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## **Response to Consultation on Targeted Charging Review**

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Cumulus Energy Storage are a UK company with a US R&D facility. Our vision developed from asking our customers what they needed. Rather than scale-up from 'mobile' batteries, or new chemistries developed in the laboratory, our vision for a grid-scale battery was to take a large-scale industrial process and adapt it to our purpose for stationary energy storage.

Using chemistries and architectures already used for 50 years in the mining industry at ~100 MWh scale equivalent, we have developed a rechargeable Copper/Zinc battery that is safe, reliable and sustainable, and offers class-leading Total Cost of Ownership to our customers.

Our unique technology will play a significant role in improving the economics of renewable generation and transforming energy markets.

We welcome the opportunity to respond to Ofgem's Consultation re Targeted Charging Review. Cumulus would also welcome the opportunity to meet with Ofgem and discuss these matters further.

### **Introduction**

The consultation rightly recognises residual charges as a conceptual inevitability, but the level of those charges (particularly demand residual charges) has been the major driver that has resulted in the spotlight on this issue. The level of residual charges is far from being an inevitability and in our view Ofgem and UK government need to give wider consideration to improve the cost reflectivity of all network charges.

The growth of transmission demand residual charges has principally come about due to:

- Increase in funding of Offshore Transmission Operator (OFTO) assets
- Reduction in generator TNUoS to comply with the EU approach of harmonised (low) TNUoS charges for generators
- Increase in network assets although total transmission usage as measured in both GW and TWh is falling
- Charging incentives encouraging some users to avoid network charges whilst they still benefit from the existence of the network. Generators connected to spilling Grid Supply

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Points (GSPs) are an extreme example of this and hence we specifically address this issue below.

The consultation focuses particularly on the last cause but the others do also need to be addressed. To address the other issues may be outside Ofgem's remit or may only be implementable as part of a price review change so they may have to be outside of the Significant Code Review (SCR). Ofgem should though recognise these issues and that they have a significant role in changing all of them. We set out below some suggestions.

#### OFTO assets

Failure to be transparent with the wider community has resulted in diminishing support for sensible energy policies such as renewables and investment in energy efficiency by suppliers. In future all charges should be made transparent to those who are paying them and should be allocated directly to those who cause them where possible. The error of including part of OFTO charges in residual charges should be corrected and this could be done as follows. All existing CfD and ROC funded offshore projects would pay all OFTO charges as from a future date such as 2034 (2017+2 years to build + 15 years of revenue). For all future offshore wind projects i.e. CFD3 onwards all OFTO charges should be paid by the generator.

#### Low Generator TNUoS

Harmonisation itself is not the cause of this impact on demand residual charges it is a result of the fact that unfortunately most of the EU countries do not recognise the benefit of encouraging generators to see the full cost of the locations they choose. Hence the EU agreed that Generator charges should be set at low levels which has resulted in demand attracting the bulk of transmission charges and in particular residual charges. This should be recognised as one of the principal disadvantages of GB staying in the Single Energy Market. For the time being whilst the UK remains in the EU and we may post Brexit remain in the Single Energy Market (SEM) we probably have to live with this misguided approach. But if GB (NI leaving the SEM is another matter) leaves the Single Energy Market then we should unwind this approach as a matter of urgency. Generators can and do respond to locational signals to a greater extent than consumers. So Generators should see strong forward-looking charges and their share of residual charges.

#### Underutilised Assets

Whilst it is recognised that network companies have a duty to install assets and hence there is always a risk of overbuilding this situation should occur less in the future as network owners have now got more options including using storage which can be used on a temporary basis and hence reduce overbuilding. Network companies currently are incentivised to overbuild as they earn the same rate of return on an asset regardless of whether it is being used or not. To reduce residual charges and to incentivise the use of "alternative" approaches to managing the network owners should receive a lower rate of return on those assets that are not fully utilised.

### Forward-looking/ Residual Charge mix

Limited over recovery of forward-looking charges will sharpen incentives and improve geographic matching of supply and demand. Provided the impact on forward-looking charges is not excessive then this is unlikely to have any negative implications.

Note like all changes the introduction for assets built recently but before the change was visible should be provided with some short term relief.

**Question 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?*

Charges should be cost reflective and the current charging structure potentially over rewards certain activities. The issue of allocation of monopoly charges to inelastic customers is the symptom rather than the cause see issues set out in Introduction above. Nevertheless the symptom still needs addressing.

