European Network of
Transmission System Operators
for Electricity

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Annex 8: Justification of configurations of the Bidding zone review region "United Kingdom" which are to be considered in the bidding zone review process

Bidding Zone Review Region UK

18 February 2020

1. General justification for the set of configurations

Today, and as foreseen for 1/1/2020, Great Britain consists of one bidding zone. This configuration of a single GB market has existing since the introduction of BETTA[1] (British Electricity Trading and Transmission Arrangements) which came in to effect on 1 April 2005. The principal objective of the BETTA reforms was the creation of a single, competitive wholesale electricity trading market in Great Britain. It joined the previous separate, but electrically synchronous, markets of Scotland and England & Wales.

The GB transmission system is interconnected with other European countries through a few offshore HVDC links; however, the GB system is operated in such a way that the cross-border flows are not constrained on the HVDC interconnectors in real-time. Whilst there is some congestion on internal boundaries, this is a known feature of the efficient operation of the GB market rather than considered structural congestion.

The borders of the current bidding zone are the HVDC Interconnectors connecting GB to other synchronous areas. Namely, Moyle Interconnector and East West Interconnector to the Irish (IE) bidding zone, and IFA, NEMO and BritNed connecting to the Core region and the France (FR), Belgium (BE) and Netherlands (NL) bidding zones respectively. As further interconnection is commissioned to other or the same bidding zones, the new interconnector will form part of the bidding zone border.

Rationale for the Status Quo

The requirement to undertake a bidding zone review follows from the Clean Energy Package. Article 14.1 outlines the rationale behind bidding zones:

> *Member States shall take all appropriate measures to address congestions. Bidding zone borders shall be based on long-term, structural congestions in the transmission network. Bidding zones shall not contain such structural congestions unless they have no impact on neighbouring bidding zones, or, as a temporary exemption, their impact on neighbouring bidding zones is mitigated through the use of remedial actions and those structural congestions do not lead to reductions of cross-zonal trading capacity …*

In GB, we make the argument that our existing *status quo* bidding zone configuration (of one bidding zone for GB) does not lead to a reduction in cross-zonal trading capacity. The congestion that is seen in GB is transient and internal, and evidence of an efficient regime for consumers. Value of consumers is sought by savings in delaying transmission investment, balanced by short-term increased remedial action costs. The rationale for maintaining the existing single bidding zone is twofold:

- **High-level of cross-border capability available:** within GB the near maximum capacity of cross-border interconnection is routinely offered to the market, thus maximising potential for cross-border exchange of energy, and therefore our bidding zone configuration does not affect the efficient functioning of other bidding zones or the single energy market.
- **We do not have structural congestion in GB - transient internal congestion is a known feature of the GB market and frameworks:** Transient internal congestion and the associated remedial costs, are an integral and explicit part of the way in which GB delivers an efficient and effective transmission system and system operation. This ensures the best value for consumers; as in some circumstances, short-term temporary congestion and the cost of remedial actions are more efficient that early transmission build or reinforcements.

High-level of cross-border capability available

Within GB we routinely offer the full cross-border interconnector capacity to the market, with the market then deciding how much to flow on the interconnector subject to the price spread between the GB and BE, FR, IE and NL markets. Therefore, we are complaint with the intention of Article 16. Interconnector capacity

[1] https://www.ofgem.gov.uk/sites/default/files/docs/2005/02/9549-2605.pdf

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offered to the market is only reduced in exceptional circumstances when other commercial means have been exhausted by the System Operator, or are likely to prove ineffective due to the specific market spread. The reduction is capacity is taken to ensure a secure system can be operated in real-time.

We do not have structural congestion in GB - transient internal congestion is a known feature of the GB market and frameworks

Structural congestion is defined as being congestion that is capable of being unambiguously defined, is predictable, is geographically stable over time, and frequently reoccurs under normal electricity system conditions. Moreover, Article 14.1 requires that this congestion must be long-term when considering bidding zones.

Within GB, we have congestion on some of our internal boundaries from time-to-time, and under certain operating conditions. These operating conditions are a combination of the locational generation and demand patterns, the interconnector flow (resulting from market coupling), availability and operability of the transmission network at a given time and operation consideration of system security.

We argue that this congestion is however neither *long-term* nor *structural*. This argument is based on two key assertions – firstly, congestion within GB and the associated remedial costs are an integral and explicit parts of the way in which GB delivers an efficient and effective transmission system and system operation. Secondly, that it delivers the best value for consumers; as, under many circumstances, short-term temporary congestion and the cost of remedial actions are more efficient that early transmission build or reinforcements.

