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Dear Nick,

**Consultation on Window 3 Projects**

I am writing to provide GridLink's response to Ofgem's consultation on the "Initial Project Assessment ("**IPA**") of the Third Cap and Floor Window for Electricity Interconnectors", published on 1 March 2024.

We thank Ofgem for the opportunity to provide commentary on their initial findings and both recognise and appreciate the transparency in the way in which data and initial findings have been presented to enable such commentary to be made.

GridLink is developing a 1,250MW interconnector between the UK and France. Whilst GridLink is a Window 2 project and not a Window 3 project, and thus is not one of the projects being consulted on, we believe there are certain key issues which should be highlighted and addressed, and we are therefore responding to the consultation. This response is not confidential.

We support the use of three new indicators to evaluate Window 3 projects, namely contribution towards reducing $CO_2$ emissions, security of supply and constraint costs. This brings Ofgem's approach in line with the ACER recommendation on best practice for cross border cost allocation decisions, and also in line with practice of other European regulators.

That said, we have serious concerns about the methodology used by National Grid Electricity System Operator Limited ("**NGESO**") to evaluate constraint costs. Our concerns are so great we are of the view that this indicator should not be used as an evaluation criterion for Window 3 projects and at best should be treated as indicative only.

We have focused on this issue in our response and separated our response into two categories (i) "Significant" issues which must be addressed as each issue has a profound impact on the assessment and (ii) "Less significant" issues which are issues of less importance, but which nevertheless should be addressed.

***Significant Issues***

**1. Balancing market costs bear no relation to the actual cost of grid reinforcement**

1.1. The methodology used by NGESO to estimate grid constraint costs in the consultation paper assumes that constraint costs are set equal to the marginal cost generators would charge in order to turn up generation or turn down generation in order to balance the system and overcome the constraint.

1.2. ***GridLink's observation:*** These costs bear no relation whatsoever to the costs NGESO would actually incur if they were instead to invest in the grid to avoid the congestion. By way of example, the NGESO report for Aquind shows constraint payments to be in the range of £0.4-3.5 billion[1]. In Ofgem's project assessment of the Eastern Greenlink 1 dated 20 March 2024, Ofgem estimates the cost of this 2GW/176km project to be £2.0 billion (2018/19 prices)[2]. Similarly, in its assessment of the Eastern Greenlink 2 project dated 27 March 2024, Ofgem estimates the cost of this 2GW/436km project to be £3.4 billion (2018/19 prices)[3]. It is evident that NGESO could build an offshore interconnector to overcome these grid constraints and it could do so at less than the estimated congestion costs of £3.5 billion for Aquind[4]. This point is acknowledged in the accompanying NGESO Modelling Report (on page 12), which states that "The cost of reinforcing the network is expected to be lower than the additional constraint costs shown"[5].

1.3. Furthermore, balancing market constraint costs can be extremely volatile and are very complex to model due to their high sensitivity to a range of factors including underlying fuel commodity prices and overall system supply/demand in specific half-hourly periods.

1.4. We believe it is appropriate for grid reinforcement costs to be used as a metric for evaluating and comparing projects and those costs should be included in the cost benefit analysis. NGESO should have benchmarked reinforcement costs as part of its analysis to provide a realistic comparison against constraint costs. However, we believe it is unreasonable to use balancing market costs as a proxy for grid reinforcement costs, particularly if the constraint costs are greater than grid reinforcement costs to mitigate such constraint.

1.5. We recognise however, that it may be reasonable to perform a sensitivity under which grid reinforcement works are delayed for a defined period beyond the operational date of the relevant interconnector project, with the balancing market constraint payments being limited to the delay period but not beyond it. Assuming that these costs are applicable for the entire life of the interconnector project implies that the relevant grid reinforcements are never implemented.

