National Infrastructure Commission
1 Horse Guards Road
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08 January 2016

Dear Sir/ Madam

National Infrastructure Commission call for evidence: Energy interconnection and storage

Scottish Renewables is the representative body for the renewable energy industry in Scotland, providing a united voice for more than 275 member organisations working across the full range of technologies delivering a low-carbon energy system integrating renewable electricity, heat and transport.

Our vision is for a Scotland that harnesses the full economic, social and environmental potential of all forms of renewable energy, in order to provide consumers with secure, low-carbon supplies of energy at the lowest possible cost.

The Committee on Climate Change estimates that 66 – 93GW of renewables will be required to deploy in order to deliver an electricity system in line with our 2030 carbon budgets - at least double today's operational capacity. Our energy infrastructure is central to this ambition and it is increasingly clear that providing more flexibility on that network will allow us to meet that target at lower costs to the consumer[1].

Interconnection and storage are both vital sources of this required flexibility and we welcome the commissions focus in this area. However, it is important to note that on the subject of 'system balancing' there is some concern that there is no definition of problem that the commission is seeking to remediate. It is our view that any proposal to alter the way that supply and demand is balanced should be supported by a clear 'needs case'.

We have set out or response to the questions provided below, and we would be happy to contribute to any additional work that arises from this consultation.

Yours Sincerely,

Michael Rieley
Senior Policy Manager: Grid & Markets

[1] https://d2kjx2p8nxa8ft.cloudfront.net/wp-content/uploads/2015/11/Sectoral-scenarios-for-the-fifth-carbon-budget-Committee-on-Climate-Change.pdf

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Electricity interconnection and storage

1. What changes may need to be made to the electricity market to ensure that supply and demand is balanced, whilst minimising cost to consumers, over the long-term?

It is important to note that NIC's review comes after a number of completed and ongoing reviews of aspects of balancing arrangements. This includes over-arching work initiated by the regulator Ofgem, as well as narrower industry-initiated work as part of the industry code governance process. Including;

- National Grid's review of locational targeting of balancing costs (BSUoS), which was rejected by Ofgem[2]
- The Ofgem Electricity Balancing Significant Code Review (EBSCR) which recently completed and has targeted more cost reflective cash-out prices[3]
- Ongoing evaluation of the Capacity Market to establish any lessons and changes that may be needed to secure sufficient capacity during times of system stress
- A number of proposed changes to the System Security and Quality of Supply Standards (SQSS) triggered industry discussion on targeting higher costs of reserve onto users that trigger them[4]. This has been an issue for nuclear power and for large clusters of generation connected by a single radial connection e.g. offshore wind farms and island connections.

With this in mind, there is some concern that although it is clear that system balancing is a priority issue for the commission, there is no definition of problem that the review is seeking to remediate. Therefore, any proposal to alter the way that supply and demand is balanced should be supported by a clear 'needs case' building on this existing work and identifying where the current system could be improved.

Overall, it is our view that it may be too early to say how well current arrangements are working in the interests of consumers given the relatively recent introduction of more cost reflective 'cash-out' prices through the Electricity Balancing Significant Code Review (EBSCR). However there are issues that act as barriers for specific market participants including the development of electricity storage and distributed generators and we have set out our concerns in this area below.

Finally, given that any fundamental change to balancing arrangements would impose significant costs on market participants whose working arrangements, communications and IT systems have been purpose-built for the existing arrangements, we would welcome any clarity from the commission on how any changes, if identified, would be made.

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[2] .https://www.ofgem.gov.uk/publications-and-updates/decision-relation-use-system-charging-methodology-modification-proposal-gb-ecm-18-"locational-bsuos"

[3] https://www.ofgem.gov.uk/electricity/wholesale-market/market-efficiency-review-and-reform/electricity-balancing-significant-code-review

[4] https://www.ofgem.gov.uk/sites/default/files/docs/2010/10/gsr007-ia-final_0.pdf

The NIC will presumably report to government with recommendations, but this need to be mindful that government typically intervenes to effect major changes via legislation, and the prospect of this will impact on the market.

Specific questions

What role can changes to the market framework play to incentivise this outcome:

- ***Is there a need for an independent system operator (SO)? How could the incentives faced by the SO be set to minimise long-run balancing costs?***

Given the increasing set of market-wide responsibilities taken on by the SO, we believe the direction of travel is for an independent system operator, but we have no strong views on exactly when this should happen.

The Ofgem Integrated Transmission Planning and Regulation (ITPR) Project has already taken steps toward this by enhancing the role of National Grid as system operator in planning the electricity network.

If and when the SO becomes independent, its incentives need to be aligned with those of the TO's, in order to minimise overall network costs. Network investment can alleviate balancing costs and vice versa and it is important that drivers are consistent across the businesses.

- ***Is there a need to further reform the "balancing market" and which market participants are responsible for imbalances?***

All market participants are directly or indirectly responsible for their imbalances via the system of cash-out. As already noted, Ofgem has recently completed a review of cash out prices. These arrangements encourage participants to "self-balance" by submitting accurate Final Physical Notifications at Gate Closure, one hour before the trading period starts. Penalising imbalances between notified positions and actual positions helps to ensure that the information available to the SO is as accurate as possible.

While we understand that a case could be made for widening out balancing market participation to smaller parties not currently obligated to do so. At the moment, smaller parties can voluntarily participate in the balancing market, and as far as we know this arrangement is satisfactory. Therefore any benefit (such as providing National Grid more choice when taking balancing actions) would need to be set against the subsequent cost of smaller parties having to bid 24/7

However that there may be opportunities to better utilise intermittent generation and demand side response for the provision of services – and we would encourage the commission to consider this further.

