

# **Preliminary Information Memorandum**

## **London Array (Phase 1) Offshore Transmission Assets**

**November 2010**

*ofgem* E-Serve



**RBC Capital Markets®**

## SUMMARY

In June 2009 the Department of Energy and Climate Change (“**DECC**”) and the GB energy regulator, the Office of Gas and Electricity Markets (“**Ofgem**”) introduced a new regulatory regime for licensing offshore electricity transmission. The regime provides an opportunity for investors to acquire offshore electricity transmission assets in Great Britain (“**GB**”). The first transitional tender round commenced in July 2009 and strong competition has attracted over £4 billion of investment appetite for nine transmission links worth around £1.1 billion. Three preferred bidders have been selected to own and operate the first £800 million worth of transmission links to eight offshore wind farms. All three firms are new entrants to the sector. Ofgem has now launched tenders for the second round of transitional projects.

Ofgem E-Serve, which is the delivery arm of Ofgem, is now launching tenders for the second round of transitional projects. These tenders will be conducted across two tranches of tender exercises. The first tranche of tender exercises (Tranche A) will commence in mid-November 2010. The second tranche of tender exercises are expected to commence in spring 2012 (Tranche B). Projects included in Tranche A are those projects which have been confirmed as qualifying projects by Ofgem E-Serve and have satisfied the necessary tender entry conditions in accordance with the Electricity (Competitive Tenders for Offshore Transmission Licences) Regulations 2010 (“**the Tender Regulations**”). Projects in Tranche B have been deemed as qualifying projects by Ofgem and have until 31 March 2012 to meet any outstanding requirements in accordance with the Tender Regulations.

This document is a summary of information provided by the developer and outlines specifically the opportunity for investors to acquire the transmission assets and to become the licensed Offshore Transmission Owner (“**OFTO**”) of the London Array (Phase 1) offshore wind farm. London Array (Phase 1) is a qualifying project in accordance with the Tender Regulations and is being tendered in Tranche A.

The transmission assets for the London Array (Phase 1) offshore wind farm (the “**Transmission Assets**”) are currently owned and being constructed by DONG Energy, E.ON and Masdar (together the “**Participants**”). It is currently expected that construction of the London Array (Phase 1) Transmission Assets will be completed in June 2012. Once completed, the London Array (Phase 1) Transmission Assets will be transferred to the OFTO identified as the successful bidder through the tender process via a transfer agreement.

The costs of developing and constructing the London Array (Phase 1) Transmission Assets, estimated on the basis of the information provided to date, are £475.7 million (the “**Initial Transfer Value**”). This Initial Transfer Value includes the two offshore substation platforms (“**OSPs**”). The Initial Transfer Value will be updated as part of Ofgem’s cost assessment process, as described in the Generic Preliminary Information Memorandum entitled “GB Offshore Transmission: Investment Opportunity – Tender Round 2” and as further described below. That document also provides further information on the tender process generally.

