



## **National Infrastructure Commission Call for Evidence**

### **Response by E.ON SE Group**

#### **Executive Summary**

- Ofgem has recently implemented major reforms to the balancing market and will be reviewing the effectiveness of this before proceeding with further changes in 2018. We do not believe further reforms need to be considered at this stage.
- The requirement for flexibility is growing. We strongly believe that this provides an opportunity to reset the market framework for ancillary services such that it treats all sources of flexibility; demand side response, storage or generation equally.
- Interconnectors have a role to play in the GB market and should be built to an economically efficient level, but we should avoid intervention which specifies a target by a set date. Instead the market should be left to choose the most economic options.
- There needs to be a much greater emphasis on tackling the energy efficiency challenge of the nation, which will help to deliver a more permanent reduction in energy usage. In particular there remain over 7 million solid wall homes without insulation, and will need to be tackled if we are to meet our longer term legally binding carbon emission targets as set out in the Climate Change Act. This should be a major infrastructure priority for the nation.

#### **Questions**

##### **Q1. What changes may need to be made to the electricity market to ensure that supply and demand are balanced, whilst minimising cost to consumers, over the long-term?**

*Is there a need for an independent system operator (SO)?*

1. We note that one of the questions behind seeking evidence on this issue is around the merits of having an Independent System Operator (ISO). Since the industry was privatised, National Grid has shown that it is able to operate the system in a way which has been effectively independent from its transmission asset owner responsibilities.



2. Our biggest concern with the current structural arrangements is more around whether GB transmission companies should continue to be able to own generation and supply businesses. As a developer of generation assets, we have to negotiate connection agreements with these companies and are arguably competing for resources and connection time slots with their own respective generation interests. Additionally, with the state aid requirements allowing interconnector owners to bid into the Capacity Market, some of which will have an equity interest from the owner of the System Operator (SO), there is at the very least a case to consider in respect of making the Delivery Body role within Electricity Market Reform (EMR) wholly independent of National Grid.

*How could the incentives faced by the SO be set to minimise long-run balancing costs?*

3. The aim with setting mechanisms to assist in minimising the long term balancing costs, that are ultimately paid for by customers, should be to enable the SO to make trade-offs between short term operating actions and longer term investment decisions.
4. However, setting incentive schemes for a sufficiently long time is challenging. The incentive parameters assumed in the first instance, will from time to time need to be re-opened, especially when the assumptions turn out to be fundamentally flawed. Market participants who are exposed to the costs of those schemes end up being exposed to uncertain cost adjustments which they could not predict. This therefore lends itself to setting incentive mechanisms that are relatively shorter term in nature, typically two years, than they would be in an ideal world, and is perhaps something worth evaluating to see whether the risk/reward balance is set appropriately.

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

5. Over the last few years, the industry has been working closely with Ofgem via the Significant Code Review process to undertake major reforms to the balancing arrangements. A key element of the reform is to move to a system whereby all trades that are out of balance with their respected contracted positions are treated equally, commonly known as the 'single cash-out' price option. Other reforms include sharpening the cash-out price significantly via the use of a Value of Lost Load (VOLL) which is included in the calculation, along with moving in two stages to a marginal cash-out regime.

6. We welcome the two stage approach to reforming the imbalance price calculation, which is designed to guard against unintended consequences. The first stage of moving only commenced in November 2015. We fully support this approach including the decision of Ofgem to undertake an interim review before the second stage is implemented in 2018. We should allow this process to be completed as opposed to considering now whether further reforms are required.

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

7. The increasing penetration of variable renewables such as onshore and offshore wind along with inflexible new nuclear generation coincide with the closure of some existing conventional coal and gas generators that have in the past provided flexibility to the SO for balancing the system on a second by second basis.
8. However, the market is changing: the requirement for flexibility is growing and new sources of flexibility are emerging which may be able to provide services to the SO more cheaply in the coming years. We strongly believe that this provides an opportunity to reset the market framework for ancillary services such that it treats all sources of flexibility equally and is open to new, distributed and smaller individual sources of flexibility to compete alongside traditional sources; this ensures the best possible deal for customers. Open and transparent markets are key design principles that would enable the SO to procure the most efficient products for delivering these services, be that from the demand side - including load shifting, embedded generation and battery storage - or the more traditional supply side transmission connected generators.
9. There is no technical reason why the demand side cannot contribute to the wider range of sources of flexibility. Indeed batteries for example are well placed to provide frequency response to keep the grid frequency within the required tolerance limits in a matter of seconds. What is therefore important is making sure the market is not distorted and designed to drive a particular technology outcome. There is no need for specific, targeted subsidies for any particular technology. The transmission SO (TSO) and perhaps even more sophisticated distribution SOs (DSO), should specify the services they need and procure them through an open and transparent process where newer sources of flexibility can compete. SOs should avoid bilateral or opaque pricing wherever possible.

