Response to OFGEM's Targeted Charging Review Consultation

Submitted by Tesla UK on 5 May 2017.

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This submission is in response to the invitation from OFGEM to offer remarks on its consultation published 13 March 2017 and closing on 5 May 2017, titled "Targeted Charging Review: a consultation."

Tesla UK appreciates OFGEM's holistic approach to review the Residual Charge, and the opportunity to comment. It is Tesla UK's hope that OFGEM would see storage as an integral part of the grid and not as a point of generation and/or demand.

1 Executive Summary

Tesla UK has registered OFGEM's decision to review the Residual Charges by 5 May 2017. With this submission, Tesla is pleased and grateful to be able to share its views with OFGEM in its consultation round.

Tesla supports fairness as a principle that should underpin the design of electricity system charges as a whole, and therefore welcomes OFGEM's intention to review residual charges. Importantly, the costs associated with running the network should be reviewed holistically, in light of the potential of available technologies and various rate and charge design mechanisms. Altering the way residual costs are recovered without a complete system approach could inadvertently lead to a peaky, costlier grid to operate and maintain.

When utility charges and compensation mechanisms are established appropriately, all electricity consumers will benefit from embedded generation, or distributed energy resources ("DERs"), regardless of whether or not they have DERs themselves.

Implementation should be done considering a full and complete grid, system and market analysis. Modifications should be considered and implemented over time that allows for a full understanding of all solutions and technologies and the impact on the network/users of the network.

Tesla has further taken note that OFGEM believes storage is not presently on a level playing field with regards to other flexible generation and flexible demand sources. Tesla shares this view, and is appreciative of OFGEM's intention to review and address this.

Tesla also notes that storage generally tends to be viewed as a generation and consumption asset. With this submission, Tesla would like to reframe this view. Tesla proposes to generally view storage as an integral part of the grid, and neither generation nor end-use. Storage is a new, different type of asset than what we have had on the grid previously. While storage acts like generation, consumption, transmission, and distribution at different points in time, it is not any one of those types of resources. Thus, storage should not be fit into rules for other types of grid resources where they are not applicable or appropriate.

Storage is socially highly desirable as it, on the whole, tends to deliver significant avoided network and generation capacity build-out and costs, and will be increasingly valuable as renewables intermittency increases. Our ask would therefore be for OFGEM to consider an alternative view of storage and to enable its full entry into the marketplace on terms for Transmission System Operators (TSOs) and Distribution System Operators (DSOs) that are identical to other socially desirable network-contracted investments and services such as voltage lines, substations, and transformers. We are aware that this was covered in the BEIS call for evidence, but would like to re-iterate the view here.

After an introduction in Section 2, Section 3 of this submission frames what storage is and what storage does in a grid-connected environment. It elaborates on why storage is better seen as an integral part of the grid, and not as a point of supply or demand. If through a publicly acceptable market mechanism, for example similar to the Firm Frequency Response market ("FFR"), the regulated grid operator entities can deploy storage assets of any scale, the logical consequence of this is that storage should probably be a recipient of grid support charges rather than pay such charges. When contracted by a regulated entity, could plausibly be made part of the mechanism to recover the TSO's or DSOs' cost for its regulated activities (often known as Cost-plus regulation).

Zooming out from the specific topic of residual rates, Section 4 next overviews some general positions that in a holistic setting will be useful to consider when it comes to designing rate structures. In response to the growth of DERs like solar, wind, and storage, many utilities and utility regulators are currently making changes to grid charge schemes as well as customer rate structure policy, both of which significantly impact the economic viability of DERs.

Finally, in Section 5 we address directly the questions posed by the TCR consultation.

2 Introduction

Tesla is pleased to submit this response to OFGEMs Target Charging Review. Our mission is to accelerate the world's transition to sustainable energy. To help achieve this, the electricity network's operation and design is of paramount importance and is widely seen as one of today's most important and exciting societal challenges. All eyes are on this space as new technologies integrate with the ageing grid to deliver a decarbonised electricity supply, and provide users with choice, cognisant of the fact that this also needs to ensure increasing resilience, reliability and stability, all at an affordable cost.

This of course is not able to happen overnight and we welcome OFGEM's decision to take a measured and timely review of the system in order to deliver the best possible path to the challenges ahead. With that said, we do believe that storage should be treated on a level playing field. Addressing this issue promptly, as indicated with the BEIS/OFGEM call for evidence on Smart, Flexible Energy Systems, is welcomed for both double charging and the effects of embedded benefits.