## THE INVESTMENT OPPORTUNITY

### Transmission Assets Overview

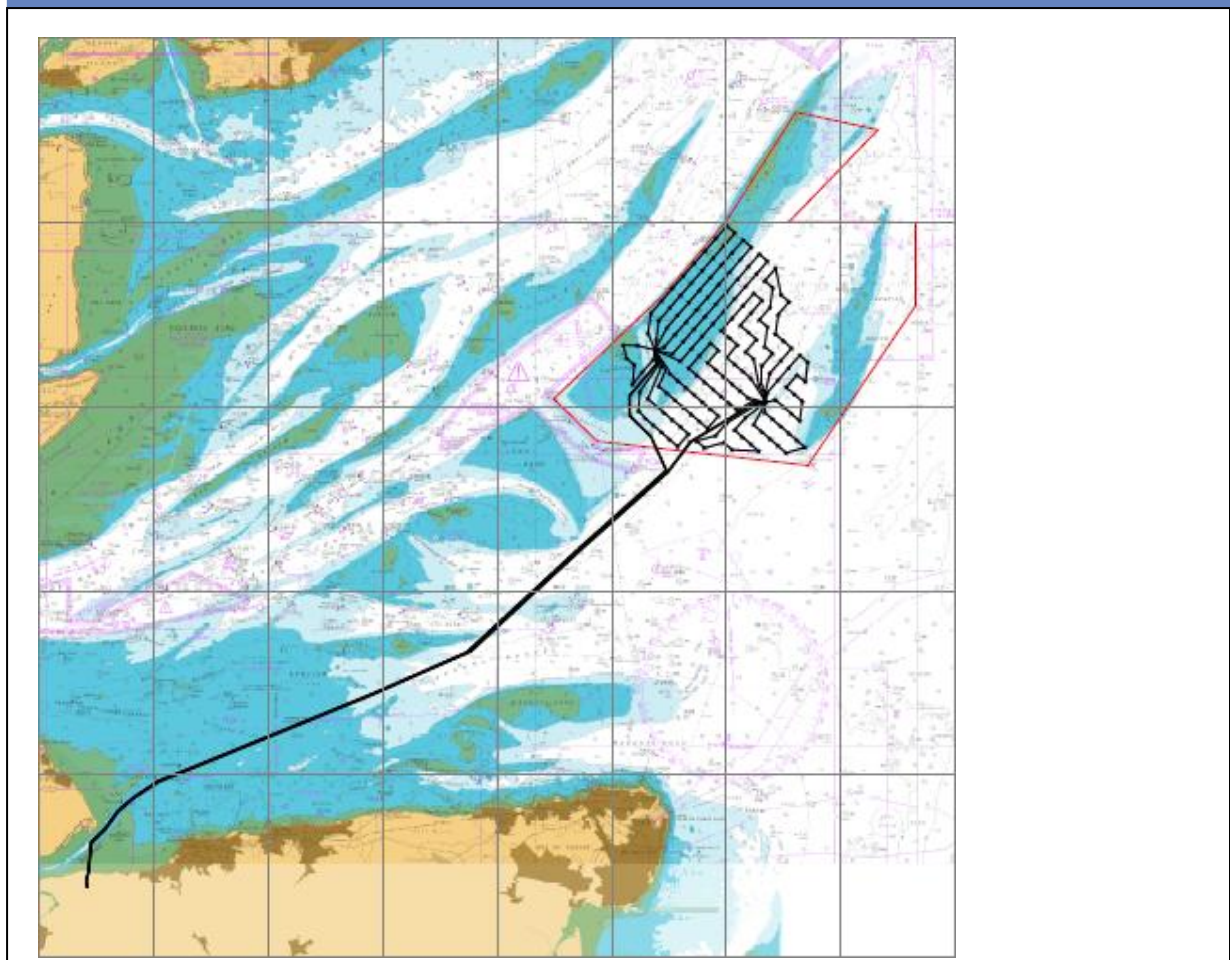
#### Location

London Array (Phase 1) is a wind farm under construction, situated in the Outer Thames Estuary midway between the Kent and Essex coastlines, more than 20 km (12 miles) from each shore. Phase 1 consists of 175 turbines, to be installed on the Long Sand and Kentish Knock sand banks and in the Knock Deep channel that lies between. The electricity produced by the wind turbines will be transmitted through 33kV sub-sea cables to two offshore substation platforms.

The two offshore substation platforms will be connected through four sub-sea 150kV cables, each around 54km long, to a new onshore substation at Cleve Hill, near Graveney in North Kent. The onshore substation will step up the voltage and transmit the power onwards into the existing 400kV transmission network via a new National Grid Electricity Transmission ("NGET") substation. On completion, the installed capacity of Phase 1 will be 630 MW.

**Figure 1** below shows the location of the Wind Farm and Transmission Assets, which are located inside UK territorial waters.

Figure 1: Location of the London Array Phase 1 Wind Farm and Transmission Assets



### Timeline

Construction of the onshore substation commenced at Cleve Hill in July 2009; NGET started construction of their 400kV substation in February 2010. Work is progressing according to schedule. A near shore consent construction constraint, which comes into force on 30 September 2011 and lasts until 31 March 2012, limits installation of export cables to one to each OSP in 2011. The first two cables have sufficient capacity to carry export power from the wind turbines that will be installed and commissioned before the third and fourth cables are due to be installed, in May and June 2012 respectively.

