ELEMENT POWER RESPONSE TO NATIONAL INFRASTRUCTURE COMMISSION

JANUARY 2016

Introduction

Element Power is pleased to respond to the National Infrastructure Commission's call for evidence of 13th November 2015. Element Power is an established global renewable energy developer that develops, acquires, builds, owns and operates a portfolio of wind and solar power generation and interconnection projects in several countries. Currently present in 8 countries, Element Power is actively developing a pipeline of c.3,000 MW, is contracted to manage nearly 100 MW of third party assets and operates 20MW of our own onshore wind and solar PV assets.

Among Element Power's current projects is Greenwire, a proposed strategic renewable energy interconnector between the UK and Ireland which holds existing grid connection contracts to construct up to 2.5GW of interconnector capacity between the two countries, linked to new renewable generation capacity. Greenwire has potential to provide Great Britain (GB) with up to 9TWh of clean electricity per annum, making a substantial contribution to UK energy security and low cost decarbonisation. The project is being developed in partnership with General Electric.

1. 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?

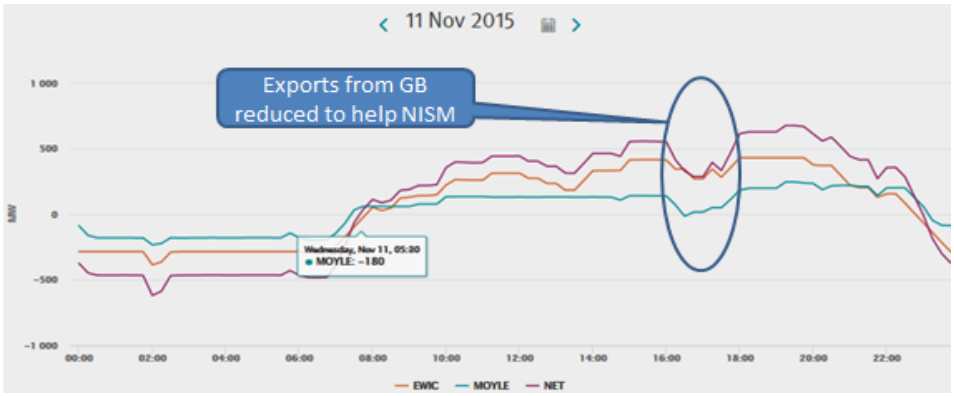
Generation capacity imported through interconnectors between Britain and other land masses could help balance supply and demand. The geographic dispersal of renewable energy sources reduces their variability as increased physical separation reduces the correlation of weather systems and therefore power outputs are "smoother". Extending the Contracts for Difference support scheme (including subsidy-free support) to generators located outside the United Kingdom, e.g. in Ireland, will reduce the variability in the renewable generation portfolio, increasing security, reducing carbon emissions and the reducing costs of back-up generation for consumers.

There are two aspects to this question.

a) Ensuring sufficient capacity to meet customer demand especially at high / peak demands and those high demands when renewables are not generating.
b) Balancing supply and demand on a short-term basis due to the mismatch of generation and demand.

In relation to a)

In the British market electricity suppliers are responsible for meeting the demands of their customers in each half hour settlement period. If their generation and supply are not matched they are out of balance and suffer the risk and penalties of the balancing market. Interconnectors can provide power at times of system stress, especially links to Ireland (which are often exporting to Ireland) can be reversed to bring power into GB at times of system stress. This behaviour was seen on the afternoon of 11th November 2015 when National Grid issued a NISM – Notice of Inadequate System Margin – due to unexpected breakdowns and shortfalls of fossil fuel generators.



In relation to b)

Providing better short-term matching of supply and demand to keep the system stable can be achieved in a number of ways including adding inertia to the system (rotating mass) and providing enhanced and faster frequency response. Interconnectors can provide such fast frequency response as was identified in National Grid's submission to Ofgem's cap and floor regime "SO submission to the Cap and Floor", (16 December 2014).

Element Power approved of the decision to include interconnectors in the 2015 Capacity Market auction as part of its efforts to increase interconnection capacity. As well as delivering routes to market for strategic interconnection, the Government should consider prioritising energy markets for interconnection which are economically and geographically desirable in order to increase the likelihood of it making a significant contribution to capacity. The company behind this submission would want Ireland to be included as a strategic priority for interconnection.

2. 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?***

An Independent SO (ISO) would have merit in being clearly independent of any network asset owners. An ISO would not have any incentive to build transmission and could judge each proposed transmission and interconnector project on its merit. It could also assess the options for interconnectors to reduce transmission constraints, e.g. flowing energy from Scotland to Northern Ireland and from southern Ireland to Wales creating north-south flows in Britain without needing additional transmission assets.

There are two facets to balancing costs faced by the SO.

a) Costs faced in balancing the residual and instantaneous supply and demand which has not been balanced by suppliers
b) Costs faced in managing generation because of transmission constraints.

It is tempting to believe that constraint costs should be eliminated, however it is important that an appropriate level of costs is maintained, otherwise there will be a massive over-investment in new infrastructure to avoid these costs.