We also believe that a smart and flexible system that makes use of DERs to maximise ratepayer benefits, improve system operator control and management, increase resiliency and capacity utilisation of existing renewables, and alleviate pressure on a peaking grid, will also offer very significant economic advantages that are currently undervalued.

An electric grid leveraging DERs offers an economically better alternative to the centralised design of today. DERs bring greater resiliency to our electric energy system; bring total economic benefits at lower cost; enable more affordability and consumer choice; and improve flexibility in grid planning and operations, all while facilitating the de-carbonization of our electricity supply.

3 What storage really is and does

3.1 Storage is an extension of the wires in the grid

Storage can usefully be viewed as a 'thicker' extension of the wires in the grid. An analogy may be the transport system. Storage is like a parking garage that takes cars off the streets to relieve congestion -- saving road capex -- and putting the cars back on the streets when needed and outside of road congestion periods -- thus causing no extra road capex.

So rather than continually build more roads/lanes on highways, storage would be akin to the creation of parking garages at transport hubs, distributed throughout the system, and linking into other modes of transport that can move more people (trains, tubes, highways) and which creates a much more efficient existing system by eliminating congestion at peak times. Energy storage behaves like parking garages, including at people's homes, and provide places to keep the cars when they shouldn't be on the road or are not needed.

In our experience it has been helpful to policymakers to note that storage is neither an end-use point, a source of generation, nor transmission / distribution equipment. Trying to fit storage, which is a new type of grid asset, into these conventional categories would be incorrect. Storage is instead better regarded as a parking garage of electrons that are en-route from a generator to an end-use point. This parking garage is what enables storage to lower network system capex versus any other alternative (save efficiency).

3.2 Storage inherently reduces grid costs

Storage rarely causes the need for network capacity build-out. On the contrary, storage very often helps T&D operators *avoid* network build out charges; costs that would have fallen upon the electricity consumers through the regulated grid charges. So storage is in a large part a lower-cost replacement of an otherwise more costly build-out of traditional wires and infrastructure.

Network costs are to a large degree driven by the need to cover peak demand, both in terms of transmission, generation and balancing capacity. Ensuring reliability of the grid given these relatively short periods of peak demand is costly as assets need to be available, but their utilization is limited.

Storage temporarily stores electric energy. As storage is temporary, storage has the ability to *support* the grid, by for example shifting load away from peak times and providing frequency support.

Network costs like TNUoS and DUoS charges on the other hand, are driven primarily by peak demand – short periods when use in the system is highest driving these costs, per sections 4.4. page 31, and Appendix 1, Sections 1.5, 1.7, 1.9, and 1.12 pages 61 and 62 in the consultation document. These costs arise both from the need for more wires and for more generation capacity. The network needs to have the capacity to be able to withstand these fairly irregular but considerable peaks at all relevant times and geographical locations. And while sufficient generation resources are needed to fulfil this peak demand, much of it is utilized only at these peak times, so very infrequently, yet needs to be adequately funded to be available when needed.

Storage is a lower cost alternative when correctly located in the grid and managed and incentivized to perform the most useful function to the grid. Storage can help avoid investments in generation and network capacity, and reduces the costs associated with both the wires and peak generation capacity.

As opposed to end-use or generation, both of which cause network costs to increase by driving network and generation capacity build-out, storage instead helps use the existing network more efficiently, reducing the costs associated with both the wires and (peak) generation capacity.

With the appropriate market mechanisms in place, storage asset operators naturally deliver these benefits to the grid. Put differently, no rational storage asset operator would regularly fill his or her batteries from the grid at peak times when the electricity is priced at maximum, and sell when there is little end-use and prices are low.

3.3 Storage is a grid-type of investment

As the physics of distributed storage in particular delivers benefits to the grid in the form of avoided alternative grid build-out costs (versus the scenario of not having this form of storage), storage should logically be viewed as a socially desirable investment option available to T&D operators. In short, it should be regarded as a grid-type investment, and certainly not as a generation or demand type investment.

So if through publicly acceptable market mechanisms, for example the FFR market, a regulated grid operator entity can deploy storage assets, the second logical consequence of this is that storage should probably be a recipient of grid support charges rather than pay such charges. When contracted by a regulated entity, storage should be mandated as one option or part of any mechanism to recover the TSO's or DSOs' cost for its regulated activities.

Storage should however pay its proportional share of network residual charges for any periods which it contributes to congestion and therefore on the margin drives network capacity investments.

Storage should also be rewarded for balancing generation or demand as it responds to issues and helps balancing. A storage asset deployed at a generation or demand center, would therefore be able to reduce residual charges for the generation or demand center if peak grid usage is avoided.