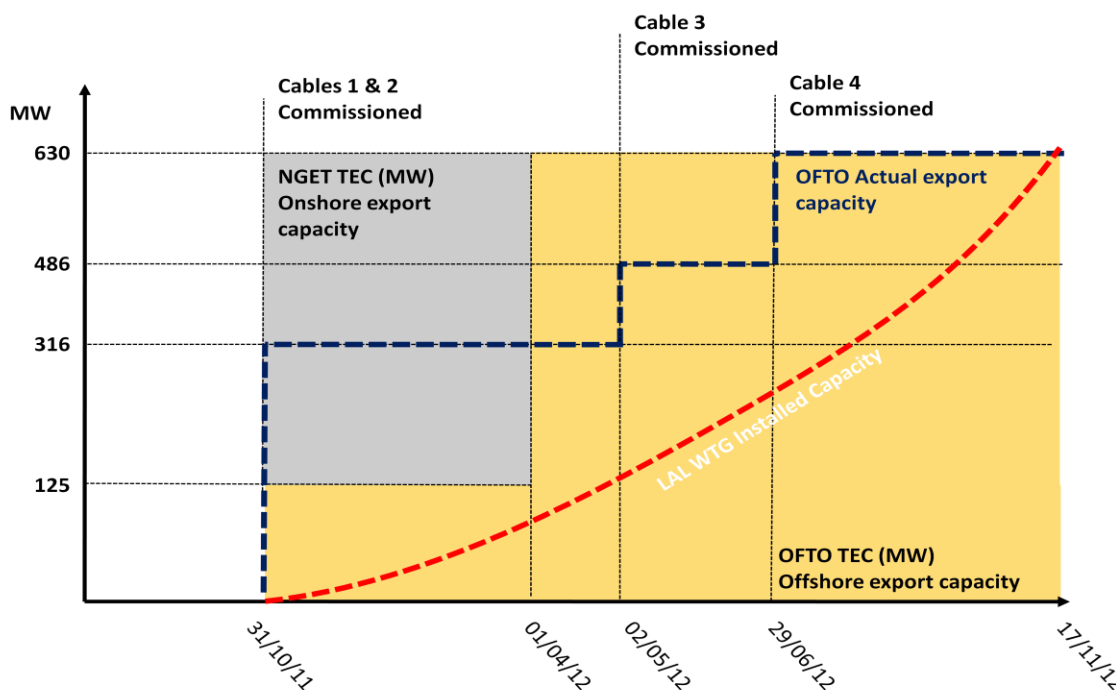
The bilateral connection agreement has the following connection stages:

**Table 1 – Transmission Asset Commissioning Timetable**

Stage	Date	NGET TEC	OFTO Export Capacity
1	31 October 2011	126MW	316MW
2	1 April 2012	630MW	316MW
3	2 May 2012	630MW	486MW
4	29 June 2012	630MW	630MW

Figure 2 below illustrates the phased completion of the transmission assets, differentiating between the NGET onshore transmission entry capacity (TEC), the OFTO export capacity and the LAL installed turbine capacity. The London Array (Phase 1) Transmission Assets are expected to be fully operational on schedule by June 2012.