[1] https://www.ofgem.gov.uk/sites/default/files/2024-03/ESO%20CF%20W3%20Report%20-%20Final.pdf (table 3)
[2] https://www.ofgem.gov.uk/sites/default/files/2024-03/EGL1%20PA_Consultation.pdf (section 3.30)
[3] https://www.ofgem.gov.uk/sites/default/files/2024-03/2024%2003%2027%20EGL%202%20Policy%20Consultation%20Document.pdf (section 3.3)
[4] https://www.ofgem.gov.uk/sites/default/files/2024-03/ESO%20CF%20W3%20Report%20-%20Final.pdf (table 3)
[5] https://www.ofgem.gov.uk/sites/default/files/2024-03/ESO%20CF%20W3%20Report%20-%20Final.pdf (page 12)

## 2. Inclusion of location specific constraint costs

2.1. The consultation paper notes that it is not possible to quantify grid reinforcement costs for Window 3 and OHA projects at this time (in para 3.47 and 3.49). Consequently, the analysis uses balancing market constraint costs as a proxy for grid reinforcement costs.

2.2. Prior to making a grid connection offer for a project NGESO will produce a Connection and Infrastructure Options Note ("**CION**"). The purpose of the CION is to identify the most economic point on the transmission system at which to provide a grid connection. As part of that process, NGESO takes the most recent approved network development plan, assumes that the project in question will go ahead, and then identifies the constraints on the National Electricity Transmission System ("**NETS**") that the project would cause, together with the grid reinforcements necessary to overcome those constraints. In identifying what reinforcements are necessary, NGESO looks at the entirety of the transmission system to ensure that, should the project proceed, it can continue to operate the system within the operational parameters set out in the NETS Security and Quality of Supply Standard ("**SQSS**"). Importantly the CION also sets out the capital costs for these reinforcement works.

2.3. ***GridLink's observation***: It is important to note that the reinforcements set out in the CION and grid connection offer, are based on a view of the transmission system at a particular point in time. NGESO has received an unprecedented demand for connection and has not been able to develop the grid to keep up with this demand. We do not think it appropriate that an interconnector with an existing legally binding grid connection should in effect be penalised because NGESO has been unable to develop the grid. Furthermore, the developer is required to put in place significant financial securities to ensure that delivery of the ongoing network reinforcements, particularly referred to as 'wider attributable works', are progressing according to the agreed construction schedule, and in doing so delivering the necessary 'reinforcements' which should mitigate against constraint costs. The CION also notes that following installation and during the operational lifetime of the project, a cable failure may occur, and this will give rise to a constraint which requires a balancing action to be taken. Based on industry standard failure rates and time to repair, NGESO calculates the cost of those balancing actions and includes these cost estimates in the CION.

2.4. With the above in mind, we are of the view that where grid reinforcement costs are set out in the CION, then the project's share of those costs (as set out in the grid connection offer), together with the cable failure constraint costs included in the CION should be carried over into the cost benefit analysis of the project. In that case it would be inappropriate and incorrect to additionally apply imbalance charges as a proxy for the grid reinforcement costs.

2.5. In Ofgem's report entitled "Targeting Analysis for the Third Cap and Floor Application Window and MPI Pilot Regulatory Framework"[6] and in Ofgem's guidance to applicants for Window 3[7], Ofgem state that "The impact of an interconnector on network constraints is dependent not only on its location in GB, but also on supply and demand assumptions, wholesale price dynamics, import/export flows and the number and location of other interconnectors in the scenarios. Given that the constraint cost impact is highly dependent on these variable factors, we cannot make a statement on optimal interconnector locations for the third investment round. On the basis of the results of this NGESO analysis, we will

[6] https://www.ofgem.gov.uk/sites/default/files/2022-08/TargetingAnalysis_ThirdWindowMPI.pdf
[7] https://www.ofgem.gov.uk/sites/default/files/2022-10/ApplicationGuidance_ThirdWindow%20v2.pdf

not add targeting measures in the third investment round beyond the system operability indicators that are being included in the needs case cost-benefit analysis by NGESO. This means that projects will be assessed upon the benefits their design can bring to the transmission network, however project applications will not be screened out or deterred in the application process from connecting in particular areas". The IPA of the Third Cap and Floor Window confirms this approach, "In our targeting analysis from August 2022 we decided not to exclude interconnectors connecting to specific locations from applying for Window 3. However, we have sought to provide more transparency on NGESO's constraint costs (balancing market impacts) analysis in this window compared to Windows 1 and 2".