As recharging typically occurs at off-peak times, or when excess, zero marginal cost generation from intermittent renewable sources is available, storage should in principle not be regarded as a resource that causes external balancing costs, and certainly not that causes these to arise.

With the exception of an urgent review of double charging of storage, Tesla sees no need for an urgent change of the current Charging regime. Tesla believes that implementation should be done considering a full and complete set of holistic grid cost drivers and market policies. Modifications should be considered and implemented over time that allows for a full understanding of all solutions and technologies and the impact on the network and users of the network.

Having covered key storage-specific principles, for the holistic picture, we next turn to a handful of very important broader principles we'd like to highlight. We then turn to Ofgem's specific questions and our answers.

4 General positions on customer rate structure changes

Below, Tesla outlines some high-level positions regarding how regulators should develop changes to customer rate structure to fairly allocate costs to customers while still appropriately compensating customers that choose to invest in DERs that support the grid.

- Time-varying rates -- all rates if they were time-varying would better incentivise appropriate customer behaviour, including usage of customer owned energy generation and storage assets
    - In the short-run, time-varying rates must be available at least as an option for customers who want to utilise DERs.
    - In the long run, all customers should have time-varying rates to incentivise appropriate behaviour and ensure that customers are choosing between DER investments or not as opposed to choosing between rate structures (i.e. customers should choose between DER or no DER rather than between DER with time-varying rate structure versus no DER with flat rate structure).
- Customer investment certainty -- policies should ensure that customers and developers investing in distributed energy resources (DERs) can be reasonably certain that future changes in policy and rate design will not significantly lessen the economics of their investments
- Gradualism -- significant policy changes affecting DER customers and industry should be implemented on a gradual schedule to avoid major market disturbances
- Fixed charges – if any fixed charges are applied, they should reflect only the costs of the electricity system that are truly fixed, of which there are few.
- Distributed Energy Resources compensation -- mechanisms should appropriately compensate customers for investing in DERs. DER compensation policies should provide customers with an incentive to use and produce electricity at times and locations on the grid where it is most efficient.

5 Tesla's responses to OFGEM's specific questions

1. Do you agree that the potential for residual charges to fall increasingly on groups of consumers who are less able to take action than others who are connected to the system, is something we should address?

Fairness is a principle that should underpin design of charge. A holistic view on the costs associated with running the network should be reviewed, in light of the potential of available technologies and various rate and charge design mechanisms. Altering the way residual costs are recovered without a complete system approach could inadvertently lead to a peaky, costlier grid to operate and maintain.

When utility charges and compensation mechanisms are established appropriately, and when utilities are encouraged to realize the potential to avoid or defer forward-looking infrastructure upgrades on the transmission and distribution system through for example storage investment, all customers will benefit from distributed energy resources ("DERs") regardless of whether or not they have DERs themselves.

2. If so, why do you think, or do not think, action is needed? Why?

To the extent question #1 relates to the societal equity issue, it should certainly be minded when it arises.

Per consultation, e.g., Netherlands showed one way of how to do that, see section 4.10 on page 32 of consultation.

Moreover, there is an urgent need to transition to a sustainable future. This transition will help certain groups of consumers, especially lower income groups, who already pay an inequitably high price in the form of shorter lives and more diseases by living close to highways, polluting power stations, and toxic petrochemical industry. The Louisiana Cancer Alley is a well-known example of this, e.g., http://www.msnbc.com/interactives/geography-of-poverty/se.html.

Done correctly, the transition to renewables and storage will help and not hurt such groups and prevent then gradually eliminate worsened inequitable outcomes in the future. This transition also promises greater electric system resiliency, which also has value to all segments of society. Taken together, the holistic system view should be taken on whether true and holistic inequities are worsened or bettered.

3. We are proposing to look at residual charges in a Significant Code Review. Are there any elements of residual charges that you think should be addressed more urgently? Please say why.

Double charging for storage should be urgently reviewed, as the current charges create an uneven playing field. In turn this uneven playing field artificially limits the deployment of an asset class that has significant value additive potential for the grid, and can deliver multiple services simultaneously.

Beyond this, there is no requirement for an urgent change. Implementation should be done considering a full and complete grid, system and market analysis. Modifications should be considered and implemented over time that allows for a full understanding of all solutions and technologies and the impact on the network/users of the network.

OFGEM should be cognizant of how unexpected, quick implementation of regulation on certain issues may detract investment from external parties and customers into improvements on the system and scare away future projects that seek to provide improvements. A case study of this can be found by looking at the US state of Nevada and how the sharp policy changes made around solar resulted in several solar providers immediately stopping all solar deployments in the state. The same is true for Spain's PV policy.