**Figure 2: Commissioning dates for Phase 1 transmission assets**



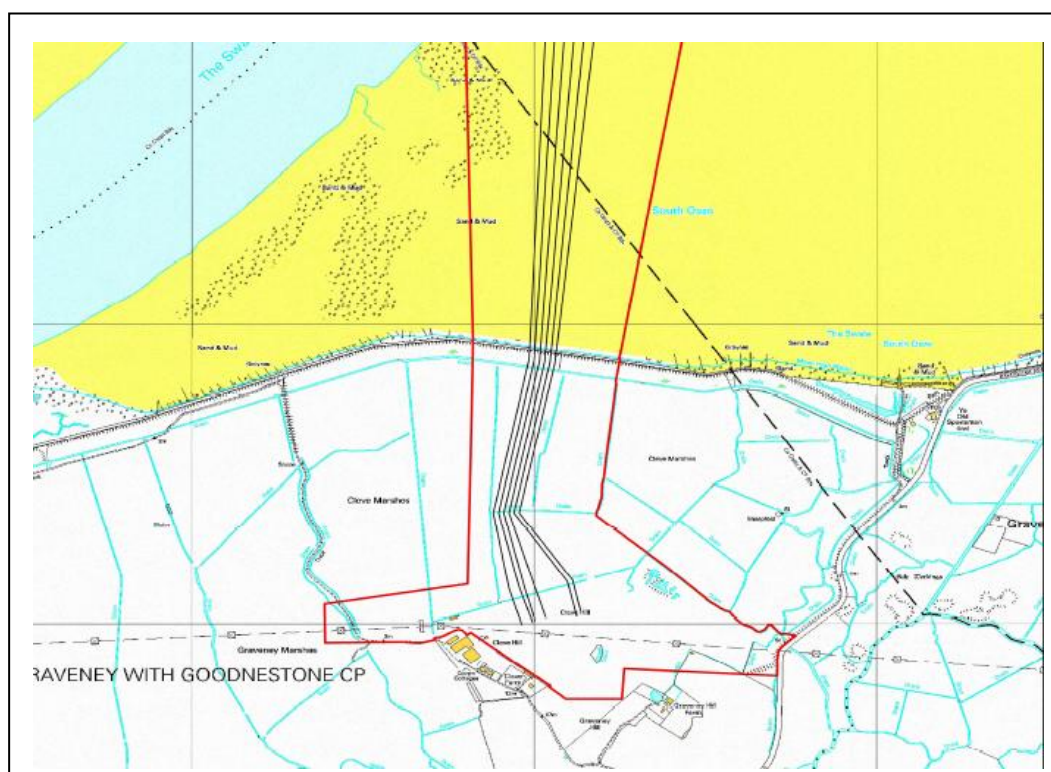
### Transmission Network Design

Table 2 summarises the key transmission network design features of the London Array (Phase 1) Transmission Assets:

**Table 2 – London Array (Phase 1) Network Design Features**

Key Features	
Expected minimum designated service life	20 years
Capacity ratings	623.2MVA

**Figure 3: Route of London Array Phase 1 Onshore Transmission Cable**



**Notes:**

1. This figure indicates the onshore route of the 6 export cables for Phases 1 & 2; the four on the left are for Phase 1
2. Also omitted are the Cleve Hill overhead line diversion, completed by NGET in 2008, and the footprint of the substation.
3. The red line signifies the boundary of the consent application.

Source: RPS for London Array

An overview of the assets that the Participants currently propose to transfer to the OFTO and which were used to derive the Initial Transfer Value of the London Array (Phase 1) Transmission Assets, is set out in Table 3 below. Table 5 provides a more detailed list of equipment proposed for transfer.

