

East Anglia ONE North Offshore Windfarm Development Consent Order and
East Anglia TWO Offshore Windfarm Development Consent Order

National Grid Electricity Transmission PLC (NGET) response to ExA's ISH 16 Action Points

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Internal Use

Qu. No.	Question	Response
1	<p>National Grid Substation</p> <p>Your answer to ExQ 2 10.6 [REP 6-110] seems to state that it is highly unlikely that the proposed NG substation would be gas insulated for various reasons including lower operational costs, climate change and meeting government targets.</p> <ul style="list-style-type: none"> • Is this a fair summary? • Detail any potential reasons why a GIS substation may be chosen and the likelihood of such reasons occurring in this instance. • How important are your Electricity Act 1989 s9 duties when choosing technology for your substations 	<p>In REP6-110 NGET said:</p> <p><i>"NGET's current preference is to pursue AIS technology for the NGET substation as the AIS technology is easier to operate, maintain and repair and as such has lower operational costs which is important in meeting its s.9 duties.</i></p> <p><i>The GIS technology produces SF6 which has the equivalent impact of ten times the carbon equivalent of AIS technology. NGET's current policy is to reduce its greenhouse gas emissions by 80% in advance of the target date 2030 set by the UK government.</i></p> <p><i>Where appropriate, NGET has pledged not to carry out procurement of any 275kV or 400kV gas insulated switchgear containing SF6 (excluding circuit-breakers) from 2024.</i></p> <p><i>However, NGET recognises that GIS technologies are evolving and there may be potential options for greener GIS in the future. As such NGET is keeping the GIS option open to allow for its use in the future if it is a greener option to AIS".</i></p> <p>Accordingly NGET would comment as follows on ExA's question:</p> <ul style="list-style-type: none"> • NGET agree that ExA's summary of what NGET said in REP6-110 is a fair summary. The government's climate change targets are the primary driver in addition to NGET's commitments to Ofgem to reduce its SF6 inventory. • In this instance NGET's strong preference is to construct an AIS substation, essentially a GIS substation would only be constructed if the DCO, if approved, restricts the type of substation to be constructed. NGET consider it is relatively unlikely that non-SF6 technology will be available in the time frames for the construction of the substation for

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		<p>this Project. NGET's approach in relation to the construction of new GIS substations is that they shall only be considered where lifetime related conditions (such as pollution, permanent space restriction or public visual amenity) preclude the use of open terminal equipment.</p> <ul style="list-style-type: none"> • NGET must comply with its s9 duties at all times, to develop and maintain an efficient, co-ordinated and economical system of electricity transmission. In deciding which technology to use NGET therefore consider the solution that would offer the lowest lifetime cost solution, taking a balanced view of safety, environmental implications, project delivery and whole life costs. Considering the environmental implications and whole life costs would involve factoring in the SF6 implications and will mean in practice that NGET will only construct GIS technology (in the absence of non SF6 technology) where AIS technology is not an option for the reasons identified in bullet 2.
2	<p>National Grid Substation</p> <p>The Applicants have provided plans to the examination showing a range of site designs in response to a request from the ExA [AS-122].</p> <p>Would the size of the proposed NG Substation be the same regardless of whether one or both projects (East Anglia One North and East Anglia Two) were to be approved?</p> <ul style="list-style-type: none"> • Is the location of the proposed NG Substation tied to its location as 	<p>NGET have previously confirmed in REP6 -108 (CA2 Post Hearing Submission) that:</p> <ul style="list-style-type: none"> • NGET confirmed that only the customer connection bay will be removed from the substation if only one of the EA1N/EA2 projects proceeds and these are small elements of the overall substation design which do not therefore reduce the extent of the footprint required. • As per NGET's written response REP3-111 (see page 7), the NGET elements of the DCO do not change if only one of the projects is built because both overhead lines will still need to be connected into the new substation which due to its component parts will remain the same size whether or not both projects are connected.