## **Q2. What are the barriers to the deployment of energy storage capacity?**

*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?*

10. The ancillary services market has been designed for a world in which there is relatively low wind penetration, with conventional generators typically providing flexibility services to the SO. These services, such as frequency response and fast reserve, have been typically provided via the use of bilateral agreements. This makes the market opaque and difficult to value when considering possible investments in alternative demand side products, including load shifting, onsite generation and battery storage. Addressing this issue via the use of greater standardisation of the products and procuring this via regular open auctions, as some other markets have adopted, would provide fairer access for all.
11. However there are other barriers that need to be considered, some of which are more relevant to storage.
  - a. Definition of storage
  - b. Creation of a Distribution System Operator market
  - c. Enhanced Frequency Response

### Definition of storage

12. The lack of a definition of storage complicates the way storage is treated at different points in the energy system. It is currently defined as a generation asset, which does not recognise its true role in the energy system as an enabler of flexibility. This makes it difficult to address storage as a separate entity in regulations such as grid codes. It also means that stored electricity is often liable for payments under the Contract for Difference (CfD), Feed-in-Tariff (FiT) and Capacity Market regimes twice: both directly (when importing electricity to store) and indirectly (when a customer consumes the stored electricity), resulting in double charging for using energy.
13. A fair definition of storage would have to include a number of things:
  - A focus on the temporal aspect of storage, not on the import and export of energy (as this can lead to double charging/location dependence issues);
  - A recognition that with all forms of energy storage comes an efficiency loss (so that more efficient technologies are more favourable than less efficient alternatives); and



- An appreciation that the role of storage in an energy system should be as an enabler of flexibility.

#### Creation of a Distribution System Operator (DSO) market

14. Energy storage could offer constraint management services to network operators, helping to defer the investment of replacing copper cabling, but there is no market in which to offer these services. This greatly reduces the opportunities for storage projects.
15. We welcome Ofgem's recent commitment to engage with Distribution Network Operators (DNOs) and other stakeholders in clarifying their future role, including work to remove any barriers to DNOs transitioning to DSO functions and the nature of their interactions with the Transmission SO.

#### Enhanced Frequency Response

16. National Grid has introduced a new Enhanced Frequency Response product in order to increase inertia on the system which is currently reducing as larger conventional power stations close. It is currently the main value stream for Lithium-ion batteries in the GB market. However National Grid has found it difficult to specify the exact requirements for battery performance within this product.
17. As highlighted above, we believe the long term aim should be for an open and transparent market setting out requirements for services that the SO requires, without any particular technology in mind. However, until this aim is reached we believe there are three aspects of the Enhanced Frequency Response product that need to be addressed to maximise the flexibility that can be provided by energy storage.
  - Delivery duration - the current definition of 9 seconds needs to be clarified with an explanation of exactly what is required in the case that a frequency deviation lasts longer than 9 seconds.
  - Extended service - clarification is needed on exactly what is required in the case that the battery is essentially bid in to the primary and secondary response markets.
  - Availability - an appreciation that the 95% availability is not in line with other products because of the longer contract, and therefore a relaxation on this availability constraint.

*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?)*

18. It is not clear at this stage where the most appropriate scale will be, especially as innovation is likely to continue for the foreseeable future. This is why it is imperative that the underlying market signals do not skew the market in any one particular direction, especially since each segment has the capability of providing flexibility into the market place.
19. In the short term, however, our expectation is that battery storage will initially be targeted at grid scale and industrial and commercial customers. But there is no reason why over time the market cannot support the domestic market if the propositions are sufficiently compelling, which in part will be driven by the scale of cost reductions that the industry is envisaging.