**Table 3 – Asset summary**

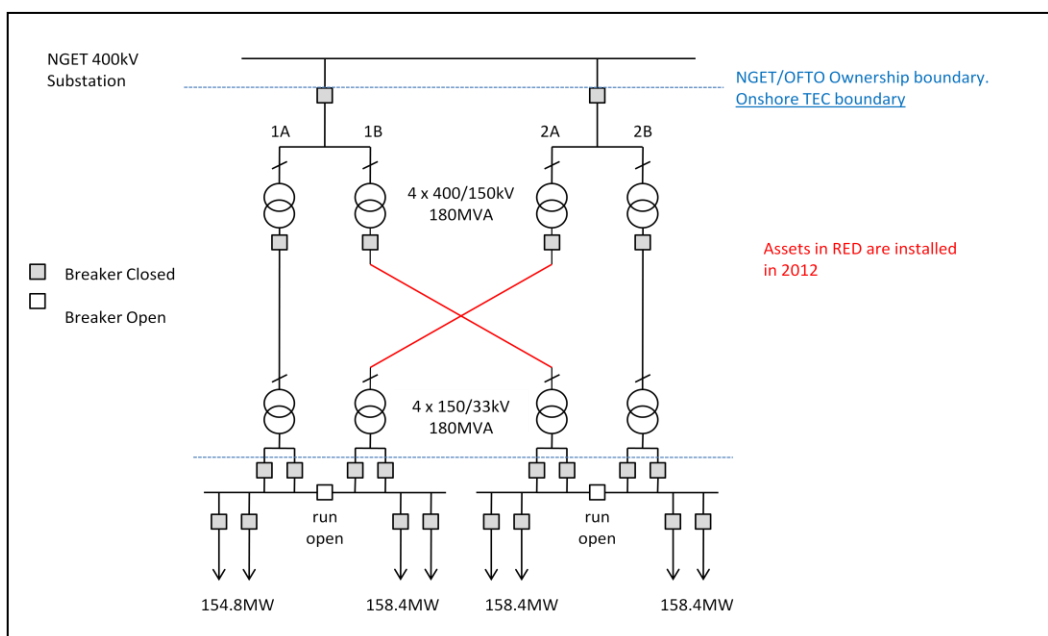
Asset	Description
<p><b>OSPs</b></p>	<p>2 OSPs each of which consists of a three deck fabricated topside structure containing two 180 MVA main transformers, two 150 kV GIS units and one 36 kV switchgear module.</p> <div data-bbox="563 436 1377 880" data-label="Image"> </div>
<p><b>Subsea cable</b></p>	<p>4 subsea export cables each on average 54km long - single wire armour 630mm<sup>2</sup> for majority of length, with 3km of double wire armour 800mm<sup>2</sup> at each end; Cable is three core 150 kV XLPE cable with 52 fibre optic cores.</p>
<p><b>Onshore cable</b></p>	<p>The offshore cables run under the sea defences, through directionally drilled ducts, and then nearly 800m to jointing pits adjacent to the onshore substation.</p>
<p><b>Onshore substation</b></p>	<p>One complete onshore substation at Cleve Hill, Kent, adjacent to the 400kV substation of NGET, including all civil and enabling works, 4 x 400/150kV 180MVA transformers, switchgear, SVCs and harmonic filters.</p> <div data-bbox="552 1238 1386 1787" data-label="Image"> <div data-bbox="616 1644 1329 1771" data-label="Text"> <p><b>Note:</b> Above impression is for Phases 1 and 2 (1000MW). The two closest transformers and SVC pods will be for Phase 2 transmission assets</p> </div> </div>
<p><b>Spares</b></p>	<p>Spare export cable has been ordered but the length available for spares can only be confirmed when installation has been completed.</p>

Table 4 below sets out the current offshore and onshore boundary points proposed by the developer. These have been used for the purposes of calculating the Initial Transfer Value.

**Table 4 – Proposed boundary points offshore and onshore**

Boundary Point	Location
Offshore	Offshore Transmission Asset ownership boundary with the OFTO will be at the 33kV breakers at transformer LV terminal where the metering will be located.
Onshore	400kV breakers with NGET's 400kV substation

**Figure 4: Diagrammatic representation of proposed boundary points offshore and onshore**



### Redundancy

The Transmission Assets have been designed in consultation with NGET to meet SQSS and have limited redundancy. There is no additional redundancy in transformers or cables in the event of a single component failure.

### Contractual Arrangements

A multi-contract approach has been adopted by the Participants. The London Array Project Team has carried out the ITT process, tender negotiations and contracting activities, with legal advice on contracts provided by Pinsent Masons. The interfaces between packages have been managed by the Project Team, with a Participant Procurement Compliance Panel ensuring compliance with the contracting and procurement policy.

The transmission assets consist of the following supply and installation elements:

- Electrical equipment for onshore and offshore substations and onshore substation construction
- Export cable supply
- Export cable installation
- Supply and installation of foundations for offshore substations
- Fabrication and installation of offshore substation topsides

Table 5 sets out the main contracts, current contract status and assets proposed for transfer.

