POSITION PAPER

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Prepared:	TenneT team	
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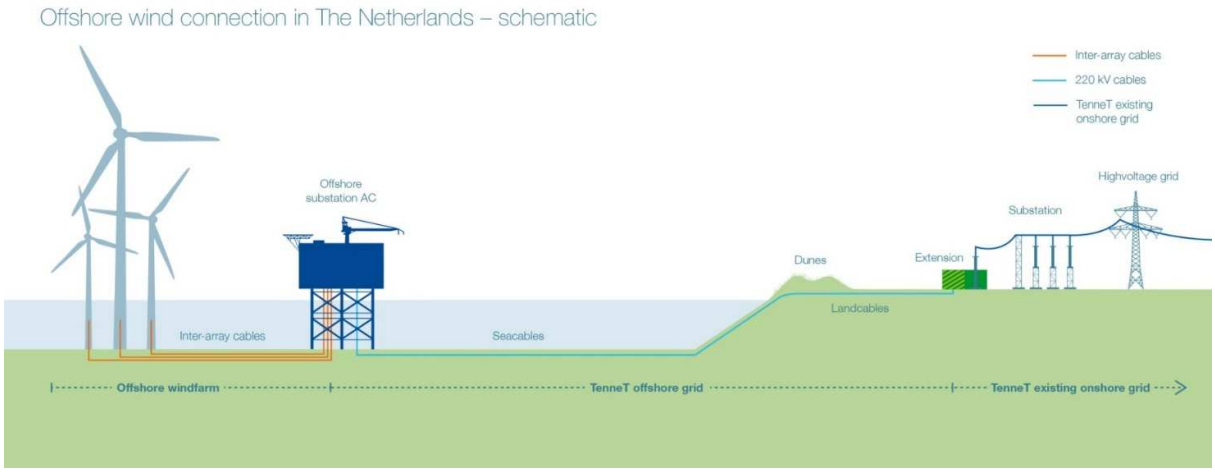
1. Background material

Literature used:
• Minutes of Meeting stakeholder consultation of 12&13.05.2015

2. Scope and considerations

The figure below shows the connection of an offshore wind farm to the onshore electricity grid. TenneT will supply and install the grid connection up to, and including, the offshore substation. The wind park, including the inter-array cables, up to the offshore Connection Point (the offshore substation of TenneT) is to be supplied and installed by the owner of the Offshore Windfarm (OWF).



Schematic of the offshore electrical grid. Source: TenneT

This paper describes how TenneT proposes to deal with the planning of the installation of the grid connection and the interfaces with the installation of the OWF's. The focus will be on the planning of the first grid connection, for the 700 MW of the wind areas Borssele 1 and 2, called Borssele Alpha. The planning of the other grid connections will be considered in a later stage, but will be based on the same principles.

2.1 Planning framework Wind op Zee

For the development of the offshore windparks, in the context of the Wind op Zee programme, a Routekaart is given which together with the Energieakkoord makes the following framework for the planning:

Tender in	*Areas Routekaart*	*Windpower*	*Operational in*
2015	Borssele	700 MW	2019
2016	Borssele	700 MW	2020
2017	Hollandse Kust: Zuid Holland	700 MW	2021
2018	Hollandse Kust: Zuid Holland	700 MW	2022
2019	Hollandse Kust: Noord Holland	700 MW	2023

This shows that the deadline for the first OWF's operational at Borssele, and thereby also for the grid connection Borssele Alpha, is 2019.

Additional to the Energieakkoord and the Routekaart, there has been an agreement with the Ministry of Economic Affairs that the last possible start of the subsidy payment is 5 years after the subsidy tender decision. TenneT will not anticipate on this possible later start date of the operation phase, but the planning can be adjusted if necessary.

