

STAKE HOLDER CONSULTATION PROCESS OFFSHORE GRID NL	
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## Table of Contents

<b>1. BACKGROUND MATERIAL.....</b>	<b>2</b>
<b>2. SCOPE AND CONSIDERATIONS.....</b>	<b>2</b>
<i>General</i> .....	2
<i>Technical</i> .....	3
<i>Implementation</i> .....	3
<i>Cost, uncertainties and risk</i> .....	3
<b>3. POSITION TENNET .....</b>	<b>3</b>
<b>4. TOPIC CONSULTATION .....</b>	<b>4</b>

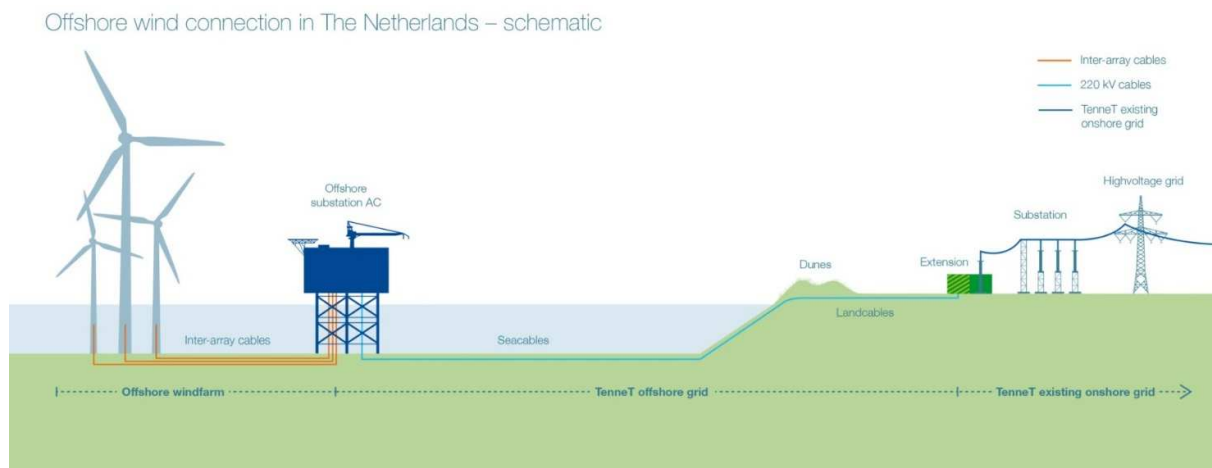
## 1. Background material

Background material used:

- N.A.

## 2. Scope and considerations

The figure below shows a schematic cross-section of the connection of an offshore wind farm to the onshore electricity grid. Wind turbines are connected through medium voltage “inter-array” cables (in orange) to an offshore substation, from which electricity is transported to shore. TenneT will be responsible for the offshore grid, from the onshore substation up to and including, the offshore substation. TenneT intends to standardise the offshore substations for all five wind areas to be realised in the coming years in line with the Energy Agreement.



Schematic of the offshore electrical grid. Source: TenneT

### General

The Energy Agreement requires a 40% cost reduction for offshore wind to be realised over the period 2014-2024. Realisation of this cost reduction is expected to require a combination of measures<sup>1</sup>, including - but not limited to standardisation of the offshore electrical infrastructure and larger capacity wind turbines within larger wind farms. TenneT contributes to this overall cost reduction target, through a strategic long term vision on the development of the offshore grid. Cost reduction is realised by standardisation of all 5 offshore platforms to be realised for the development of 3450 MW offshore wind, by serving concentrated large wind areas with a single platform and use of technology that is ready for future large capacity wind turbines.

<sup>1</sup> [http://tki-windopzee.nl/files/2015-01/20141124\\_TKI\\_Roadmap.2015-2020\\_EZU\\_F%20\(1\).pdf](http://tki-windopzee.nl/files/2015-01/20141124_TKI_Roadmap.2015-2020_EZU_F%20(1).pdf)

## Technical

In Position Paper T3<sup>2</sup>, the position on the connection point between the offshore PPM and TenneT is described, specified at the cable termination of the inter array cables (owned by the PPM) and the switchgear installation on the platform (owned by TenneT). Regarding the protection and their settings, agreements are necessary between TenneT and the PPMs, covered by a separate paper. In case of a failure in an inter array cable or connected equipment, the operation of the switchgear is covered, either by the protection or manually.

## Implementation

Regarding the operation of bays under normal circumstances, during commissioning, normal operation and maintenance, two solutions for operation of the switchgear bays can be defined:

1. The whole switchgear installation (disconnectors, earthing switches and circuit breakers) is operated by the owner of the switchgear, TenneT. TenneT has a 24/7 manned dispatch centre which can operate the switchgear on request of the PPM at any time of day. Also in this case for maintenance purposes and planning, intensive cooperation between TenneT and the PPM's is preferred/needed. The switching state should be clear to the PPM for their maintenance purposes.
2. The disconnectors and the earthing switches are operated by TenneT and the circuit breaker by the PPM, which gives freedom to the PPM for switching of their strings. However, for maintenance purposes and planning, intensive cooperation between TenneT and the PPM's is preferred/needed and the switching state of the switchgear should be visible. Operation of the switchgear for TenneT purposes should be organised, certainly with respect to the maintenance of the switchgear itself.

Regarding the operation of the switchgear bays, the system operator and PPMs shall make arrangements and agreements regarding the operation of the switchgear bays as described above. These points will be addressed to in the 'Customer Connection Agreements (in Dutch "Aansluit en Transmissie Overeenkomst" (ATO)).

## Cost, uncertainties and risk

No impact on LCoE is expected from choosing either option 1 or option 2 from the above list as only ownership and operation is under consideration.

## 3. Position TenneT

The above considerations, and referenced background material, lead TenneT to the following position:

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TenneT is inclined to standardise the operation of bay's for the offshore platform, similar to the current practice for the operation of switchgear onshore for the connected parties, where the switchgear installation with connections to the offshore PPM is fully operated by TenneT, as the owner of the switchgear.

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<sup>2</sup> TenneT, Position Paper (ONL 15-061 Point of Common Coupling).

This solution is common practice for customer connections within TenneT. The dispatch centre of TenneT is 24/7 manned and contactable. Based on the request of the offshore PPM, switching actions can be carried out by the system operator. One way of working (which is already applicable for other connected parties) can be applied for all offshore connections with clear uniform procedures for all parties involved.

#### **4. Topic consultation**

The expert meeting of 15-16.04.2015 gives TenneT the opportunity to get feedback from developers on their position regarding the Operation of Bays. The main goal of this meeting will be to assess whether TenneT's views as documented within this position paper, and background data above, are shared by the industry.