**Question 2:** *If so, why do you think, or do not think, action is needed?*

Action is needed as the current situation is causing inappropriate investments and actions for example government EMR (introduced for environmental reasons) contracts being awarded to polluting diesels and diesels being run to reduce triads whilst NO<sub>x</sub> levels are being breached in many urban areas. Ofgem's view that vulnerable consumers will particularly suffer is also relevant.

As a pioneer in developing more competitive energy markets GB has unfortunately added good measures (for example the CfD) alongside poor measures such as a Capacity Market that does not really work for storage and a market structure that has a number of flaws (e.g. non-competitive offering of CfDs, Final Investment Decision Enabling for Renewables (FiDER) and Nuclear). Hence an SCR is required to ensure we do not repeat past mistakes by changing one aspect of the energy market without fully considering wider energy market issues.

An SCR provides an opportunity to recognise the overall impact of different parties and future changes to charging mechanisms. Such a holistic view of the energy market is overdue and will ensure that the changes identified are brought with wider support and will create more enduring charging methodologies.

**Question 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.*

The treatment of storage needs to be addressed more urgently as well as the governance of Connection and Use of System Code (CUSC) and Balancing and Settlement Code (BSC). These issues are discussed in Q 16-19 below.

**Question 4:** *Are there elements of the approaches in other countries that you think could be appropriate for GB residual charges?*

The GB structure of separate network owners and energy suppliers is a short term barrier to the introduction of technologies such as storage and DSR. This is because these flexible technologies can provide value both in terms of energy services as well as network avoidance. Whilst the Consultation paragraph 3.23 recognises this benefit the changes that this consultation could introduce should have a positive impact but might also have a negative impact on the implementation of these technologies. Currently network owners have limited incentive to pursue significant implementation of these technologies. This needs to change and prior to that change happening (e.g. some changes could be delayed till the next price review) other mechanisms may need to be utilised to support those nascent technologies. For example encouragement by Ofgem of further projects to establish DSOs and testing the use of storage in place of reactive compensation by National Grid. Ofgem could also signal that in the next price review current returns on conventional assets that were built without evaluation of DSR/ storage etc. alternatives will be seen as potentially against consumer interest.

Such GB specific issues will require GB specific solutions.

In particular the example of Spain should be noted with particular caution. Allowing an under recovery to build up over 15 years is an extreme example of failing to address issues in terms of transparency and inappropriate allocation of charges. This is particularly relevant to the GB treatment of OFTO charges and is an object lesson in how not to manage such costs.

One point that comes out of the international examples is the impact of time of day tariffs on network utilisation. Further implementation of domestic smart meters will provide more solutions to the electricity industry. Even where half hourly metering is already installed time of day tariffs seem to be under-utilised in GB. Whilst the decision to offer and promote such tariffs is a call to be made by players in the competitive market Ofgem could conduct research to understand the barriers and potentially encourage more imaginative tariffs which DSOs could also benefit from.

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

None that we are aware of.

**Question 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.*

The proposed principle in themselves are the right ones but the cause of “so called” residual charges also needs to be reviewed. Including EU approach re generation charges, offshore wind subsidy, and overbuilt assets see introduction.

**Question 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?

Transmission Residual charges should be levied at a similar level across all users but it would be appropriate to exaggerate forward-looking charges to provide additional incentive to encourage generation to locate nearer to centres of demand and vice versa. Distribution connected generators who supply 100% of their generation to demand below the GSP should not pay transmission charges nor the transmission residual charge. Generators below GSPs that spill on to the grid or where there is a future risk of spill should pay a charge to reflect potential future usage. Demand charging needs to reflect usage as well as network security as even if they never draw any kWh demand relies on the grid system for security. So Demand should always pay a “residual charge”. Note the same logic does not apply to embedded generation as it only needs the adjacent network that absorbs the energy that it provides. In the future we may even see DSOs using embedded generation to provide Black Start.

Transmission or distribution connected storage should be treated in a similar manner to generation but charging should be structured to ensure that storage is incentivised to reduce the need for transmission assets. GSPs can be allocated to 1 of 3 categories demand driven, generation (peak or base load) and intermittent. A demand driven GSP will have a similar profile to the demand profile of GB demand. Some GSPs may be a combination of intermittent and demand or generation. A storage unit located at a demand driven or an intermittent GSP should not pay any transmission charges nor should they pay a residual charge provided they flatten the demand shape. As the process of flattening the demand shape is reducing the need for the transmission network.

Any charging system should be introduced over a period to avoid damaging investor confidence.