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	<p>shown on the plans whether in AIS or GIS form. For instance could the GIS proposed be moved west or eastwards for environmental purposes?</p>	<p>This has also been explained in REP3-111 (linked above).</p> <ul style="list-style-type: none"> • In light of the response above, the size of the NG Substation would be the same regardless of whether one or both of the projects (East Anglia One North and East Anglia Two) were approved. The size of the NG Substation will be established through the detailed design process within the parameters set out and controlled within the DCO. • In relation to AIS technology given its size and the need for the NG substation to sit between the EA1N and EA2 substations and the existing overhead line, there is very little opportunity to amend the location of the NG substation. In relation to GIS technology the most efficient way to connect the substation to the proposed EA1N and EA2 substations is to locate the NG substation centrally between the EA1N and EA2 substations, although the NG substation could be located anywhere within Work Area 41 this would increase the length of cable runs and could potentially necessitate another CSEC if moved too far from the 400kv pylon, which would result in an inefficient design and additional impacts. Obviously, any movement east or west would need to be within Work Area 41 and the parameters assessed. • The question of site location for the NG Substation is not as simple as considering whether the NG Substation can be moved eastwards or westwards because the siting is determined by many factors including the existing and proposed OHL locations, the sealing end compound locations and the location of the EA1N/2 substation(s). As mentioned, if only one of the EA1N or 2 projects is consented the NG substation will not change in size and therefore could not be moved eastwards or westwards to align with the single consented scheme. Detailed design will establish the optimal location for the NG Substation and this will be

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		based on the locations of the OHLs, the Sealing End Compounds and the EA substation(s).
3	<p>National Grid Substation</p> <p>The Applicants Substation Design Principles Statement [REP8-082] documents how the East Anglia One Substation and ancillary works evolved through the design process.</p> <ul style="list-style-type: none"> Outline how the NG Substation for East Anglia One evolved in design terms through the lifetime of the project (through to built substation), if at all? 	<p>There isn't a dedicated NG Substation for EA1, the connection of EA1 was incorporated as part of the design solution developed as part the reconfiguration of existing National Grid Bramford 400kV Substation to serve a number of transmission system needs including both asset replacement and connections.</p> <p>The National Grid Bramford Substation is a GIS substation and it wasn't consented via the EA1 DCO and accordingly NGET cannot compare parameters against final design in the same way that the applicants have in their Substations Design Principles Statement.</p>
5	<p>Location of National Grid Substation</p> <p>As per Action 4, during ISH16 the Applicants referred to the efficiencies inherent in siting the proposed National Grid Substation (whether AIS or GIS) in the position shown on their R17QE response [AS-122]. Please describe and quantify any efficiencies to NGET of placing the Substation in the shown location.</p>	<p>The location of NGET's substations is determined by many factors including costs of design, operation and construction, minimising environmental impacts, minimising visual impacts, ensuring proper design and safety principles are adhered to and other determining factors which are taken into account as part of NGET's s9 obligations to maintain an efficient, co-ordinated and economical system of electrical distribution and other statutory obligations.</p> <p>In principle, NG substations are more cost efficient when sited as close as possible to the transmission network (i.e. the Overhead lines) and the current siting of the NG Substation reflects this. The primary efficiencies for the location are cost and electrical efficiency.</p> <p>Cost</p>

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		<p>For every extra 10 metre of cable there is a significant cost increase. As there are 4 circuits that connect the OHLs into the NG Substation any increase of distance between OHL and NG Substation has an associated 4x increase in cost.</p> <p>As there are 2 underground circuits between the EA1N/2 Substations and the NG Substation any increase in distance between the two substations has an associated 2x cost increase. There are troughs laid in the ground for these cables which also increase costs.</p> <p>As such, it is most efficient to locate the NG Substation close to both the OHLs and the EA1N/2 Substations to ensure cost efficiencies are achieved and the current proposed siting reflects this. As the length of cabling is reduced this also minimises construction and environmental impacts.</p> <p>Electrical Efficiency</p> <p>In principle, the shorter the cable or circuit the more electrically efficient the cable is. As such the NG Substation is positioned to ensure that the cables will allow for correct and safe spacing between the OHLs, the sealing end compounds and the EA substation(s) whilst ensuring the cables are as electrically efficient as possible. Further, the close location of the EA substation(s) and the NG Substation ensures that a fourth sealing end compound is not required.</p>