**Q3. What level of electricity interconnection is likely to be in the best interests of consumers?**

*Is there a case for building interconnection out to a greater capacity or more rapidly than the current 'cap and floor' regime would allow beyond 2020? If so, why do you think the current arrangements are not sufficient to incentivise this investment?*

20. The market framework should be designed to bring forward the most cost effective solutions for delivering the intended policy objectives, for example, in delivering a specified security of supply standard. We would therefore be extremely concerned if a specific target for new interconnectors was set for the GB market. Similarly some of the current underlying distortions to the market need to be addressed which are arguably in favour of interconnection over competing options, such as the UK's unilateral carbon price floor which interconnectors do not have to pay when supplying energy from the continent.
21. Interconnection needs to be built to an economically efficient level. These are not cheap investments to make particularly for an island network such as the UK and have a significant environmental impact with large converter station facilities at either end. We recognise that they can provide access to surplus capacity which becomes available in other markets and in this context can provide additional value, although it is not clear interconnectors can provide reliable capacity during times of system stress which is caused by adverse weather conditions that if affecting large parts of North Western Europe.
22. There is clearly a limit to this kind of benefit, and investment should not be encouraged beyond this, this is why it is crucial that investment is market driven rather than regulated. The cap and

floor regime has some critics as it is based on a forecast of this benefit with the risk underwritten by customers rather than investors. Nevertheless it does attempt to analyse this overall benefit, which we are supportive of. We would therefore not be supportive of moving to a system which further encourages interconnection, but rather focus effort on making sure that a robust cost-benefit assessment is conducted to mitigate the risk of over investment that is ultimately paid for by customers.

23. The risks of underinvestment in interconnectors is likely to be asymmetric, in so far as it may result in a few years when energy or balancing costs are higher than they would otherwise have been in an optimal system. In contrast, over investment in interconnectors means much longer periods of time over many decades that customers are paying for large capital projects which should never have been built in the first place.

*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?*

24. No. Interconnectors in our view already receive preferential treatment which other providers of services do not receive, such as avoidance of the carbon price floor and other charges such as transmission use of system charges, as well as benefiting from a cap and collar regulatory approach which provides a stable investment environment.

**Q4. 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?**

25. As an island, it is important to recognise that these characteristics are somewhat different to continental Europe today where energy systems are generally much more interconnected. It is therefore difficult to find other regions that are similar enough to the GB system to draw useful conclusions. Our neighbour Ireland has perhaps an energy system that most resembles the GB market, but it is much smaller in size, and therefore market arrangements adopted may not necessarily be directly applicable to the GB market.
26. But if we focus on Ireland, it is interesting to see what has been achieved; in particular, Ireland has been able to integrate a significant ramp up in renewables capacity over a short space of time. System Operators have traditionally favoured a gradual change in the makeup of the system, but Ireland has demonstrated that in terms of balancing the system on a second by second basis, the SO needs to have the right tools at their disposal. This is why EirGrid has



proposed a number of new balancing services to accommodate the changing nature of their energy system, and are exploring a fairly large redesign of their electricity market.

27. A key lesson we would therefore draw from Ireland is to ask the question of whether the SO has all the available tools at its disposal to meet the challenges of the evolving energy system, and to be able to procure those tools in the most efficient way. Our belief is that whilst there are some short term measures that can be introduced in order to highlight to the market the new opportunities as we transition to a lower carbon energy system, a more fundamental redesign of the market(s) for flexibility (predominantly the existing ancillary services markets) appears inevitable if we are to efficiently and securely balance supply and demand.

**Additional Points:**

28. We believe a smarter energy system supporting a greater penetration of flexibility, including DSR and Storage will help deliver a better deal for customers, by reducing the need for new generation, optimising the existing amount of generation on the system particularly for technologies that are less flexible in their operating regimes, helping to avoid significant reinforcement of our energy networks and delivering a lower cost for balancing the system.
29. But there are other areas of the energy system where there is, or needs to be an infrastructure focus over the next decade and beyond. The UK government is already committed to the Smart Meter programme which will not only help to make it easier for customers to take greater control over their energy usage, but also support innovation in the market, which could create new opportunities for domestic DSR and Storage. However we also strongly believe that there needs to be a much greater emphasis on tackling the energy efficiency challenge of the nation, which will help to deliver a more permanent reduction in energy usage, thereby improving the productivity of businesses and the affordability of energy for households. In particular there remains over 7 million solid wall homes without insulation, which will need to be addressed at some stage if we are to meet our longer term legally binding carbon emission targets as set out in the Climate Change Act. This in our view represents a major infrastructure project in its own right.