2.6. It appears that by including location specific constraint costs, Ofgem's evaluation goes beyond a consideration of system operability indicators[8] (defined by NGSEO as frequency response, reactive power and black start) and this operates against the guidance given.

## 3. Baseline assumptions

3.1. We note that in NGESO's report entitled "ESO analysis to support Ofgem's Third Cap and Floor Window and MPI Pilot Regulatory Framework"[9], NGESO identifies a number of means by which congestion charges can be reduced, including:

- additional obligations on interconnectors to provide within-day trading platforms on commencement of operations which will enable the ESO to minimise balancing costs;
- development of market based and transparent cross border trading tools common to all interconnectors; and
- changes to the wholesale market, such as a move from national pricing to zonal or nodal pricing, which are discussed in the Department for Business, Energy and Industrial Strategy's ("**BEIS**") Review of Electricity Market Arrangement ("**REMA**") consultation.

3.2. Ofgem, in its consultation, notes that these changes to market structure would serve to reduce constraint costs and acknowledges their impacts have not been taken into account.

3.3. NGESO states in the consultation paper that all the impacts of the Window 3 and OHA projects have been factored into the HND1/ NOA 2021/22 Refresh (at para 3.47). However, NGESO goes on to say that "estimating the required reinforcement costs to mitigate the additional constraint costs attributable to the Window 3 and OHA projects is not possible at this stage" (at para 3.49).

3.4. The NGESO document, dated July 2022 and entitled "Network Options Assessment 2021/22 Refresh"[10], states that 26 asset-based options have been proposed for delivery from 2031 onwards and four of these have been accepted. The Window 3 projects come online after 2030; both the CION and grid connection agreement which set out grid reinforcements are confidential; and also the NGESO modelling report is silent on how the Window 3 and OHA projects have been factored in.

3.5. In March 2024, NGESO published its Beyond 2030 report[11] setting out extensive plans to reinforce the GB grid and included an Interconnector Analysis Report. The proposals include

[8] https://www.ofgem.gov.uk/sites/default/files/2024-03/ESO%20CF%20W3%20Report%20-%20Final.pdf
[9] ofgem.gov.uk/sites/default/files/2022-08/ESOTargetingAnalysis.pdf
[10] https://www.nationalgrideso.com/document/262981/download
[11] https://www.nationalgrideso.com/document/304756/download

an additional £58bn of direct investment into electricity networks and further interconnector capacity with GB neighbours. Much of this budget is fully costed on projects to relieve constraints on the system and integrate further Renewable Energy Sources ("**RES**"). While the report was not available for all of the review period, it seems likely that the report was prepared in parallel with the Window 3 Needs Case Assessment. NGESO's analysis could be updated to use the beyond 2030 project costs.

3.6. ***GridLink's observation***: Given that the market scenarios and network plans look 25 years into the future, we believe that account should also be taken of these market changes.

3.7. It is neither clear nor transparent how Window 3 and OHA projects have been factored into NGESO's Modelling Report. It is clear that if the HND1/ NOA 2021/22 Refresh includes some of, or none of, the grid reinforcements for Window 3 and OHA projects, then any modelling is by default bound to generate substantial constraint costs.

## 4. Forecasts of installed capacity

4.1. In its market modelling report, ARUP state that NGESO's assumptions for European countries are strongly inspired by the Ten Year Network Development Plan (("**TYNDP**") 2022). The price of electricity is largely a function of the capacity mix. The higher the level of renewables in the energy mix, the lower the electricity price.

