Base Load Power Hub (BLPH)

NITROGEN GENERATION PACKAGE
ELECTRICAL LOAD LIST

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Table of contents

1 INTRODUCTION 5

1.1 PROJECT OVERVIEW 5

1.1.1 Project Location 5

1.1.2 Project Concept 6

2 DOCUMENT SCOPE 8

2.1 REFERENCES 8

2.2 DEFINITIONS AND ABBREVIATIONS 8

3 ELECTRICAL LOAD LIST 9

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List of Figures

Figure 1 HOLLANDSE KUST NOORD WIND PARK Location Map 5

Figure 2 - Wind Park Details 6

Figure 3 – BLPH Concept 6

List of tables

Table 1 - Reference Documents 8

Table 2 - Definitions and Abbreviations 8

List of Attachments

None

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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.

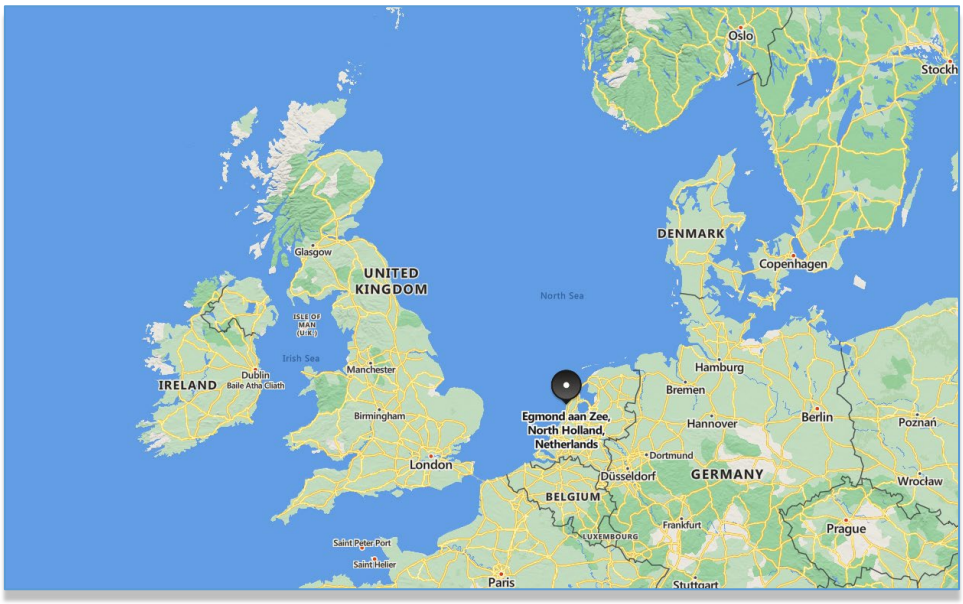


Figure 1 HOLLANDSE KUST NOORD WIND PARK Location Map

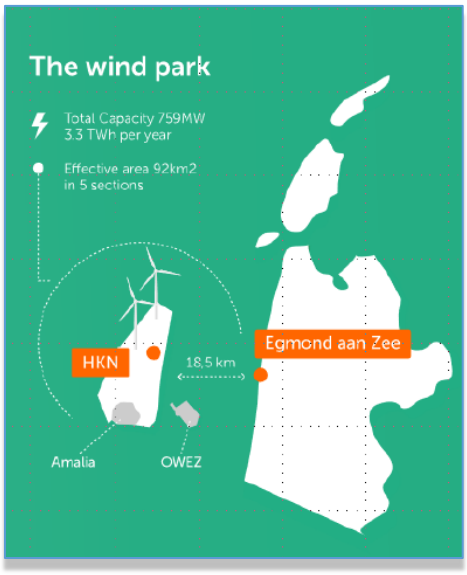


Figure 2 - Wind Park Details

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 located on coordinates E 590719.1, N 5841602.3 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.

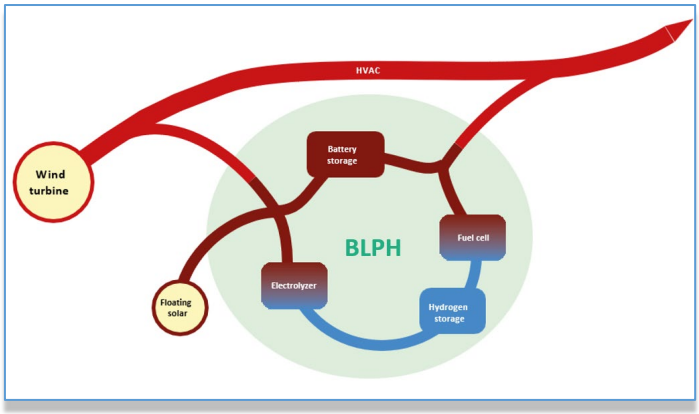


Figure 3 – BLPH Concept

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 s 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

This document identifies any electrical equipment to be fed with its main characteristics.

2.1 REFERENCES

Doc. No.	Description
1724000437-PR-PID-00018	PACKAGE P&ID
1724000437-MAC-DS-00011	EQUIPMENT DATA SHEETS INCLUDING PSA, ETC.

Table 1 - Reference Documents

2.2 DEFINITIONS AND ABBREVIATIONS

COMPANY or Client (CPY):	Crosswind
CONTRACTOR (CTR):	ROSETTI MARINO S.p.A.
PROJECT:	HOLLANDSE KUST NOORD WIND PARK Project

Table 2 - Definitions and Abbreviations

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3 ELECTRICAL LOAD LIST

Equipment	Power Factor	Tag	Power supply	Power	Note
Utilities	1,0		230V-1Ph+N+PE 50Hz	0.5 kW	Not managed by PLC
PLC	1,0	64-LP-001	230V-1Ph+N+PE 50Hz (UPS)	1,0 kW	
Solenoid valve		64-XY-051	24VDC	15 W	power supply is managed directly by the UCP
Solenoid valve		64-XY-052	24VDC	15 W	power supply is managed directly by the UCP
Solenoid valve		64-XY-053	24VDC	15 W	power supply is managed directly by the UCP
Solenoid valve		64-XY-054	24VDC	15 W	power supply is managed directly by the UCP
Solenoid valve		64-XY-055	24VDC	15 W	power supply is managed directly by the UCP
Solenoid valve		64-XY-056	24VDC	15 W	power supply is managed directly by the UCP
Solenoid valve		64-XY-057	24VDC	15 W	power supply is managed directly by the UCP
Solenoid valve		64-XY-058	24VDC	15 W	power supply is managed directly by the UCP
Solenoid valve		64-XY-059	24VDC	15 W	power supply is managed directly by the UCP
Pressure Transmitter		64-PIT-051	24VDC	0.5 W	power supply is managed directly by the UCP
Pressure Transmitter		64-PIT-052	24VDC	0.5 W	power supply is managed directly by the UCP
Pressure Transmitter		64-PIT-053	24VDC	0.5 W	power supply is managed directly by the UCP
Pressure Transmitter		64-PIT-057	24VDC	0.5 W	power supply is managed directly by the UCP
Pressure Transmitter		64-PIT-059	24VDC	0.5 W	power supply is managed directly by the UCP
Differential Pressure Transmitter		64-PDIT-056	24VDC	0.5 W	power supply is managed directly by the UCP
Oxygen Analyzer		64-AIT-051	24VDC	0.5 W	power supply is managed directly by the UCP

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