

STAKE HOLDER CONSULTATION PROCESS OFFSHORE GRID NL

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1.0   09.10.2015	D. Markus	Document updated acc. meeting RWS
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## Abbreviations

OWP	Offshore Wind Park
WPO	Wind Park Owner
HV-Cables	High Voltage Cables
EXC	Export Cable
IAC	Inter-array Cable
AWOS	Automated Weather Observing Station
RNMI	Royal Netherlands Meteorological Institute
SWH	Significant Wave Height
LIDAR	Laser Imaging Detection And Ranging
DTS	Distributed Temperature Sensing
CT/VT's	Current Transformers / Voltage Transformers
HVA/C	Heating, Ventilation, Air Conditioning
WTG	Wind Turbine Generator
GCS	Grid Connection System: Offshore platform, export cables and onshore substation

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## **1. Scope**

This Policy Paper defines the various data acquisition systems which are required on the TenneT offshore platform and also which of these systems can be shared between TenneT and the different Wind Park Owners (WPO's). There will be one up to a maximum of three WPO's per offshore platform. The offshore platform is part of the offshore grid connection system (GCS).

## **2. Overview of systems**

With respect to data acquisition, TenneT aims to share systems with WPO's where possible in order to save on cost, space, weight and power consumption on the offshore platform. When sharing is not possible, there is sufficient space in the WPO rooms to facilitate separate systems (HVA/C and power supply provided by TenneT in the WPO rooms).

In Table 2.1 a list of data acquisition systems is given including the responsibility of design and delivery.

Table 2.1. Overview of data acquisition systems on the platform

System	Responsible for system	Shared?
Meteo <ul style="list-style-type: none"> <li>• Wind speed &amp; direction</li> <li>• Ceilometer (Cloud height)</li> <li>• Temperature and Humidity</li> <li>• Visibility</li> <li>• Atmospheric pressure</li> <li>• Rain Gauge</li> <li>• LIDAR</li> </ul>	RWS  RWS/TenneT/EZ	Yes
Hydro <ul style="list-style-type: none"> <li>• Temperature</li> <li>• Wave height</li> <li>• Sea Current</li> </ul>	RWS	Yes  System still under discussion.
Radio & AIS <ul style="list-style-type: none"> <li>• AIS (Bacon, Sender, Receiver)</li> <li>• VHF (Radio over IP)</li> </ul>	RWS	Yes  System still under discussion.
Bird Radar	RWS	Yes
Maritime Radar	RWS	Yes
Bat detection <sup>1</sup>	RWS	Yes <sup>1</sup>
CCTV #1	RWS	Yes, System still under discussion.
4G	RWS/TenneT/Telecom Provider	Yes, System still under discussion.
DTS (Distributed temperature sensing) Export cable	TenneT	Possibly
Power Quality metering	TenneT	Yes <sup>2</sup>
VT's and CT's for metering	TenneT (within 66kV switchgear)	Yes <sup>2</sup>
Accountable metering (kWh / kVar)	Independent metering firm	No
DTS (Distributed temperature sensing) Inter array cable	WPO	No
Metering (Park control)	WPO	No
WPO CCTV	WPO	No
WPO LIDAR	WPO	No

<sup>1</sup> Not every platform will have bat detection. Bat detection will be placed basis on the permit requirements of the authorities.

<sup>2</sup> For each party a separate CT core will be available per OWP feeder bay: one for TenneT (protection), one for WPO (park control), one for the independent metering firm (kWh / kVar metering) and one for power quality measurements. So power quality measurements will be done per OWP feeder bay.

### 3. System descriptions

#### 3.1 General

Some data acquisition systems such as meteo systems can be shared as they don't have any critical interfaces to the various stakeholders of the platform. Other systems, for example a LIDAR, could have a critical interface to one of the stakeholders (in this case the WPO) and as a consequence (in this example) can't be shared with all stakeholders.

Below each system of Table 2.1 is briefly described including the possibility of sharing.

Each data acquisition system will require a communication system to shore. When a system is shared, also a data communication interface between stakeholders is required. The telecommunication system of the offshore grid shall include all communication systems and interfaces defined in this policy paper. Therefore, this policy paper shall be used as input for the project specific PvE of the offshore grid telecommunication system.

As environmental data acquisition (with systems as described in paragraph 3.2 to 3.5) is not the core business of TenneT, these will be outsourced by TenneT to Rijkswaterstaat (RWS) which is better suited and has experience to own and operate these systems. Initial discussions with this party resulted in the following overall diagram.



RWS will create a "data point" where interested parties can retrieve real time data for all connected services. This data point will be IP based and be placed on land. All communication needed to bring data on land will be under the responsibility of RWS.

The cost of the shared data acquisition systems has to be shared between the users. RWS will develop a

business model. The initial idea is to provide the data as a paid service.

### 3.2 Meteo

A weather station measures weather variables. These measurements are needed for various causes including wind forecasting and determination if safe access to the platform (or wind turbines) is possible. TenneT has the opinion that data generated by the weather station is not competitively sensitive information, therefore TenneT is planning to grant RWS access to the platform for installation and operation of a weather station. The measurements will be available for all stakeholders and will be shared through a communication interface between RWS and the stakeholders.

