

STAKEHOLDER CONSULTATION PROCESS OFFSHORE GRID NL

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QUALITY CONTROL

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1. Welcome

Rob van der Hage opens the meeting and welcomes all attendees.

2. Introduction and explanation on stakeholder consultation process

[Presentation - available on TenneT website]

TenneT has contracted Ecofys to manage the stakeholder consultation process with the project developer (bidding parties). The goal and organisation of this process is explained in a presentation.

3. General update on process

Rob van der Hage presented a general update on the consultation process. This process is very important to TenneT to ensure a thorough discussion with the sector and provide a transparent platform to discuss relevant topics on the TenneT/WF developer interface, collect feedback and inform all stakeholders on decisions. An important aspect of this is the alignment on the "rolling topic agenda" of the consultation process. This is discussed later in the Expert Meeting.

The expert meetings are intended to facilitate detailed discussion on specific technical and planning issues among windfarm developers, therefore it is necessary to keep the list of invitees limited.

Rob explains the overall framework and the role of The Ministry of Economic Affairs, which is currently drafting the "scenario". At the same time TenneT is preparing the initial investment plan. The combination of the two provides the overall structure and definition of the roll-out of offshore wind in The Netherlands.

4. T.1 Voltage Level

[Discussion]

Summary of concerns based on feedback during the Expert Meeting

- Concerns with respect to the availability and lack of competition of wind turbine and cable suppliers that can provide 66 kV best and final offers (BAFO) to bidding parties. This including guarantees which are comparable to those currently given at 33 kV.
- The 30% reduction of cable length taken into account as savings due to switching to 66 kV. Does this hold in case of specific layout constraints or redundancy schemes?
- There is a request for ranges in the LCoE impact numbers and a quantitative indication for the currently given qualitative trends.
- There may be Installation specific constraints for 66 KV and availability, with a potential impact on cost of installation vessels.

Feedback from the meeting attendees:

We don't see certification of the wind turbine to be an issue. At least three wind turbine suppliers are capable of providing a bid with the 66kV application.

We would like to express our worry about standardisation. We see other developments in the market: Dong for example makes smaller substations which decreases the costs. Standardisation could stop better solutions.

9 months before bid closure all technical details should be ready: do we expect the supply chain at that point to be technically ready and able to provide a bid including binding price and sufficient guarantees?

With regards to costs, the present cost estimation of TenneT might be too optimistic and highlighting the advantages more than the challenges and risks in applying 66kV on the short term. The presented table with qualitative aspects as presented should be more elaborated in quantitative ranges.

With my lay-out I don't come to a 30% cable reduction based on their numbers. And not to 1.7% reduction in cost. Therefore this decision could drive up the price for development of wind farms.

There could be technical issues during installation of a 66 kV cable: vessels with drums will also be a limiting factor. This may increase installation costs due to a limited market.

The implications of 66kV in terms of risks in installation and repair should be looked at in more detail.. Including the difference in installation due to a bigger bending radius, the need for different ships and their availability, both during installation and (unscheduled) repair.

5. T.2 # of J tubes / bays

[Discussion]

Summary of concerns based on feedback during the Expert Meeting

- More than one spare considered desirable to cope with repair actions.
- Is there enough room to incorporate infield redundancy schemes that require more J-Tubes?
- Designing the system on 630 A is using the upper level as base case.

Feedback from the meeting attendees:

From experience it is better to have more J-tubes. The concept presented is the lowest possible amount of J-tubes. 12 strings with 5 wind turbines per string which gives optimum flexibility. In case switch gear fails then you can still power the wind turbines. Costs will be decreased. Smaller cables decrease costs more than adding J-tubes.

Suggestion to make a specific site layout for Borssele since you might need an additional J-tube when the layout doesn't allow specific connection at certain points of the platform – due to pipelines and cabling etc. Reserve one specific J-tube that can be used for quick repair of strings that could fail (including switch gear etc). Specific reservation for that wind farm for cable repair.

What is the overload capability: upper side of what is currently available. This is the upper side/the maximum possible?

What happens in the case of co-location. With other words: will this be connected to the spare J-tube? This would mean that in case of colocation there's no spare J-tube available anymore.

6. T.3 Point of common coupling

[Discussion]

Summary of concerns based on feedback during the Expert Meeting

- Developers should be able to directly control switch gear TenneT operates but only by request of owner WF.

Feedback from the meeting attendees:

Developer needs direct control over connecting and disconnecting the switch

Measurement point: one point of measurement or will there be individual measurements? Where do we measure for our wind farm control? Details will have to be discussed and are not yet fully investigated. This also depends on the WTG design.

If TenneT owns switch gear does TenneT also take full liability and operation of switch gear. Liability for switch gear? If something happens who is responsible for the damage on the wind farm.

7. L.1 ATO/REA

[Presentation - available on TenneT website]

TenneT informs the meeting on the general framework for the connection and realisation agreements (ATO and REA) in a presentation.

Feedback from the meeting attendees:

Technical specs of connection between TenneT and bidder need to be written down/safeguarded somewhere. These specs should be fixed when project developers hands in the bid.

Can we deviate from RfG code on a string level? TenneT recommends not to do so. RfG code comment is

noted and will be discussed during another session.

8. P.1 Planning

[Discussion]

The planning of the consultation process (which topic will be discussed/decided when) is discussed.

Feedback from the meeting attendees:

A note on the timeline of the RfG code is made. This could be proven to be too ambitious.

A note on the timeline of the ATO/REA is made – the earlier the draft documents are available the better. In case the documents are available on the short term the “notify” box in the rolling planning could potentially be shifted backwards in case necessary.

A topic which is missing in the overview is harmonics and transient study. Developers need to have a clear understanding of which of studies TenneT would like to see from the operator and when these studies should be ready.

➤ Shall be a new separate topic

A topic which is missing is on the onshore interface point; the developer would preferably have space/ a allocation available at the onshore location.

➤ Embedded in T10

A document on HSE requirements should be included.

➤ Embedded in T13 and T4

Who is deciding the final position of the platform. Would this be EZ, RVO or TenneT?

➤ Locations have been presented in November 2014 – details were given. Decision on ultimate deciding party will be made very soon.

9. Closure

10. List of attendees

Company	Name
Dong Energy	Kunuk Rosing
Dong Energy	Ole Holmstrøm
Energy solutions	Richard Koning
Parkwind	Dirk van der Cammen
GDF Suez	Bob Meijer
Nuon	Martin Ars
Blix	Mark de la Vieter
E.ON Climate & Renewables	Sonja Voijt
NWEA	Dolf Elsevier van Griethuysen
Delta	Laurens van Zelst
SeaMW/Blackstone	André Hamers
RWE Innogy	Eduard Wiebe
Essent	Joost Pellens
NWEA	Guido Hommel
DNV-GL	Hans Cleijne
TenneT	Rob van der Hage
Ecofys	Michiel Müller
Ecofys	Timme van Melle
TenneT	Fokke Elskamp
TenneT	Saskia Jaarsma
Tennet	Bart van Hulst
TenneT	Ralph Harrewijn
Ecofys	Anna Ritzen