

STAKEHOLDER CONSULTATION PROCESS OFFSHORE GRID NL

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1. Background Material

LITERATURE USED:

- Commission Regulation (EU) 2016/1447 network code on requirements for grid connection of high voltage direct current systems and direct current-connected power park modules
- ACM/UIT/506390 wijziging netcode elektriciteit: <https://www.acm.nl/nl/publicaties/ontwerp-codebesluit-hvdc>
- Commission Regulation (EU) 2016/631 establishing a network code on requirements for grid connection of generators
- Netcode elektriciteit: <http://wetten.overheid.nl/BWBR0037940>

2. Scope and Considerations

For the roadmap offshore wind 2030 (routekaart windenergie op zee 2030) TenneT is tasked with the connection of several offshore wind farms up to 2030. The wind farm zones 'Hollandse kust West' and 'Ten Noorden van de Waddeneilanden' will be connected with TenneT's previously established and consulted standardized 700 MW grid connection concept. Due to its size and distance to shore, a new grid connection concept has been established for the wind farm zone IJmuiden Ver. The figure below shows a schematic cross-section of this new grid connection concept. Wind turbines are connected through 66 kV "inter-array" cables (in orange) to an offshore (HVDC) converter station. Using 2 GW high voltage (525 kV) export cables (in green) the 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 create a new standard HVDC grid connection concept for both connections to IJmuiden Ver and potential future far shore wind farms.

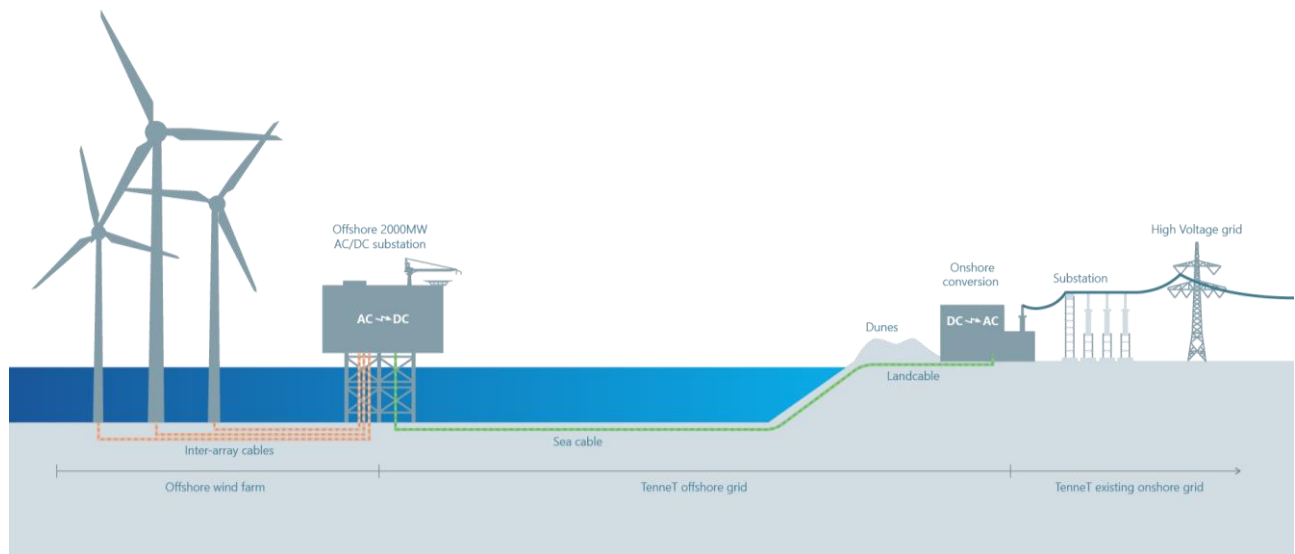


Figure 1 - HVDC grid connection concept

This paper describes how TenneT, as the offshore grid connection owner, proposes to deal with the requirements given in the grid code.

3. Topic HVDC grid code

3.1 General

The European Commission has issued a regulation establishing a network code on requirements for grid connection of high voltage direct current (HVDC) systems and direct current-connected power park modules with reference COMMISSION REGULATION (EU) 2016/1447. This regulation gives the requirements for grid connections of HVDC systems. This regulation is mandatory for all countries in the European Union.

Currently this regulation is being implemented in the Dutch law. The current status is a consultation document (ACM/UIT/506390) from the ACM, who is responsible for the conditions following article 31 of the Dutch Elektriciteitswet 1998. Therefore, the "netcode elektriciteit" will be modified to also describe the requirements for the connection of HVDC systems.