Brexit and potentially Scottish independence remove the obligation on English and Welsh consumers to support generation outside of England & Wales. So subject to the nature of the Brexit negotiation outcome electricity should be treated no differently than any other commodity. So if we need it we won't impose a tariff but if we can produce it ourselves then we should.

## Summary Transmission Charges

The table below shows our suggestion in terms of allocation of forward-looking and residual charges. Note this includes the concept of over recovery of forward-looking charges (see Introduction). Hence residual charge is remaining charge after [10%] over-recovery of forward-looking charge.

	Location transmission charges	Residual transmission charges	Notes
Generation transmission connected or distribution connected (with GSP spill)	55% x spill factor	Pay, generation + storage see below, pay 50% of remaining residual.	
Generation distribution connected (no spill)	0%	Should not pay but should not be able to offset Demand	

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Demand	55%	Pay, 50% of remaining residual.	
Storage located at Demand driven or Intermittent GSP (1)	0%, unless opt in as a source of income	No	Transmission and distribution connected treated the same
Storage at other locations or where breach (1)	Treat as generation with transmission/ distribution as above	Pay but only based on MW export	No charge payable on storage's MW demand

(1) Subject to the entire output being used to flatten peaks

**Question 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?*

All parties, including demand at co-located sites as it relies on the distribution system for security, use the distribution system. Co-located Generators and storage should only pay in relation to the largest MW of either generation or storage as the extent of their dependency on the network is limited to that level of MW.

#### Summary Distribution Charges

	Location distribution charges	Residual distribution charges	Notes
Generation & storage not co-located	55%	} Pay, 50% of } remaining residual. } } }	Both paid on export MWs only
Storage and generation co-located	0%, provided no MW exported at time of distribution system peak		
Demand	55%		
Demand at co-located sites	0%, provided no MW imported at time of distribution system peak	} Pay, 50% of } remaining residual. } } }	

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

	Advantages	Disadvantages	Notes	Choice
A: kWh charge		Allows network users who self-generate to free ride		No
B: Fixed	Appears simple	Complex to profile all (non-domestic) customers. Profile may not determine extent	Could consider using Council Tax bands to set profiles for domestic customers.	Only as per E

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		to which customer relies on network.		
C: Fixed linked to Connected capacity	Relatively simple to administer. Cost reflective.	Need to police free riders with apparently low capacity who will breach their Capacity in an emergency.	Could limit by fuse rather than contractual capacity	2 <sup>nd</sup>
D: Gross kWh consumption		Challenging to implement		No
E: Hybrid (e.g. Application of C to non-domestic and B to Domestic)	Facilitates a proportionate approach			1 <sup>st</sup>

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

None although note that it is our view that over recovery of forward-looking charges would be appropriate.

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

“A” because it encourages free riding and “D” because it would be challenging to implement.

**Question 12:** *Do you think we should do further work to analyse the potential effects of the charging arrangements for smaller EG (called ‘embedded benefits’)?*

The elasticity of and the benefits brought by all such generators needs to be fully understood. DNOs currently see embedded generation/ storage as something they tolerate whereas a DSO will see well located MW/MWh as a major network asset. The transition to DSO has hardly started so the role of embedded MW/ MWh and how they can be incentivised and used is not well understood. Further research by Ofgem could help to highlight these benefits and thereby result in lower costs for consumers hence justifying Ofgem’s investment in such research.

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

Part of the issue re distorted incentives may be due to the way TNUoS Demand charges are levied. Hence the behaviour of small embedded generators in managing demand triad charges is a symptom not the cause of the problem. Once we have universal smart meters it may well be appropriate to introduce GSP by GSP charging for both generation and demand. These charges could then be established on a level playing field where “forward-looking” charges are matched so that the incentives to generate or provide negative demand are equivalent. To achieve this the Triad may need to be spread over more peak periods and residual charges would need to be levied



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separately. These issues and future opportunities to introduce a single charge levied as + on import and – on export (and vice versa) should be incorporated in the wider review.

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

Unfortunately we have developed the GB energy market in a learning (optimist view) or haphazard (pessimist view) way and we need to recognise that we should develop changes whilst considering all implications and make changes in a co-ordinated way. Hence a Significant Code Review (see Q22) is required and we should only prioritise a change if it is needed to address a specific issue. See examples 16-18.

**Question 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?*

The implementation of losses is material in this regard. As they are challenging to predict cost reflective and transparent charging for losses is more challenging to achieve so over-stating “forward-looking charges” helps to redress this balance and make the overall charging fairer.