### 3.3 Identification of vessels (AIS)

The Automatic Identification System (AIS) is an automatic tracking system used on ships and by vessel traffic services (VTS) for identifying and locating vessels by electronically exchanging data with other nearby ships, AIS base stations, and satellites. An AIS system on the offshore platform is needed for monitoring vessel traffic around the platform. TenneT has the opinion that data generated by the AIS is not competitively sensitive information, therefore TenneT is planning to grant RWS access to the platform for installation and operation of AIS equipment. The measurements will be available for all stakeholders and will be shared through a communication interface between RWS and the stakeholders. Possibly there are legal obligations to share the AIS information which has to be cleared with RWS.

### 3.4 Hydro measurements

Sea state measurement equipment will measure wave height, water temperature and sea current (optional), Measurement of the sea current depend on technical feasibility. These measurements are needed for various causes including determination if safe access to the platform (or wind turbines) is possible. TenneT has the opinion that data generated by these sensors is not competitively sensitive information, therefore TenneT is planning to grant RWS access to the platform for installation and operation of these sensors. The measurements will be available for all stakeholders and will be shared through a communication interface between RWS and the stakeholders.

### 3.5 Bird and bat radar

A bird and bat radar detects birds and bats in the vicinity of the offshore platform. These measurements are needed to monitor the number of birds and bats visiting the platform and to assess migration patterns. The WPO site permit requires the WPO to temporary shutdown the wind turbines in case of mass bird migrations. TenneT has the opinion that data generated by this bird and bat radar is not competitively sensitive information, therefore TenneT is planning to grant the RWS access to the platform for installation and operation of this bird and bat radar. The measurements will be available for all stakeholders and will be shared through a communication interface between RWS and the stakeholders

### 3.6 CCTV

A deck cam is used to get imagery from the platform and from the surroundings of the platform (nearby wind turbines) to a remote location (onshore). These images can be used for various causes including determination if safe access to the platform (or wind turbines) is possible.

WPO's will have the possibility to place their CCTV cameras outside and in their control room. TenneT will provide brackets and cabling from the camera position(s) towards the respective WPO room.

RWS will, most likely, also place a 360 degrees camera outside. The imagery will be available for all stakeholders and will be shared through a communication interface between RWS and the stakeholders.

### 3.7 LIDAR

Lidar measures wind speeds at different altitudes. Wind speed measurements are input to the park control system of the WPO's and are therefore a critical interface for the WPO. Each WPO may have specific requirements on functionality and on the manufacturer and model of this equipment. Therefore, the WPO will have the option to place their own LIDAR.

TenneT will provide space on the platform deck to install a LIDAR for each WPO. To standardize the mechanical interface between the LIDAR equipment and the platform a CAD drawing of a skid will be released. Each WPO has to mount their LIDAR on this skid. The skid will be easy mountable on the platform deck. To connect the outside LIDAR equipment with control equipment inside the WPO rooms a cable route including cabling (as specified by WPO) will be provided by TenneT to each WPO.

Additionally, TenneT or RWS will place a LIDAR. The data of the LIDAR of TenneT/RWS will be available for all stakeholders and will be shared through a communication interface between RWS and the stakeholders.

### 3.8 Distributed Temperature Sensing (DTS)

Distributed Temperature Sensing (DTS) is a technique to measure the temperature of an inter-array or export cable by the means of an optical fibre. 66 kV inter-array cables will be installed, operated, maintained and owned by the WPO's and therefore the WPO's have to make the decision if DTS will be used for 66 kV cables.

As the fibre optical cables from the inter-array cables will be routed to the WPO rooms already, the DTS system can be installed in the WPO room without any additional requirements for the platform.

TenneT will provide a DTS system for the 220kV export cables. Sharing of data is not required but an interface will be required for power curtailment. See external position paper [T11 - Overplanting] on export cable rating and power curtailment.

### 3.9 Accountable metering (kWh / kVar)

With respect to accountable metering equipment, reference is made to external position paper [T09 - Metering].

### 3.10 Metering for wind park control

Power metering used as input for the wind park control systems of the WPO's will be the responsibility of the WPO's themselves as this equipment is WTG vendor specific and also has to comply to the standards of an WPO.

For the metering for wind park control, a VT connection and a CT core per WPO feeder bay will be made

available to the WPO in the WPO room (hard wired connection).

### 3.11 Power quality metering

TenneT will install measurement systems on the offshore platform to monitor the power quality of the offshore grid. If a WPO also needs power quality measurements, the data can be shared through a communication interface between TenneT and the WPO('s). One measurement system per 66 kV WPO feeder bay is foreseen (with current measurements per WPO feeder bay and voltage measurement per 66 kV section as input).

### 3.12 VT's and CT's for metering

TenneT will install sufficient VT's and CT's to fulfil all protection and measurement requirements. For a 66 kV feeder bay to the WPO's following designations for CT's and VT's are identified:

1. Accountable measurements;
2. Power Quality measurements;
3. Measurements for wind park control;
4. Protection (string protection, busbar protection).

## 4. Position

Above considerations lead TenneT to the following position:

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With respect to data acquisition on the offshore platform, TenneT aims to share systems with WPO's where possible in order to save on cost, space, weight and power consumption. The data acquisition systems have been described as summarized in Table 2.1 including possibilities for sharing.

TenneT will outsource the shared data acquisition to RWS. RWS will develop a business model. The cost of the shared data acquisition systems will be shared between the users.

Some data systems cannot be shared, TenneT will make available all provisions required for installation and operation of these systems including mounting facilities and auxiliary services .

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## 5. Topic consultation

The expert meeting of November 9, 2015 gives TenneT the opportunity to inform the developers on their position regarding "Data acquisition systems on offshore platform".