The formal acceptance of the netcode elektriciteit will mark the moment that the Dutch implementation of the European network code will be mandatory and applicable to the IJmuiden Ver project, the European network code is already mandatory. There is a specific part of the grid code that is applicable on the offshore AC 66 kV grid, which describes the requirements for the windfarms (=DC-connected PPM) and for the offshore HVDC converter station (=remote-end HVDC converter station). Many articles of the grid code are discussed in other position papers and will therefore not be covered in this document.

The draft Dutch implementation of the HVDC network code is published by the ACM;
<https://www.acm.nl/nl/publicaties/ontwerp-codebesluit-hvdc> (NL).

3.2 Reference to articles of the ENTSO/e network code (EU) 2016/1447

The articles in the network code HVDC that apply to the offshore AC grid and associated equipment are the following, where articles 38 until 45 are requirements for DC-connected PPMs and articles 46 until 50 are requirements for remote-end HVDC converter stations:

3.2.1 Article 38 Scope

Article 38 gives reference to requirements in the RfG regarding the performance of power park modules connected to the grid. Purpose of the article is to safeguard that power park modules connected to an offshore grid have the same performance as if they were connected to the onshore AC grid. This article will be implemented in the articles 6.29 and 6.30 of the netcode elektriciteit.

3.2.2 Article 39 Frequency stability requirements

This article is implemented in article 6.28 of the netcode elektriciteit. Details regarding the fast signal, as mentioned in article 39.1, will be derived in the discussions with offshore windfarm owners at a later stage in the consultation period.

3.2.3 Article 40 Reactive power and Voltage requirements

This article is implemented in article 6.29 of the netcode elektriciteit. The Netherlands has declared that the voltage deviations applicable to voltage levels 110 kV and higher are also applicable for voltage levels below 110 kV e.g. 66 kV. So the same voltage levels will be applied in Ijmuiden Ver.

3.2.4 Article 41 Control requirements

This article is implemented in article 6.30 of the netcode elektriciteit and applicable to Ijmuiden Ver.

3.2.5 Article 42 Network characteristics

This article is implemented in article 6.31 of the netcode elektriciteit and applicable to Ijmuiden Ver.

3.2.6 Article 43 Protection requirements

This article is implemented in article 6.32 of the netcode elektriciteit and applicable to Ijmuiden Ver.

3.2.7 Article 44 Power quality

This article is implemented in article 6.33 of the netcode elektriciteit and applicable to Ijmuiden Ver. Specific requirements with respect to Electromagnetic Compatibility will be derived in more detail once the split of the 1 GW wind parks are known (power quality will be addressed in more detail in position paper T04).

3.2.8 Article 45 General system management requirements

There is no additional requirement in The Netherlands mentioned in the netcode elektriciteit.

3.2.9 Article 46 Scope

There is no additional requirement given in article 6.34 of the netcode in The Netherlands.

3.2.10 Article 47 Frequency stability requirements

The proposed frequency for the offshore grid is 50 Hz as given in position paper T07, so no additional requirements as mentioned in article 6.35 of the netcode and article 47.1 of the ENTSO/e grid code. For article 47.2 a reference is made to paragraph 3.2.3 of this position paper.

3.2.11 Article 48 Reactive power and voltage requirements

This is detailed in article 6.36 of the netcode elektriciteit. As mentioned in 3.2.3 of this position paper, the operating envelope of 110 kV and higher voltages is declared to be applicable for 66 kV as well.

3.2.12 Article 49 Network characteristics

TenneT will deliver all relevant information of the offshore grid to the wind park owners. No additional requirements.

3.2.13 Article 50 Power quality

This article is implemented in article 6.38 of the netcode elektriciteit and applicable to Ijmuiden Ver. Specific requirements with respect to EMC and power quality and negative sequence voltages will be derived in more detail once the split of the 1 GW wind parks are known (power quality to be addressed in more detail in position paper T04). Article 3.34 will be evaluated in more detail in position paper T03.

4. Position TenneT

Above considerations lead TenneT to the following position:

TenneT has to implement the requirements as given in the Dutch netcode elektriciteit. The current prevailing netcode is not incorporating the specific requirements for HVDC converters and DC connected wind park modules.

TenneT follows in this respect the latest draft version of the proposed new netcode elektriciteit, in order to be prepared to implement the new netcode once it is accepted and published.