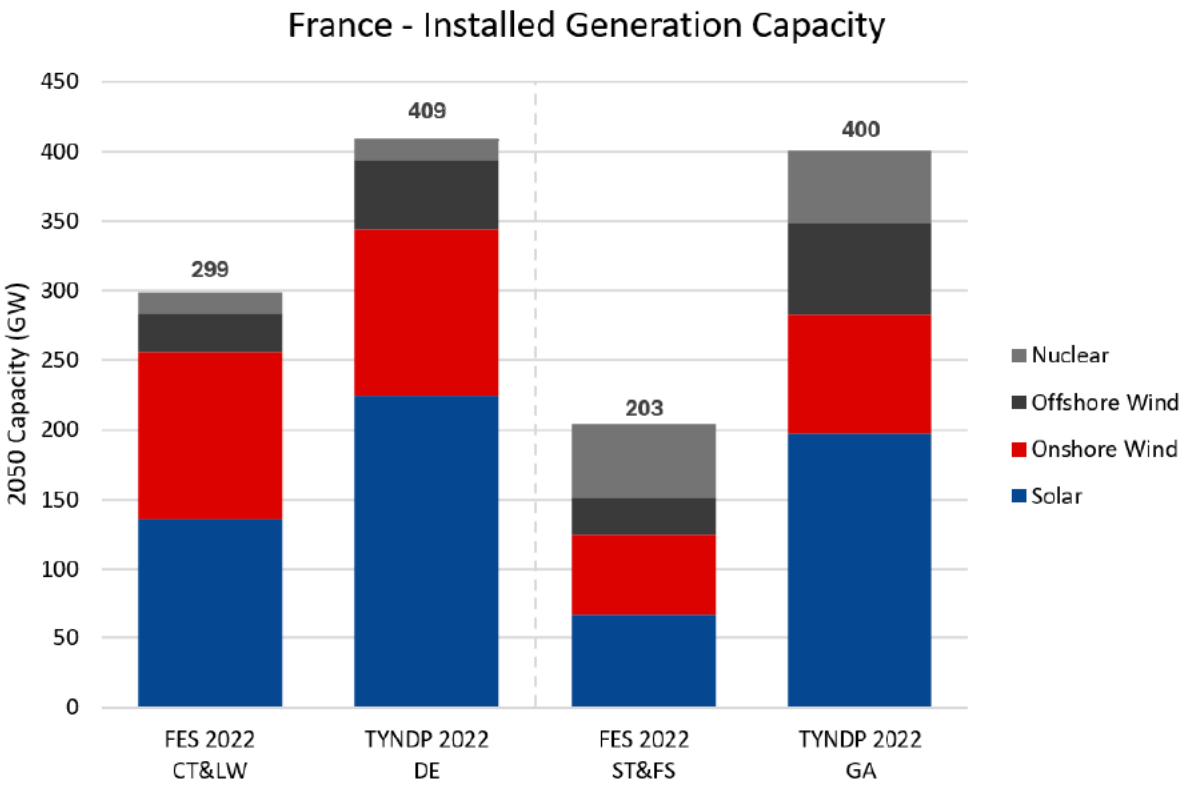
4.2. NGESO Future Energy Scenarios ("**FES**") 2022 forecasts a rapid decarbonisation in GB compared to France leading to lower GB wholesale prices. Arup's modelling of NGESO FES 2022 concludes the GB wholesale price from 2035 to 2050 will be close to £40/MWh (2022 real prices) compared to France and Germany at £65/MWh, some 50% more[12].

4.3. This forecast structural price difference inevitably leads to predominantly export power flows over the life of the projects and NGESO has assumed that GB is a large net exporter electricity post 2035. This in turn gives rise to high congestion charges for interconnectors on the south and east coast of England.