**Table 5 – Key Contracts and Assets**

Services and main equipment list	Contract	Contractor
<p><b>OSP - construction:</b></p> <p>There are 2 Offshore Substations</p>	<p>Design of foundations and topside structure. Fabrication of topside structure.</p> <p>Fabrication and installation of substation foundations.</p> <p>Installation of topside structure.</p>	<p>Future Energy (JV between Fabricom, Iemants and Geosea)</p> <p>JV between Par Aarsleff A/S and Bilfinger Berger GmbH</p>
<p><b>OSP - mechanical and electrical equipment:</b></p> <p>Each substation consists of two 180 MVA main transformers (two 150 kV GIS units and one 36 kV switchgear module)</p>	<p>Design, supply and installation at Future Energy works of electrical equipment</p>	<p>Siemens Transmission &amp; Distribution Ltd</p>
<p><b>Offshore cable:</b></p> <p>Offshore - 4 Cables connect the OSPs with the onshore substation (2 per OSP)</p> <p>Route length approx 54km from Offshore substations 1 &amp; 2. Cable is single wire armoured 630mm<sup>2</sup> for majority of length, with 3km of double wire armour 800mm<sup>2</sup> at each end. Cable is three core 150 kV XLPE cable with a 52 fibre optic core</p> <p>Offshore - Installed approx. 1.5-2 m below the sea bed</p>	<p>Supply</p> <p>Installation</p>	<p>Nexans Norway</p> <p>JV between Visser and Smit Marine Contracting and Global Marine Systems Limited</p>
<p><b>Onshore cables:</b></p> <p>Onshore - Connection is to be made within the substation site boundary which is approximately 775m from the sea wall on higher ground</p> <p>Breach of sea wall by directional drilling (Completed September 2010) and cable pull to jointing pit on Cleve Hill site. Buried at a depth of approximately 1-1.5m below ground level</p>	<p>Supply</p> <p>Installation</p>	<p>Nexans Norway</p> <p>JV between Visser and Smit Marine Contracting and Global Marine Systems Limited</p>
<p><b>Onshore Substation:</b></p> <p>A connection point for the 150 kV export cable from the wind farm and the interconnector to the NGET 400 kV Transmission Network system</p> <p>Provides reactive compensation and harmonic filters.</p>	<p>Design, supply and installation of civil works and electrical equipment at Cleve Hill</p>	<p>Siemens Transmission &amp; Distribution Ltd</p>



## Consents and property rights

All necessary offshore consents and licences are in place for the construction of the London Array (Phase 1) Transmission Assets. These include an exercised option on a Crown Estate lease, Electricity Act (1989) Section 36 and Coastal Protection Act (1949) consents and a Food and Environmental Protection Act (1985) licence. It should be noted that consents obtained also cover the construction of the London Array (Phase 2) Transmission Assets.