5. Are there other approaches that you know about from other jurisdictions, that you think offer relevant lessons for GB?

There are lessons from California on how to encourage storage and the wide-ranging benefits of its integration and utilisation (specifically Assembly Bill 2514, http://www.leginfo.ca.gov/pub/09-10/bill/asm/ab_2501-2550/ab_2514_bill_20100929_chaptered.pdf). There are also lessons to be learned from Nevada about hastily implementing policy changes in niche areas. And Spain's PV policy change, including very poorly designed retroactive claw-backs.

GB has the opportunity to create an approach for reaching GB targets, yet to be done anywhere in the world. Implementing a balanced system that encourages DERs, renewables and a low/zero carbon grid needs new thinking and a new approach.

This new thinking and new approach will doubtlessly require distributed renewable energy resources, and energy storage will play an important role in balancing as an integral component of a balanced grid. EU's Winter Package proposed market design reforms might also be worth looking at, especially with regards to prosumers, level playing field, transaction cost, settlement procedures, and microgrid developments.

6. Do you agree that our proposed principles for assessing options for residual charges are the right ones? Please suggest any specific changes, or new principles that you think should apply.

This TCR and a SCR provide the perfect opportunity to have a complete system review. This can

consider where the system has come from, what it is currently and how it operates, then how it should be in the future.

Taking this opportunity, we would suggest that there are additional principles that should be considered, such as: (1) enabling customer choice by rewarding flexibility, (2) supporting the efficient use of DERs, and (3) enabling a zero/low carbon grid of sustainable energy

7. In future, which of these parties should pay the transmission residual charges: generators (transmission- or distribution-connected), storage (transmission- or distribution-connected), and demand, and why? What proportion of these charges should be recovered from each type of user?

In principle, the cause of there being a network can historically be attributed to the fact that generation always was centralized. This centralization of generation with distributed points of end-use necessitated a grid. Centralized generation facilities that drove the network build-out should now also be assigned the majority burden of TDR charges. And to incentivize the demand-side to minimize network costs, these charges should in principle be passed on to consumers of electricity from centralized generation through time-varying rates that encourage customers to shift usage out of the peak period, which therefore helps to lower the key driver of TDR costs, ie. capacity build-out. Distributed generation that relies on the grid to export power off-site should also pay, consistent with the approach for centralised generation, but only for the exported portion, as the self-consumption portion that distributed generators generate but do not export, contributes to a reduced need for capacity and power transmission via the grid.

Transmission charges for peak usage should be paid by those that create the peaks and at that time. Those that provide relief should be rewarded. All transmission-connected end-users should pay for using the transmission system. Here, storage is not an end-use in our view, but an integral part of the grid that should help to reduce peaks if tariffs are appropriately designed.

Consumers should have a choice on whether it is best for them to be benefiting from transmission connections while the transmission system should value services DERs can provide that are of benefit to it.

8. In future, which of these parties should pay the distribution residual charges: generators (transmission- or distribution-connected.), storage (transmission- or distribution-connected), and demand, and why? What proportion of these charges should be recovered from each type of user?

Distribution charges for peak usage should be paid by those that create the peaks and at that time. Those that provide relief should be rewarded. All distribution-connected end-users should pay for using the system. As noted above, storage itself is not an end-use in our view, but an integral part of the grid.

Consumers should have a choice as to whether it is best for them to be benefiting from connections, while the distribution network should value service DERs can provide that are of benefit to it. Larger generators connecting to the distribution grid should, as above, contribute to the costs of the network. customer-located generation's contributions should be exempt or limited to the amount exported.

Again, we emphasize that storage is neither generation nor end use, and should not be charged for either. Time-varying tariffs will in any case incentivize the efficient use of storage, to the overall benefit of all electricity consumers.

9. Do you support any of the five options we have set out for residual charges below, and why?

The proposed options do not reward flexibility but mainly harmonises costs penalising those that are active in terms of actually helping the system. This is an opportunity to take a complete look at the electricity system as a whole and make it work for the future rather than amend it to fit in with what is already being done.

An electric grid leveraging DERs offers an economically better alternative to the centralised design of today. DERs bring greater system resilience; greater total economic benefits at lower cost; enable more affordability and consumer choice; and improves flexibility in grid planning and operations, all while facilitating the de-carbonization of our electricity supply.

10. Are there other options for residual charges that you think we should consider, and why?

Taking a holistic view to answer this question: Given their nature and how they arise, the policy objective on residual charges should probably be to leverage the transition that is happening anyway to reduce and eventually eliminate all residual charges.