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

As discussed above see Q7 and Q8 storage should not be seen as demand and subject to its location it reduces the need for a network all together. If storage is using the network (e.g. by importing at the time of the Triad or super-red periods) then it should be exposed to “forward-looking” charges but storage is unlikely to import at these times so this is not a major concern. Charging both residual import and residual export on storage would impose a double burden. As storage normally competes with generation then charging the same residual export is more appropriate than residual import. This proposal is consistent with Ofgem’s proposal for transmission Charges, CDCM and EDCM distribution. So we agree that storage should not pay the demand residual charge.

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

In terms of managing and not causing BSUoS a SO should see the most useful parties to manage (or help them manage) in the following sequence 1. storage 2. generators 3. demand (even though DSR in GB is under appreciated). Storage subject to its location has significantly greater value to the system than the usage it makes of the system. Storage located at or close to demand centres offers the greatest value to the network. Therefore we believe that double charging BSUoS to storage cannot be justified.

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

The role of storage in managing BSUoS should be recognised and therefore any storage unit that can switch from 100% charging to 100% discharging within a settlement period should as Ofgem propose



only pay BSUoS on its gross exports. Logic for using exports is that storage is competing with generation.

**Question 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?*

Early implementation of the issues in Q16 to Q18 is appropriate (see issue re development of UK storage companies in Q21) and a change through industry standard code change process would normally be appropriate. There is an issue around storage being represented on the CUSC and other panels. Industry (as in the storage industry) need to find a method to ensure they are heard in these forum. It may be necessary to make the case to Ofgem to support the storage industry establish itself in these fora.

**Question 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.*

As mentioned above See Q19 storage is currently not well represented in industry code fora. This is particularly problematic as storage as a disruptive technology is likely to impact on the residual value of conventional assets in particular conventional generation. The decision on participants is also challenging as there are currently limited storage (other than pump storage) installations. There are other tests though such as parties who have EFR contracts, planning consents or made/ accepted network connections. Other logical participants are storage Trade Associations (REA and ESN), DNO/DSO and SO. An excessive accumulation of incumbents (particularly those who have made no investments to date in storage) should be avoided.

**Question 21:** *Do you agree with our proposed delivery model, including its scope?*

We agree with the scope of the proposed delivery model but we are also of the view that a number of other areas also need to be addressed (see Introduction and Q13) in the longer term. These include the treatment of “forward- looking” distribution and transmission charges, development of DSOs and security standards (see below). These may need to be linked to price review cycles so later implementation needs to be recognised.

Network company’s security standard only make a passing reference to the use of alternative methods of supporting those networks. This reflects the historical environment. The SCR should also review security standards and how they are and should be adopted by network companies particularly DSOs.

We agree that in general the preference should be for industry to lead on code changes but given the issue described in the answer to Q20 the CCG and Ofgem’s leadership thereof will be needed to ensure incumbents do not delay or block the required changes. So we support the approach of industry lead changes for storage charges (TCR issues). For other changes we recognise that the CCG are the appropriate party to propose changes based on a Co-ordinated Charging Group (CCG)

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summary design but we share Ofgem's view that Ofgem should then instruct industry to raise modifications which would include carrying out the detailed design.

Early implementation of the proposals re storage charges is critical as this will send a positive signal to storage investors and will test the response of incumbents and thereby assist in enabling the long term strategy for developing this disruptive technology. As an island GB (and Ireland although recognising this is outside Ofgem's area of interest) will benefit significantly from storage and yet it is already apparent that other markets (USA in particular) are implementing storage ahead of the UK. Late development of a home market will disadvantage UK based storage companies (such as Cumulus Energy Storage Ltd) and then create an environment which depends on imports which in itself is not in the interest of GB consumers.

**Question 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?*

The SCR approach is the most appropriate as other governance approaches are very unlikely to deliver the necessary change and will certainly take longer and require significantly greater investment by all parties. Whilst some solutions are outside industry codes the bulk of the changes are within industry codes and there is no reason to delay the code changes whilst the other changes such as price review issues are implemented, particularly given the extended cycle associated with price reviews.

There is inevitably a price tag attached to the SCR but this is an investment that must be made to achieve the savings associated with a flexible energy system. Parties such as the National Infrastructure Commission, Carbon Trust and Imperial College have valued the 2030 flexibility prize as £2bn pa or greater. The SCR cost will be only one of the costs associated with building a flexible energy system but it will be a one off cost and will be a tenth of a % of the annual flexibility prize.

Kind regards



Nick Kitchen

CEO