Base Load Power Hub (BLPH)

INSTRUMENT AIR PACKAGE A-63000

SPARE PARTS LIST (2 YEARS AND COMMISSIONING & START-UP)

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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.

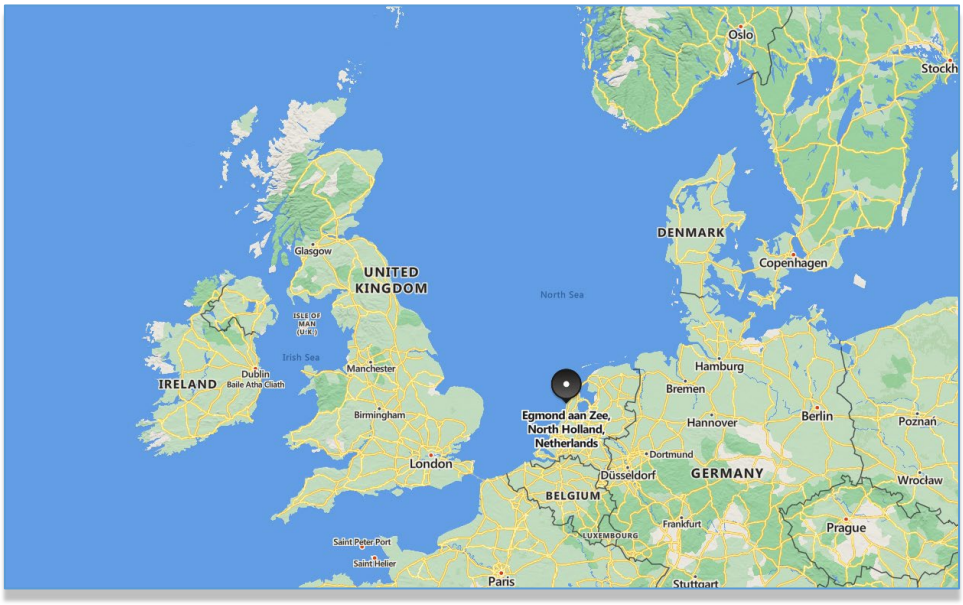


Figure 1 HOLLANDSE KUST NOORD WIND PARK Location Map

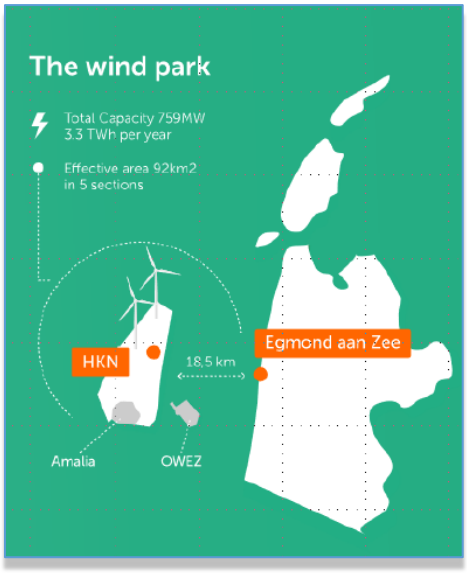


Figure 2 - Wind Park Details

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.

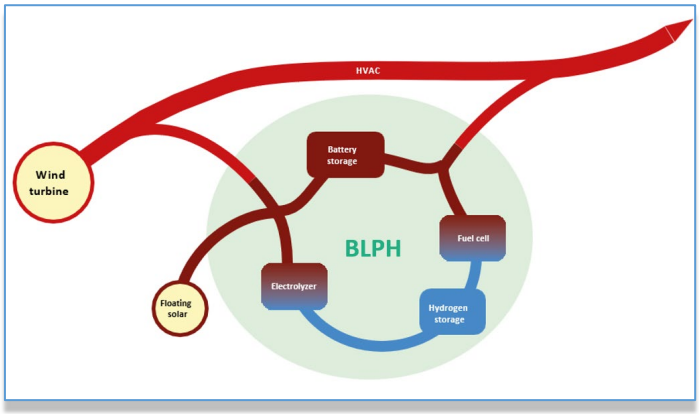


Figure 3 – BLPH Concept

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
1724000428-PR-PID-00019	PACKAGE P&ID
1724000428-MAC-DA-00005	CERTIFIED PACKAGE GENERAL ARRANGEMENT AND DIMENSIONAL OUTLINE DRAWINGS (INCLUDING : NAMEPLATE, BASEFRAME, FOUNDATION LOADS, NOZZLES LOADS, NOZZLES LIST, BATTERY LIMITS, CoG)
1724000428-MAC-DS-00011	EQUIPMENT DATA SHEETS INCLUDING MOTORS, AIR COMPRESSOR, DRYERS, 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 COMMISSIONING & START-UP SPARE PARTS

Description	Valid for	Equipment TAG	Reference drawing	Material	Dimensions	Supplied quantity	Coes code
Set of piping gaskets	Complete package	A-63000	1724000428-MAC-DD-00008	AISI 316 + GRAPHITE	1" ANSI 150	1 PC	C3052
				AISI 316 + GRAPHITE	1.1/2" ANSI 150	1 PC	C3127
				AISI 316 + GRAPHITE	2" ANSI 150	5 PCS	C2416
				AISI 316 + GRAPHITE	2" ANSI 300	1 PC	D2662
				AISI 316 + GRAPHITE	DN50 PN16	1 PC	E3404
Set of gaskets for valves	Complete package	63-XV-055, 056, 057, 058, 059, 060	1724000428-PR-PID-00019	PTFE	2" ANSI 150	6 PCS	L7086

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4 2-YEARS SPARE PARTS

Description	Valid for	Equipment TAG	Reference drawing	Material	Dimensions	Supplied quantity	Coes code
Set of gaskets for valves	Complete package	63-XV-055, 056, 057, 058, 059, 060	1724000428-PR-PID-00019	PTFE	2" ANSI 150	12 PCS	L7086
Set of filter elements & gaskets	Prefilters	S-63001A S-63001B	1724000428-PR-PID-00019	MICROFIBER	Ø55 x 250mm	4 PCS	2842
				AISI 316 + GRAPHITE	6" ANSI 150	4 PCS	D2659
Set of filter elements & gaskets	Afterfilters	S-63002A S-63002B	1724000428-PR-PID-00019	MICROFIBER	Ø55 x 250mm	4 PCS	2842
				AISI 316 + GRAPHITE	6" ANSI 150	4 PCS	D2659
Set of gaskets	Air receiver	V-63001	1724000428-MAC-DD-00006	AISI 316 + GRAPHITE	24" ANSI 150	2 PCS	C3128
				AISI 316 + GRAPHITE	3" ANSI 150	4 PCS	C3125
				AISI 316 + GRAPHITE	1" ANSI 150	8 PCS	C3052
				AISI 316 + GRAPHITE	2" ANSI 150	2 PCS	C2416
				AISI 316 + GRAPHITE	1.1/2" ANSI 150	4 PCS	C3127
Maintenance kit	Air compressor	K-63001A K-63001B	1724000428-PR-PID-00019	MICROFIBER	N.A.	2 PCS	L7216

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