2.2 Overall planning grid connection Borssele Alpha

A schematic overview of the entire planning of Borssele Alpha is given in appendix 1. The planning consists of two separate phases:

1. The initiation phase, resulting in a Final Investment Decision (FID). The FID for Borssele Alpha is planned on 1-1-'17 and is dependent on the following conditions:
   - irrevocable permits
   - all necessary land acquisitions and crossing agreements
   - finished tenders
   - the subsidy tender decision
   - laws "Stroom" and "Wind op zee" in place
2. The realisation phase, resulting in a commissioned and fully tested grid connection. For Borssele Alpha this phase is planned based on experience with delivered connections of TenneT in Germany.

Taking into account the time necessary for hot commissioning and trial run, the grid connection can be operational on 31 August 2019. Given the restrictions due to weather conditions it is not realistic to install the top side earlier than after the storm season of 2018-2019, so the grid connection cannot be operational before August 2019.

2.3 Planning key interaction points between grid connection and OWF

In the following table a specification is given of the key interaction points, between the planning of the grid connection and the planning of the OWF's, as well as the planned date in the planning of TenneT for Borssele Alpha.

Planning interaction point	*Specification*	*Planning*
Jacket ready	• Jacket and cable deck installed • Jacket and cable deck ready for pull in and storage of inter-array cables	31 Mar. 2019 (effort: 30 Sept. 2018, with respect to storm and drilling season)
Grid connection ready	• Topside installed on jacket • Export cables connected to top side and land station • Grid connection commissioned and fully tested without WTG • Grid connection ready for connection with the first turbines • Grid connection ready for power supply and transport	31 Aug. 2019

After the grid connection is ready and the first turbines are connected on 31 August 2019, the rest of the turbines will be connected and tested and power will be build up until full power is available. This process is yet to be planned in cooperation between TenneT and the OWF-developer.

2.4 Planning uncertainties grid connection

For the project Borssele Alpha an analysis of the uncertainties and the sensitivity of the planning has taken place, based on the lessons learned in German offshore projects. This has led to a risk inventory of the initiation and the realisation phase which is now subject to a risk management process of mitigation.

The most important planning uncertainties and their mitigation measures are given below:

Uncertainty	*Mitigation*
Mistakes in permits	Extensive review process on permit application
Public resistance	Stakeholder management and analysis
Unexpected conditions (soil, UXO, archaeology)	Extensive soil investigation
Bad weather	• Introduce weather window in planning • Determine tender criteria for dealing with weather windows • Analysis of historical weather data

Restrictions flora and fauna (mating season fishes)	• Introduce mating window in planning • Early consultation with responsible authorities • Possible usage of bubble screen
Production slots lead to longer lead times	Check possible throughput time with suppliers in market consultation
Vessels, equipment and yards not available	Check possible availability in market consultation
Problems at internal and external interfaces	Interface management

Because of the available mitigation and planning optimisation measures, TenneT is confident that, despite of these uncertainties and their knock-on effects in the planning, the grid connection can be operational in August 2019. Nevertheless there are worst case scenario's in which this will not be reached.

2.5 Fixation and tuning of planning appointments

The mentioned planning dates in this memo will be fixed within the legal framework for Wind op Zee which is currently under construction.

During the preparation and installation by TenneT and the OWF-developers it is important to have a tight cooperation to predict possible delays or accelerations and to anticipate on their effects.

3. Position TenneT

These considerations lead TenneT to the following position:

- TenneT plans to have the grid connection for Borssele Alpha ready 31 August 2019. The jacket will be ready 31 March 2019 (with an effort to be ready 30 September 2018). The specification of these interaction points with the planning of the OWF's is given in this memo.
- TenneT will not anticipate on a possible later start date of the operation phase, according to the agreement that the last possible start of the subsidy payment is 5 years after the subsidy tender decision.
- A tight cooperation with the OWF-developers will be pursued to mitigate and anticipate possible delays or accelerations.

4. Topic consultation

The expert meeting of 2-3 July, 2015 gives TenneT the opportunity to get feedback from developers on their position regarding "Planning". 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.