The GB regime allows for the connection of generation ahead of wider transmission system reinforcements being undertaken – the "connect and manage" regime. The GB regime also considers the timing and type of investment needed in the network, and makes decision to minimise cost of consumer, and maximise consumer value – the "network option analysis" process. In both cases, congestion (and remedial action payments) will happen in the short-term, but this is evidence of an efficient outcome for consumers, as the cost of remedial actions is lower than the cost of earlier transmission reinforcements.

It is the nature of a constantly evolving system, that new connections continue to drive additional investment requirements. Take for example, the large volume of wind generation connected – and forecast to continue to connect in Scotland - requiring additional capacity to be built north-to-south. The Western HVDC link, commissioned in 2018, brings up to 2.2GW of capacity between Scotland (Hunterston) and England and Wales (Deeside). However, our Electricity Ten Year Statement[2] process shows, based on our Future Energy Scenarios[3], that further capacity will be needed in the future. However, this capacity will only be built when it is economic to do so, resulting in congestion and remedial action costs in the interim.

In GB we plan for the future network, based on credible scenarios. Then, build transmission reinforcement to address congestion only when it is most economic to do so. In the interim, we have some congestion and the remedial action costs. However, the internal congestion is neither structural or long-term, and does not significantly affect capacity offered for cross-border trade.

Connect and manage regime for advancing (low carbon) generation connections

The connect and manage regime has been part of the GB generator connection arrangements since 2011. The regime allows new electricity generators to connect to the network once all enabling works are complete, but ahead of wider transmission system reinforcements. This brings on generation – especially low carbon generation – sooner than would otherwise be the case. As the wider reinforcements, have not taken place, there will be occasions when there are system operability issues caused by the new generation, and the system operator therefore takes remedial actions to secure the system.

[2] https://www.nationalgrideso.com/document/133836/download
[3] http://fes.nationalgrid.com/

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Therefore, a direct consequence of the connect and manage regime is higher remedial action costs under certain times, ahead of wider reinforcements. However, by delaying wider reinforcements the costs to the consumer overall are lower than they would otherwise have been, and secondly it allows generation – including low carbon generation – to connect to the system earlier than it otherwise would have done. For most the time the newly connected generation can operate without constraint, and it is only at times of network outage or (for example) high wind output that the transient internal congestion occurs.

Network options assessment process

To reduce future congestion in the GB transmission system, National Grid Electricity System Operator (ESO) utilises long-term optimisation to identify the best way to reinforce the network during system planning. The cost of congestion is quantified by total constraint costs incurred on approximately 40 boundaries as listed in the Electricity Ten-Year Statement[4] (ETYS).

National Grid ESO is required to publish the ETYS on an annual basis to identify the future system needs in bulk power transfers of different boundaries. The required transfer for each boundary is then fed back to the Transmission Owners (TOs) or other relevant parties for them to propose network reinforcement options to meet the identified future system needs. A range of network reinforcements, including both build, reduced-build and commercial service options, are then submitted to National Grid ESO to assess for their cost and benefit.

The assessment and selection process is known as the Network Options Assessment[5] (NOA) where benefits in boundary constraint savings in future years delivered by the options are considered against their total capital expenditures. The process is conducted under different Future Energy Scenarios[6] (FES) followed by a least-worst regret analysis to mitigate the risk that investments of certain options are inefficiently driven by certain energy backgrounds which is highly uncertain in the distant future. National Grid ESO publishes the NOA report each January, recommending to the TOs and relevant parties its best view into the future of which options should be invested in over the coming years to achieve an optimal balance between reinforcing and constraining the network. This process seeks to optimise the delivery dates of the network reinforcements, should the investments be delivered early, there is a risk of inefficient capital spend and should the options being delivered late, we will see additional congestion costs. The balance is designed to offer the best value of money for consumers.

In the most recent NOA report, January 2019, National Grid ESO recommended investment of £59.8m in 2019/20 across 25 projects to potentially deliver projects worth almost £5.4bn. It was also found that commercial solutions can provide significant consumer benefit, especially in the period before asset-based options are yet to be delivered including ESO-led commercial solutions. The commercial solutions, instead and ahead of network investment, can make consumer savings up to £1.1bn between 2020 and 2028, but will lead to additional remedial costs in the interim.

It is important to note that while the investment recommendations are given by National Grid ESO, the TOs and other relevant parties will ultimately be responsible for ensuring reinforcements are delivered in time to meet system needs. For projects with large infrastructure investments, the TOs must also pass the Strategic Wider Work[7] (SWW) submission to the GB regulator (Ofgem) for approval and to determine the project's final specifications and commissioning date.

Historically, the highest levels of transient internal congestion have been seen on three internal boundaries, as shown in Figure 1.

