Base Load Power Hub (BLPH)

INFORMATION MANAGEMENT PLAN

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1. INTRODUCTION

1.1 PROJECT OVERVIEW

Crosswind, a Shell and Eneco joint venture, was awarded the tender to develop the offshore Hollandse Kust Noord (HKN) wind farm, located 18.5km off the coast of Netherlands near the town of Egmond aan Zee. The consortium plans to have HKN operational in 2023 with an installed capacity of 759MW generating at least 3.3TWh per year. This is sufficient renewable power to supply more than 1 million Dutch households with green electricity.

Offshore wind farms produce intermittent electricity and balancing these dips and peaks and integrating this electricity into the national energy system requires new technologies. For this reason, the offshore wind farm will include several new technologies that could be implemented at full-scale in the future. The new technologies being explored include a floating solar park, a short-duration battery storage as well as long-term storage via green hydrogen produced by water electrolysis and subsequently consumed in a fuel cell. The combination of these individual measures, herein referred to as the Base Load Power Hub (BLPH) will ensure a continuous power supply regardless of the wind situation.

1.1.1 Project Location

The Hollandse Kust Noord (HKN) wind farm is located 18.5km off the coast of the Netherlands near the town of Egmond aan Zee.

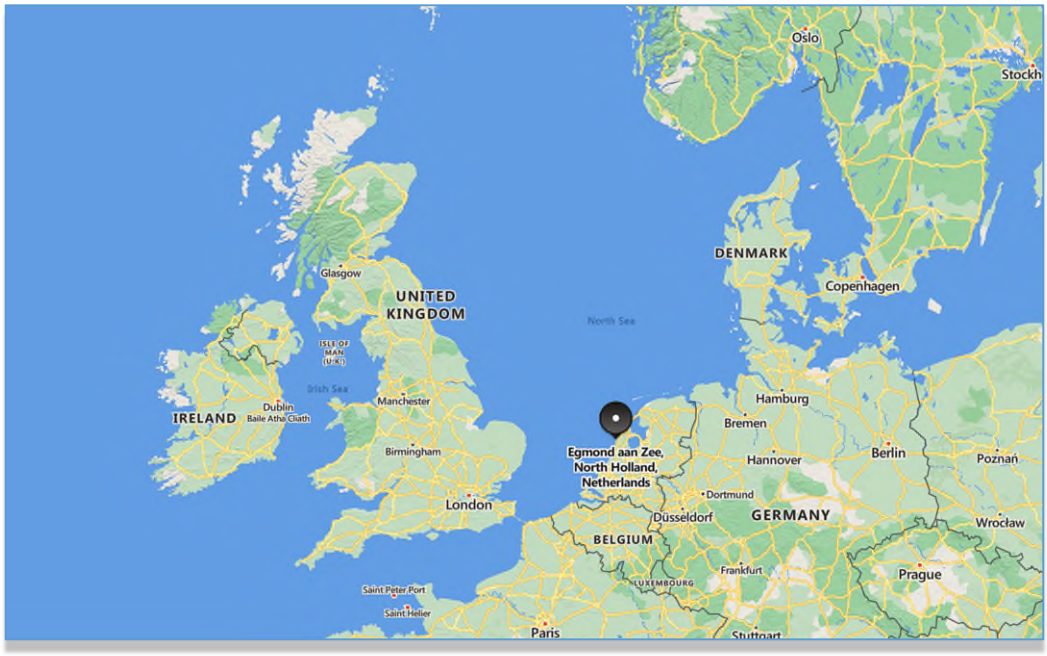


Figure 1 - HOLLANDSE KUST NOORD WIND PARK Location Map

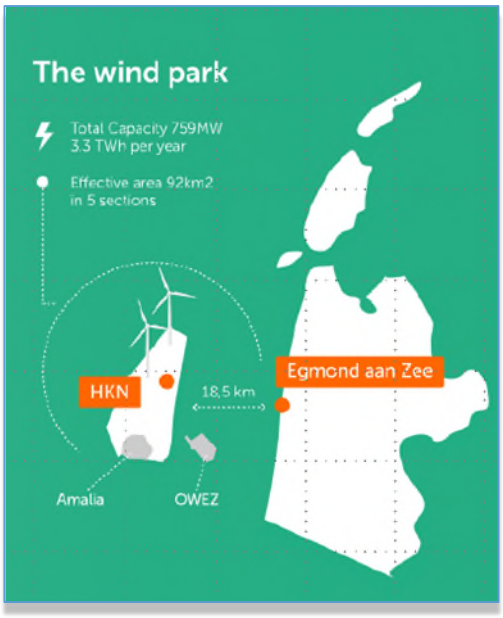


Figure 2 - Wind Park Details

The wind farm will consist of No. 69 x 11.5MW wind turbine generators each to be installed on a dedicated monopile structure. A 70th monopile is located on coordinates E 590719.1, N 5841602.3 and is reserved for installing the platform accommodating the BLPH. The monopile structure was designed and installed by Van Oord Offshore Wind (VooW) and therefore not part of the BLPH scope.

1.1.2 Project Concept