A holistic set of tools exists to get there. For example, system flexibility contributions and peak demand reductions should clearly be actively rewarded. This will create a system that is more predictable and manageable, and will reduce network costs for all. A "peaky" system only increases costs for all.

This is an opportunity to take a complete look at the electricity system as a whole and make it work for the future rather than amend it to fit in with what exists.

An electric grid leveraging DERs offers an economically better alternative to the centralised design of today. DERs bring greater system resilience; greater total economic benefits at lower cost; enable more affordability and consumer choice; and improves flexibility in grid planning and operations, all while facilitating the de-carbonization of our electricity supply.

Other options, such as time-varying charges for network use, should be investigated and equitably deployed, as they would likely provide a better balance of collecting appropriate cost from end-users while driving beneficial consumer behaviour and DER adoption

11. Are there any options that you think we should rule out now? Please say why.

In general, rule out harmonising costs. Flat rate charging, i.e. non-time-varying $/kWh charges, does not provide appropriate incentives for customer behaviour, thus increasing costs.

Option D, gross costs, directly dis-incentivises end-users from contributing their own capital to solve the urgent sustainability challenges. If, instead, end-users are incentivized to contribute own capital, this will help speed progress on managing grid needs and reducing air pollutant emissions.

Fixed costs that are not a true reflection of actual costs are not beneficial to the system overall. Normalising costs across all will not help the network and will increase costs in the medium and longer terms. Thus, fixed costs and harmonising costs must be ruled out.

12. Do you think we should do further work to analyse the potential effects of the charging arrangements for smaller EG (called 'embedded benefits')?

Yes. Zero carbon EG and storage is of great benefit to the system and essential for achieving GB's goals and commitments. There are clear net social and economic benefits of implementing DERs into the electricity system. Looking at EG in isolation (as per the 'minded to' CMP 264/265) and removing the supporting structure for sustainable DERs is missing an opportunity to reduce system costs and improve stability and resilience. Smaller EG are an integral part of the system and a benefit to it.

13. Do you think changes are needed to the current charging arrangements for smaller EG, and when should any such changes be implemented?

Yes, further work is needed to look at small EG from a system wide view. Changes are needed but not as proposed in CMP 264/265. Smaller zero emissions EG provide an inherent benefit to the system and this should be recognised as such. Any changes should only be implemented via a complete system review

and minded approach – a timely SCR.

14. Of the embedded benefits listed in our table, do you think that any should be a higher or lower priority?

Deliver a decarbonised electricity supply that provides users with choice, increasing resilience, reliability and stability, all at an affordable cost, is the priority. Looking at a small segment of the network in isolation is not a suitable approach.

Priority should be given to charges that incentivise investment in zero carbon and lower the peaks in the system.

15. Do you think there are other aspects of transmission or distribution network charging which put smaller EG, or any other forms of generation or demand, at a material disadvantage?

Double charging storage clearly puts it at a disadvantage.

16. Do you agree with our view that storage should not pay the current demand residual charge, at either transmission or distribution level?

Yes. Removing penalties for storage is a priority that will help encourage its penetration on to the network. Storage should be considered an integral part of the grid, and not generation or end-use demand. It is neither.

17. Do you agree with our view that storage should not pay BSUoS on both demand and generation?

Yes.

18. Which of the BSUoS approaches described is more likely to achieve a level playing field for storage?

Charge storage as a BMU, per definition Section 8.9 page 50 and Table 5 page 53 in consultation.

19. Do you think the changes in this chapter should be made ahead of any wider changes to residual charging that may happen in future? Do you agree with our view that these changes should be implemented by industry through the standard code change process?

We feel that the removal of double charging for storage should be done immediately, and ahead of a full review. The implementation by industry through the standard code change process is a sensible approach assuming there is widespread industry agreement.

20. We would welcome your thoughts on the potential make-up of a CCG. Please refer to the potential role, structure, prioritisation criteria and assessment criteria.

Active associations and industry representatives from all sizes of users/generators that represent all factors and facets of the industry should be equally represented if a CCG is formed. A newly formed CCG must be unlike the current set up of CUSC.

21. Do you agree with our proposed delivery model, including its scope?

The approach looks sensible, but it must ensure all industry and DERs are represented, not just the largest players.

22. Do you agree that our proposed SCR process is most appropriate for taking forward the residual charging and other arrangements for smaller EG discussed in this document?

Any SCR must take a holistic system view and take as its point of departure the future DER-based system.

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