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

We would make the following comments:

- Moving to shorter term settlement periods (e.g. 15 minutes) to reduce averaging of over and under supply by suppliers which can occur in the current 30 minute settlement period would be expected to help reduce balancing needs and costs.

- Smaller players have proportionately more imbalance than larger players as it is diversity in a large portfolio that reduces imbalance of any individual player. This in part explains the development of the "big 6" in the British energy market.

- With renewables, the forecast error on a single wind turbine will be very high, on a wind farm smaller, on wind in a region even smaller and on the whole GB wind fleet the forecast error is very small. It is important therefore that the forecast error of the whole GB wind fleet is considered in any imbalance of wind, not the forecast error of a small part of that wind fleet.

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

- DSM needs strongly variable pricing to be worthwhile. This is achieved in parts of USA with locational marginal pricing (LMP) which creates large price spikes and troughs. The GB market is at the opposite end of the spectrum to LMP with one price zone for the whole market. A halfway house is exampled by the NordPool market with a similar volume to GB but with 14 price zones.

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

As Ofgem noted in a 2014 report (Pöyry, Dec 2014), interconnectors help lower electricity prices when there is a higher share of renewables in the generation mix. This is due to the equalising or 'smoothing' effects of exchanging renewable power between jurisdictions at times of varying weather conditions.

Such infrastructure would lower the overall cost to consumers of the transition to low carbon generation.

- ***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?***

There is a case for building more rapidly than the cap and floor regime can deliver. The cap and floor regime requires sufficient market price differences between the connected markets to provide financial certainty to investors many years ahead. It takes ~5 years to develop an interconnector and ~4 years to build it, and the investors are relying on forecasts for 10-20 years after that. This high risk approach can drive interconnection where there is a severe shortage, but will result in a sub-optimal level of interconnection once that severe shortage is reduced. Under the cap and floor regime investors will only invest under such long-term and high-risk conditions against a very strong forecast revenue stream. In addition, future changes to market price zones (e.g. under CACM) could create or destroy value overnight. Interconnectors should have the option of being fully regulated as is the case for onshore transmission assets.

Even where price zones in two markets are mostly coupled (i.e. equal) there can still be value in interconnection as the lowest cost way of overcoming transmission bottlenecks. For example we already see different percentage flows and even directions on EWIC and Moyle which connect the British BETTA and Irish SEM markets. These flows indicate that the interconnectors are being utilised to solve transmission bottlenecks on the island of Ireland or in Great Britain.

Historically interconnection has been much more expensive than reinforcing onshore transmission networks, however we now see that trend reversing due to the difficulty of building new overhead power lines on shore. For example National Grid and Scottish Power are increasing British north south capacity by the offshore subsea Western Link (West Coast Bootstrap) at a cost of over £1billion. With development of subsea cables and HVDC technology and markets relative costs for interconnection are falling compared to other onshore reinforcement options.

Reinforcements across Transmission Operators (TOs) are facilitated by the regulatory regime with, for example, Kintyre, Beauly Denny, and Western Bootstrap. National transmission reinforcements are prioritised and treated differently to interconnectors. An SO independent of any transmission or interconnector asset ownership or development would help identify and assess new assets for development and funding. Ofgem has created cap and floor to put risk on developers; however developers will not be able to bring projects forward if that risk is not rewarded. A completely independent

SO would help give Ofgem greater confidence in assessing new interconnector proposals and giving those projects a regulated financial regime.

Onshore TOs are paid for developing onshore transmission assets (they are reimbursed their costs from consumers) including shared assets between TOs (such as the Western Link). There is currently no such cost recovery for interconnector developers and therefore a reducing incentive over time to develop new projects.

- ***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?***

- The Capacity Mechanism should reward interconnectors. Interconnectors that are often exporting from Britain or at float are far more valuable in addressing system emergencies and imbalances than interconnectors that are importing. Importing interconnectors cannot increase their power into Britain if there is an emergency, such as a large power station trip, breakdown, fire or fault. However exporting interconnectors can reduce exports or start importing and hence support the British system at times of stress or crisis. Therefore interconnectors with Ireland which are often exporting or float should receive capacity payments. This supporting behaviour was evidenced during the NISM event on 11th November 2015.
- Long-term capacity payments are required over 15 years to provide the certainty to enable financing interconnector projects. Making annual payments will not provide sufficient certainty to finance new interconnector capacity using the capacity mechanism.
- Interconnectors have much longer lead time than most generation projects due to the HVDC technology and dealing with permitting regimes in at least 2 jurisdictions. The Capacity Mechanisms should be able to contract years ahead for interconnectors so that new interconnectors can be financed, accounting for these benefits to UK consumers.

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?

In Denmark about 15 years ago there was a problem with an excess of generation when the wind blew and the system operator was having to dump surplus power into neighbouring markets. This situation arose because the many local Combined Heat and Power (CHP/CoGen) schemes were also running to generate power and heat when wind generation was high. By reforming the market with real time pricing it became cost effective for most of these CHP schemes to stop generating at these times, to increase heat storage and for many to install electric heating elements so that they could utilise cheap electricity to top up their heat demands. The result of the market reform was a much improved match of supply and demand taking account of variable renewables.

For additional details on this submission, please contact Leana Dos Santos [email address redacted]