All components included in the BLPH will be integrated onshore on a topsides and installed in an offshore location within the boundaries of the HKN wind farm. At its simplest, the BLPH will store energy during periods of high electricity generation from renewable sources (a wind turbine generator and the floating solar PV farm) and release it during periods of low generation. In practice. It is expected that the energy stored will supplement generation from renewable sources to ensure that at least 1.0MW of power is exported to the electrical grid regardless of wind/solar availability.

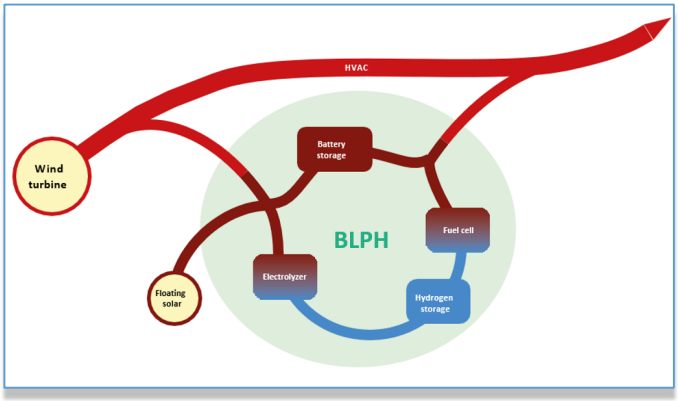


Figure 3 – BLPH Concept

Electricity in the BLPH will be stored in the form of electrons in a battery energy storage system (BESS) as well as converted into green hydrogen via water electrolysis. When the power output from the connecting wind turbine drops to below 1 MWe, the BLPH will return its stored energy to supplement the remaining power output. This will be by discharging the BESS, while stored hydrogen will be converted back into electricity using a fuel cell to extend the discharge duration.

The purpose of the BLPH is to function as a testbed for the integration of energy storage technologies with renewable generation. It is expected that equipment installed on the BLPH will operate as Normally Unmanned Installation for at least two (2) years with no or minimal maintenance and it will have its own independent control room with the ability to communicate with Crosswind's control room.

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2. DOCUMENT SCOPE

Scope of this document is to describe how and when data will be handed over by the CONTRACTOR to the COMPANY, complying with its requirements. during the whole Project and at the end of it.

The overall objective of the COMPANY regarding the Information Management is to ensure that the CONTRACTOR provides COMPANY with the minimum level of information required to effectively manage its assets and business. Good quality information adds value throughout the full lifecycle of the Asset from Project Execution through Operations to Decommissioning.

COMPANY intend to maximise the use of project information by using it in digital systems which will manage and validate all information, enabling improvements in engineering and construction information consistency, enabling quick search capability between all related data and documentation sources, and integrating with other digital systems including 3D models, photogrammetry, Asset, Facility, Operational and Production management systems.