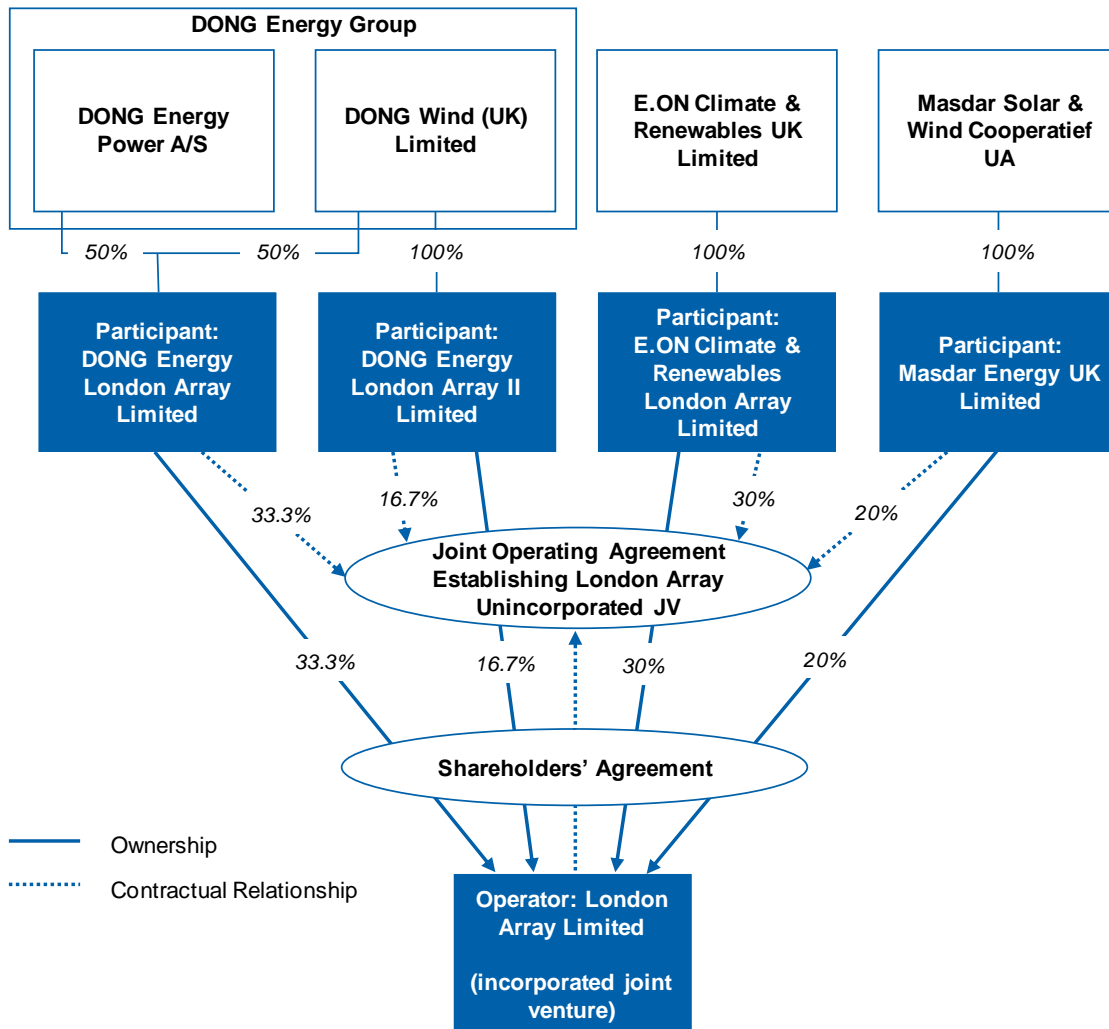
In addition to this, all necessary property rights for the onshore cable route have been agreed and secured. London Array Limited owns the land on which the onshore substation stands.

## Ownership Structure

The London Array (Phase 1) project has three parent companies in an unincorporated joint venture. The companies and their respective interests are DONG Energy (50%), E.ON Climate and Renewables (30%) and Masdar (20%) (a company wholly owned by the Government of Abu Dhabi). London Array Limited (LAL) acts as disclosed agent for the Participants, as such it is defined as the Operator and holds the generation licence, connection agreement and certain land interests on trust for the Participants. Construction contracts have been predominantly signed by the Participants.

An overview of the ownership structure of the London Array (Phase 1) Wind Farms and Transmission Assets is illustrated in Figure 5 below:

Figure 5: Ownership Structure



### Initial Transfer Value

Ofgem E-Serve will calculate the economic and efficient costs which ought to be, or ought to have been, incurred in connection with developing and constructing the London Array (Phase 1) Transmission Assets. The assessment of these costs will be used to determine the transfer value.

For the purpose of commencing the tender process, applicants should assume an Initial Transfer Value of £475.7 million for the London Array (Phase 1) Transmission Assets summarised in Table 3 and 5 above. This value has been provided from the Participants' cost forecasts, assuming the boundary points summarised in Table 4. Ofgem E-Serve has not yet reviewed this cost forecast information. Ofgem E-Serve will be undertaking a detailed review of the information as part of its calculation of the estimate of the economic and efficient costs and will provide this estimate as the indicative transfer value at the Qualification to Tender stage.

## CONTACT DETAILS

The information in this document is provided for information purposes only. It is designed to provide prospective OFTOs, lenders and advisers with certain high-level information related to the London Array (Phase 1) Transmission Assets, to support the launch of the initial Pre-Qualification stage of the tender process.

All enquiries or communications, including requests for additional information, should be sent to [tendercoordinator@ofgem.gov.uk](mailto:tendercoordinator@ofgem.gov.uk).

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