your answer.