2.1 REFERENCES

Doc. No.	Description
CONTRACT - SECTION V	Scope Description
123A90-PML-DIG-PL-00001	Digital Delivery Execution Plan
123A90-PML-PM-PL-00002	Information Technology Plan and Procedures
123A90-PML-DIG-PRO-00006	Information Quality Management Framework
123A90-PML-PM-RE-00006	Key Performance Indicators
123A90-PML-PM-PRO-00003	Document Control Procedure

Table 1 - Reference Documents

2.2 DEFINITIONS

Term	Description

Table 2 - Definitions and Abbreviations

2.3 ACRONYMS

Acronym	Description
IM	Information Management
MDR	Master Document Register
EPC	Engineering, Procurement, Construction
P&ID	Process & Instrumentation Diagram
DB	Data Base
CTR	Contractor
CPY	Company
EIS	Engineering Information Specification

Table 3 - Acronyms

3. INFORMATION MANAGEMENT STRATEGY

3.1 IM DEFINITION, SCOPE AND OBJECTIVES

Realizing the focal role that Information plays in Project success during EPC Project lifecycle and Plant operations start-up, Contractor has been developing a specific and proper **IM methodology**, exploiting the chance to improve IM processes and optimize the Information lifecycle across the whole EPC value chain, saving time and effort and giving value also to the Company in terms of Information Quality during Handover phase.

The following schema depicts the main **Project areas** that involve **Information exchange** to be monitored within IM scope:



Figure 4 - Information flows between internal areas

IM is defined as the framework that **rationalizes and regulates** all the Information exchange, from Project Start-up phase to the Project Handover one.

As per definition, Information includes:

- Data, composed by all the elementary metadata (e.g., Process design Data, Engineering design Data) that have to be elaborated in order to produce Documents and Models.
- Documents, represents Project deliverables, according to Company requirements and Project features.
- Models, consists in graphic representation of Data (e.g., Process simulation, Engineering 3D model).

Within Contractor business, Information is generated, collected, and managed across the EPC value chain, as illustrated by the scheme below:

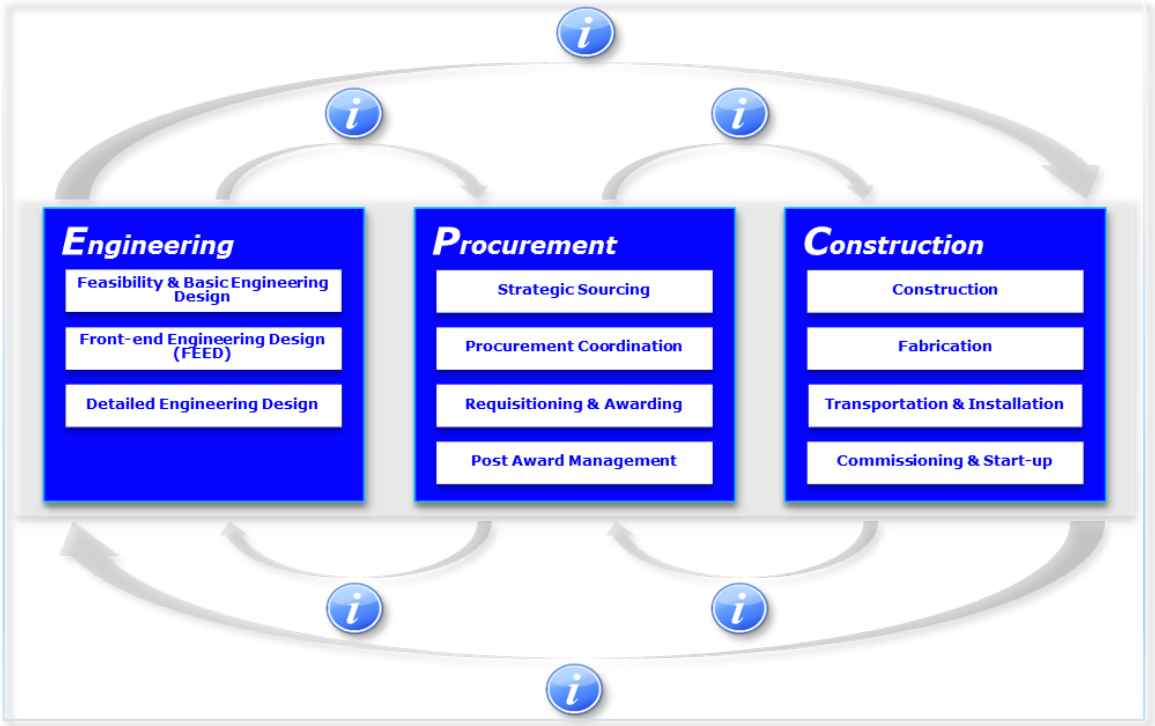


Figure 5 - Information flows across EPC value chain

In accordance with introduced scope, IM has the main target in reaching and ensuring Information Quality, guaranteeing:

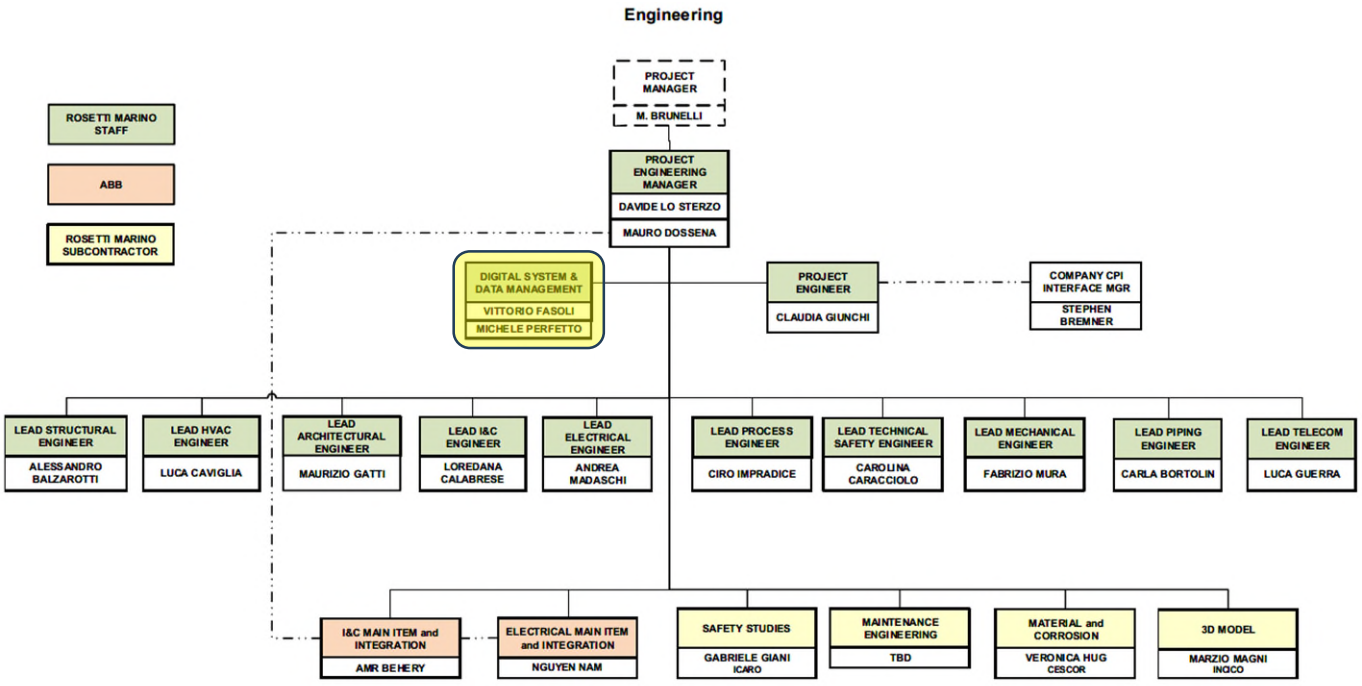
- Integrity, it means that Information is in compliance with Project requirements and features (e.g., Tag Numbering Procedure).
- Consistency, it means that Information content is compliant across all the adopted tools and Project documents.
- Traceability, it means that Information is monitored and tracked during its lifecycle from source system to target location.

IM reaches its mission when Information satisfies these characteristics.

3.2 DIGITAL SYSTEM & DATA MANAGEMENT TEAM

The CONTRACTOR's Digital system & Data management team is accountable of the development, deployment, maintenance of the Digital Platform. The team is also responsible of the user support and of the project data integrity along the whole project life.