[4] https://www.nationalgrideso.com/insights/electricity-ten-year-statement-etys
[5] https://www.nationalgrideso.com/insights/network-options-assessment-noa
[6] http://fes.nationalgrid.com/
[7] https://www.ofgem.gov.uk/electricity/transmission-networks/critical-investments/strategic-wider-works

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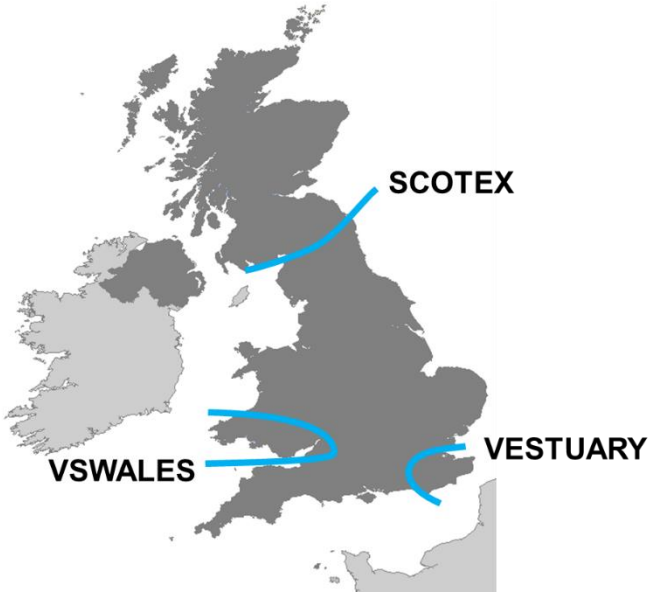

Figure 1: Historic GB internal boundaries with the highest congestion

1. SCOTEX. This boundary crosses the border between Scotland and England. Scotland has a lot of connected wind generation which results in some congestion. A combination of connect and manage schemes and difficult reinforcements in the region has made the SCOTEX boundary historically an active constraint. A new western HVDC link between Scotland and England & Wales has provided additional capacity across this boundary and was commissioned in 2018. This has alleviated much of the congestion on this boundary.
2. VSWALES is congested due to high voltages levels. The area has a lack of reactive absorption measures with the increasing level of renewable penetration and lower transmission demand. With fewer units of synchronous plant that could provide voltage support operating in merit, additional congestion spend has been incurred on the boundary, especially overnight. However, this constraint is being increasingly eliminated due to ongoing reactive compensation schemes.
3. VESTUARY. This boundary has historically seen higher constraints due to plant outages. To mitigate the voltage limitation and lower the congestion spend on this boundary, several new shunt reactors were commissioned in the area in late 2017/18. National Grid ESO and National Grid Electricity Transmission are collaborating to bring back online another large shunt reactor which has been out of service on a long-term fault.

The following section summaries the future reinforcements of the three most congested internal boundaries within GB, and how they are going to addressed to cope with future predicted transient internal congestion. Please refer to the NOA Methodology[8] for more details about how the NOA is conducted and the NOA report[9] for National Grid ESO's full investment recommendations.

For boundaries in Scotland and Northern England, including SCOTEX, the NOA process has identified 18 schemes to be delivered between 2020 and 2029 to ensure stability and reducing congestion of future flows in this region. One of the proposals, deemed to be economic and efficient in comparison to transmission build, is for a commercial solution with a duration of 40 years to provides boundary benefit across Anglo–

[8] https://www.nationalgrideso.com/document/149636/download
[9] https://www.nationalgrideso.com/document/137321/download

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Scottish border and further south (referred to as CS01 in NOA). This commercial service will cause additional remedial action costs rather than incurring network investment spend.

For boundaries in the Wales and West Midlands region, including VSWALES, the NOA process has identified that it is not economic to proceed with any of the transmission reinforcement proposal at this time as there is not expected to be sufficient congestion in future on this boundary to warrant investment.

For boundaries in the south and east of England region, including VESTUARY, the NOA process has identified nine schemes to be delivered between 2020 and 2026 to ensure stability and reducing congestion of flow in this region. One of the proposals, deemed to be economic and efficient in comparison to transmission build, is for a commercial solution with a duration of 40 years providing boundary benefit across SC1 and SC2 on the south coast (referred to as CS25 in NOA).

Summary

Cross-border interconnection between GB and other bidding zones is routinely offered at the maximum capacity of the HVDC interconnectors. It is not curtailed due to transient internal congestion within GB.

It is a feature of the GB market that there is some internal congestion – this is a sign of a functioning and efficient market. It means that generation capacity – including low carbon generation – is being connected ahead of strategic wider works being complete, and that transmission investment is being delivered at the point of economic need. The result is some costs through remedial actions in the near term to address the transient internal congestion.

Overall, consumers are well served by the single GB bidding zone in the context of the European market.

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