To what extent can demand-side management measures and embedded generation be used to increase the flexibility of the electricity system?

Demand-side management and embedded generation are already increasingly contributing to system flexibility. Embedded generators of a certain size face mandatory grid code obligations to help manage system frequency and reactive power and as noted generators and demand can voluntarily participate in the Balancing Mechanism.

Scottish Renewables strongly supports a Distributed System Operator (DSO) model where distribution companies actively manage generation and demand across their network areas and take overall responsibility for the interfaces with transmission. This effectively devolves some system operation responsibilities, and enhances the flexibility of actions available to balance the system. Under such a model, DSOs could aggregate the services of embedded generators and use these to support the operation of the transmission network.

2. What are the barriers to the deployment of energy storage capacity?

Specific questions

- ***Are there specific market failures/barriers that prevent investment in energy storage that are not faced by other 'balancing' technologies? How might these be overcome?***

Cost is often viewed to be a key barrier to deployment of electricity storage. However, there is a growing expectation[5] that the capital costs of this technology will fall. In addition a number of projects taken forward under the Low Carbon Networks Fund have shown that it is possible to significantly improve commercial viability by realising the additional value that such technologies can add to the system[6]

In many ways, the drivers of this technology can be considered as analogous to that of interconnection.– driven predominantly by price arbitrage but deriving additional benefits across multiple network users – However, there is not yet a clear regulatory framework to underpin investment in storage assets.

Through the low carbon network fund some Distribution Network Operators (DNOs) have shown that they are well placed to realise many of these wider benefits. Yet, as it stands, there is some uncertainty around the ability of DNOs to do this given the commercial and regulatory definition of 'storage' and the restrictions around DNOs being active in generation or supply markets.

Overall, the regulatory position of storage needs to be clarified. In particular, storage is charged 'Use of Network' charges as both a generator and a load, which may not

[5] http://www.ey.com/GL/en/Industries/Power---Utilities/Renewable-Energy-Country-Attractiveness-Index---Storage---A-new-frontier-or-just-another-energy-asset
[6] https://www.ofgem.gov.uk/sites/default/files/docs/2015/09/sns_progress_report_june_2015_v1.0_0.pdf

appropriately reflect the impact it has on network. There is also ambiguity over the application of the climate change levy for storage, as well as concerns that high BSUoS charges may discourage storage providers from offering balancing services at the times when the system needs them the most. A storage license, which is separate to generation and demand licenses, could be appropriate and may help resolve some regulatory issues. This would be analogous to the separate interconnector licence. However, we note that regulation for storage may be complicated by situations where generation and storage are co-located behind a single meter.

In addition there is some concern that when planning connections of storage to the transmission and distribution networks the standard DNO practice of looking at worst case scenarios for generation and demand will be applied. e.g. the energy storage will at worst case be generating at maximum during maximum generation minimum load conditions, and will be absorbing at maximum during maximum load minimum generation conditions. If networks are planned under such assumptions, this may lead to over-specification of the distribution network infrastructure required to accommodate storage.

Finally, it is our view that the capacity market has missed an opportunity to support storage, by taking a short-term approach of awarding largely one year contracts which are largely insufficient to promote investment decisions in assets with 10 – 20 year lifetimes.

- ***What is the most appropriate scale for future energy storage technologies in the UK? (i.e. transmission network scale, the distributed network or the domestic scale.)***

There is an important role for all three – transmission, distribution and domestic. Large transmission storage has always played a valuable role, principally pumped storage which can respond quickly and flexibly to system shortfalls as well as absorb excess generation during periods of low demand. Distribution-scale storage is already been trialled as a means to support DNOs in operating more as DSOs. And on the domestic-scale storage can for example help avoid or mitigate expensive reinforcements (e.g. electric cars in remote areas to utilise local renewable energy generation).

3. What level of electricity interconnection is likely to be in the best interests of consumers?

- ***Are there specific market failures/barriers that prevent investment in electricity interconnection that are not faced by other 'balancing' technologies? How might these be overcome?***

As it stands, interconnector development is largely driven by opportunities for price arbitrage. However, given the drive towards a single European electricity market, we consider that there is an increasing need for SO to SO engagement in identifying and planning long term interconnection requirements.

In some respects interconnection is treated favourably in the market arrangements, in so far as it is not liable for transmission charges, meaning non-domestic generation has a competitive advantage. The regulatory regime is also flexible to a number of interconnector investment models, facilitating merchant and merchant / regulated regimes – more so than domestic transmission investment models.

In other respects the regulatory framework is not helpful to interconnection, especially more complex arrangements which might incorporate offshore generation, and where it is not clear how the asset(s) should be treated.

4. What can the UK learn from international best practice in terms of dealing with changes in energy technology when planning to balance supply and demand?

The GB market provides uniform balancing incentives across all technologies, irrespective of capability or any more considered assessment of whether this leads to efficient outcomes. For example, is it helpful to National Grid that intermittent generation is bundled up into a portfolio for notification and settlements on a half-hourly basis, or would it be more helpful if intermittent generation notifications were more closely aligned with National Grid's (separate to settlements) wind forecasting activities? There are a variety of international practices on balancing, somewhere incentives have or do differ for different technologies. We do not have any preconceptions of the right answer, but a review of international practices would inform the debate.