Inside CONTRACTOR's organization chart for the Project, the DS&DM team reports to Project Engineering Manager and its activity is strictly interconnected with all the discipline leads, which represent the data source.



4. DATA MANAGEMENT AND DELIVERY

4.1 DATA CONSISTENCY AND DATA QUALITY

CONTRACTOR is responsible for data consistency between the Engineering Database, the Engineering Lists, the P&IDs and the 3D Model.

The 1D/2D/3D Databases will be interconnected leveraging on the Aveva Compare/Update functionality; it is CTR's responsibility to set-up the proper C/U to exchange data across the various modules.

CONTRACTOR shall manage and ensure the quality of the information for all the project life cycle.

The quality assurance will cover information consistency and completeness both for the information included in the system and the information in the deliverable produced by the tool.

As described into the document "Information Quality Management Framework" (ref. 123A90-PML-DIG-PRO-00006), CONTRACTOR will provide COMPANY access to a reporting dashboard for monitoring Data Quality and Data Consistency during the whole project life cycle.

Prior to data handover CONTRACTOR shall ensure AVEVA Platform is not corrupted and does not contain any inconsistencies.

4.2 LESSONS LEARNED

CONTRACTOR has implemented an iterative process to gain lessons learned from past projects and to share them with the new ones, learning from both the positive and the negative experiences.

For the BLPH Project, amongst the lessons learned cominq from the last project completed by the CONTRACTOR, two are the main related to data management:

- To prevent delays in receiving data from vendors, CONTRACTOR has decided to already include the data table required into the Material Requisition documentation.
- To define in detail, together with COMPANY, all the data to be handed over during and at the end of the Project, from its very beginning.

4.3 DATA DELIVERY

4.3.1 DATA

Following Engineering data shall be submitted incrementally throughout the life of Project with below timings:

- Master Tag and Equipment Register (EIS data) – extract from AVEVA Engineering Data Base; first submission within 90 days after Effective Date and then updated on a monthly basis.
- 3D CAD Model Navisworks file – extract from AVEVA Everything3D Data Base; sent on a monthly basis.
- Asset Register – extract from AVEVA Engineering Data Base; first submission: within 6 months after Effective Date and then updated on a monthly basis.

CONTRACTOR will hand over this information suitable for loading into COMPANY Asset and Maintenance Management Systems.

4.3.2 DOCUMENTS

CONTRACTOR will arrange the document transfer to the COMPANY, in line with schedule agreed in the Master Document Register (MDR), digitally submitting incremental set of data and handing over physical records, produced during the execution of the SCOPE (signed original documents, media files, core samples, etc.).

For details about numbering, workflow and schedule, please refer to the "Document Control Procedure" (ref.123A90-PML-PM-PRO-00003) and the MDR.

4.3.3 KPIs

CONTRACTOR will provide COMPANY access, during the whole project life, to the Project reporting dashboard, synchronized with AVEVA Engineering Data Base and structured as described into the document "Information Quality Management Framework" (123A90-PML-DIG-PRO-00006).

Moreover, CONTRACTOR will periodically send to COMPANY all the agreed Project's KPIs, as described into the document "Key Performance Indicators" (123A90-PML-PM-RE-00006), related to cross-functional topics (HSE, Quality and Project Management) such as specific ones like Engineering, Procurement, Construction (included Mechanical Completion) and Commissioning.

4.4 FINAL HANDOVER

CONTRACTOR shall hand over to CPY within two (2) months after Sail Away date, with As Built modifications implemented, the following data:

- AVEVA ENGINEERING database, including all the Engineering lists (for instance):
    - Fluid list
    - Equipment List
    - Pipeline List
    - Valve List
    - Master Tag Register
    - Tag to Document List
- AVEVA DIAGRAMS database (including P&IDs and associated As-Built Catalogue & Specifications and Symbols library).
- AVEVA E3D database, with the 3D CAD Model (including associated catalogue - Piping Classes).
- Project Documents eligible of as-built status in MDR, along with native files as per the "Document Control Procedure" (ref.123A90-PML-PM-PRO-00003).