4.4. ***GridLink's observation***: Figure 1 below compares installed capacity used in NGESO's forecast (FES 2022) to those set out in the TYNDP 2022 for France. It can be seen that they are materially different, with the build out of onshore wind, offshore wind and solar being approximately half NGESO's forecasts than in the TYNDP 2022. The effect of this is that French electricity is relatively more expensive than electricity in GB (because GB has a higher penetration of renewables) and consequently GB exports electricity most of the time.

[12] Figure 11, page 39, Arup - Market Modelling Analysis for Cap and Floor W3 and Offshore Hybrid Assets Pilot Projects

*Figure 1: France Installed Generation Capacity - FES 2022 vs TYNDP 2022*




4.5. The report does not explain why NGESO forecasts for renewable build out are materially less than the forecasts contained in the TYNDP. We would suggest that if NGESO used the TYNDP forecasts, the congestion charges for interconnectors would be significantly lower than is currently being estimated, because of lower exports and more balanced two-way flows.

4.6. We propose that NGESO is in the best position to prepare forecasts for the GB (i.e. the FES scenarios), but that European Network of Transmission System Operators for Electricity ("**ENTSO-E**") is in the best position to prepare forecasts for European countries. We recommend that NGESO use the ENTSO-E TYNDP forecasts for European countries.

4.7. We note that the TYNDP forecasts are required to meet 2030 and 2050 climate objectives. It is not clear whether NGESO's forecasts for Europe meet these objectives.

## 5. Material differences between NGESO and Arup modelling

5.1. Whilst it is noted that NGESO has sought to align their modelling assumptions with those used by ARUP, it is evident that there are differences in the assumptions used and this results in significant differences in the resulting flows of electricity used in the NGESO model and those used in the ARUP model.

5.2. ***GridLink's observation***: By way of example in the Leading the Way ("**LW**") case for Aquind, ARUP assumes that exports reduce from 12TWh to 9TWh over the period 2030 to 2045[13]. However, in the NGESO model[14] exports are forecast to increase from 6TWh to 11TWh over the same period. This difference represents 12-36% of Aquind's transmission capacity. The same observation can be made for other projects.

5.3. There is no clear reason for this difference. One reason may be weather years. The production of electricity from wind and solar depends on weather conditions. A "weather year" is an assumed set of weather conditions across Europe and is used to allow production capacity from wind and solar to be estimated for modelling purposes. The NGESO model uses a single weather year (2013) whilst ARUP uses three weather years (1990, 2007 and 2010). Arup's approach is in line with best practice recommended by ENTSO-E. Because the NGESO model uses only one weather year (2013), and ARUP uses different weather years (1990, 2007 and 2010) this will result in material differences in both the volume of electricity produced from wind and solar as well as the direction of flow across interconnectors.

5.4. In addition to weather years there may be other modelling assumptions that cause the volume and flow direction to be different in each model. For the results to be meaningful, the assumptions used in the NGESO model and the ARUP model must be aligned. At present, they are not.

5.5. The inability to adequately reconcile between the Arup and NGESO models reduces confidence in the constraint cost calculations and their respective results. We request that Ofgem reappraise the inputs into the NGESO model and run a sensitivity analysis based on TYNDP 2022 to provide an alternative outcome based on a set of assumptions accepted across Europe and which Member State regulators will be required to use.

## 6. Interpolation between modelled years

6.1. In its market modelling report Arup states that it models a total of 9 spot years for each project and interpolates between those spot years to obtain SEW values for the intervening years.

6.2. ***GridLink's observation***: Interpolating between years in this way, saves modelling time but also decreases granularity. It is unclear to us how interpolation between spot years has been performed. By way of example on page 62 of the market modelling report[15] Arup shows the UK-FR price differential in the LW case to be €11/MWh, €13/MWh and €18/MW in years 2027, 2028 and 2029. However the corresponding revenue streams shown on page 63 are €239m, €238m and €267m. We would have expected the revenue in 2028 to be an average of €239m and €267m i.e. €253m, rather than the €238m shown. This happens in a number of instances throughout the report. Consequently, we recommend that no interpolation is performed and that each year is modelled individually. This would also better align with NGESO's model which models constraint costs on an annual basis.

[13] https://www.ofgem.gov.uk/sites/default/files/2024-03/Market%20Modelling%20report.pdf (pages 62-63)
[14] https://www.ofgem.gov.uk/sites/default/files/2024-03/ESO%20CF%20W3%20Report%20-%20Final.pdf (Figure 35)
[15] https://www.ofgem.gov.uk/sites/default/files/2024-03/Market%20Modelling%20report.pdf (pages 62-63)

***Less significant issues***

7. **Latest Network Development plans and FES scenarios**

7.1. The NGESO Modelling report states that whilst the FES 2023 scenarios were available at the time its modelling was performed, NGESO used the FES 2022 scenarios because the output from the corresponding network development plan (the Transitional Centralised Strategic Network Plan ("**TCSNP**")) would not be available until early 2024[16]. As such, NGESO used the older network development plans (the Holistic Network Design ("**HND1**") and NOA 2021/22 Refresh).

7.2. ***GridLink's observation***: We believe that the older FES forecasts cannot be relied upon as single view of the development of the European energy market on which to base significant investment decisions, since this data is now more than 4 years old.

8. **Non-firm connections**

8.1. We note that some projects have a non-firm grid connection offer. A non-firm connection means that NGESO may constrain down capacity, and because the connection is non-firm no compensation is payable.

8.2. ***GridLink's observation***: We therefore recommend that to the extent the non-firm period applies after commissioning – and for as long as it applies – revenue streams should be adjusted downward to reflect the constraint. This will have a negative effect on SEW but will not lead to any increase in constraint costs because no compensation is payable.

9. **NGESO model is limited to 20 years and uses an estimate for beyond 20 years**

9.1. The NGESO model is limited to a 20-year period. Interconnectors have a minimum lifetime of at least 25 years.

9.2. ***GridLink's observation***: We recommend the NGESO model should be extended to model at least 25 years.

10. **Aquind start date**

10.1. ARUP assumes Aquind will become operational in 2027, however, Ofgem note this date is unachievable but that a connection before 2032 is likely to be deliverable. A later start date is likely to affect estimates of Aquind's revenue streams and constraint costs.

10.2. ***GridLink's observation***: We are of the view that Aquind would not be operational before 2031 and may be significantly later depending on the project's access to market in France. We therefore propose that ARUP remodels Aquind with an assumed commissioning date of 2032 at the earliest.

[16] Page 11, ESO CF W3 Report - Final.pdf (ofgem.gov.uk)

***Conclusions***

We support the use of three new indicators to evaluate Window 3 projects, namely contribution toward reducing $CO_2$ emissions, security of supply and constraint costs. This brings Ofgem's methodology in line with the ACER recommendation and also in line with practice of other European regulators.

We believe it is entirely reasonable for grid reinforcement costs to be used as a metric for evaluating and comparing projects and those costs should properly be included in the cost benefit analysis of the project. However, we believe the current methodology used by NGESO for calculating constraint costs is unworkable because balancing market costs bear no relation to the actual cost of grid reinforcement.

For the reasons mentioned, we do not believe the constraint costs as currently modelled are fit for purpose and as such should not be used as an evaluation metric for Window 3 and OHA projects. We recommend Ofgem and NGESO reevaluate constraint costs based on (i) grid reinforcement costs (inflated) contained in the CION/grid connection offer for each project and (ii) under TYNDP 2022 scenarios.

Should you have any queries on the above, we are very happy to discuss.

Yours sincerely,

[redacted]

Sarah Johnson
Director

Copy:

Stuart Borland, Deputy Director, Offshore Network Regulation, Ofgem
Alexander Graham, Acting Head of Team, Interconnector Delivery, Ofgem