Base Load Power Hub (BLPH)

SPARE PART INDEX REGISTER (SPIR) - HYDROGEN VENT

Document Number: 1724000887-COM-LIS-00016

ROSETTI MARINO	
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Sign	Date
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Revision / Change Log

Rev.	Description
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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.

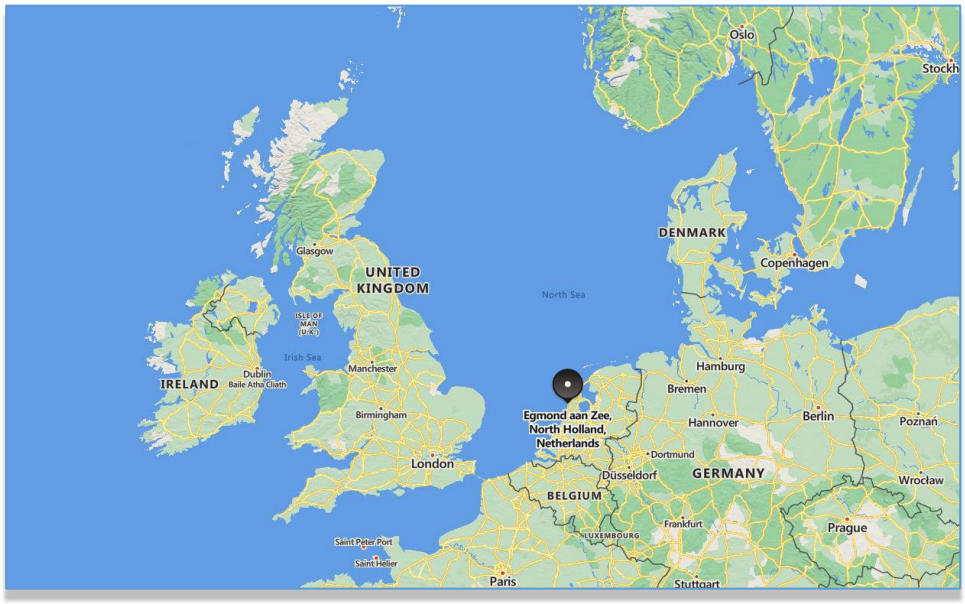


Figure 1 HOLLANDSE KUST NOORD WIND PARK Location Map



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.

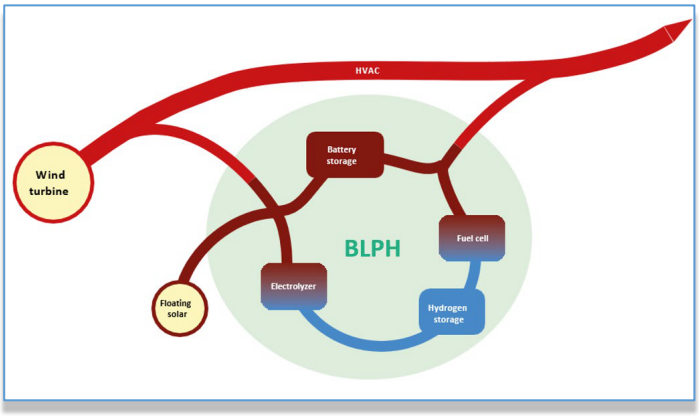


Figure 3 – BLPH Concept

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 includes the Spare Parts both for Commissioning and 2 years.

2.1 REFERENCES

Drawing No.	Rev.	Description	Notes
1724000887-MAC-DA-00003	02	GENERAL ARRANGEMENTS DRAWINGS, INCLUDING FOUNDATION LOADS-HYDROGEN VENT	NA
1724000887-MAC-DD-00005	01	DETAILED DRAWING WITH PART LIST - HYDROGEN VENT	NA
1724000887-MAC-CA-00004	02	MECHANICAL CALCULATION – HYDROGEN VENT	NA

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 1 - Definitions and Abbreviations

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SPARE PARTS LIST

ROSETTI MARINO

CROSSWIND

Document Title: **Commissioning and 2 years spare parts list**

The document relates to: **HOLLANDSE KUST NOORD WIND PARK Project - Base Load Power Hub (BLPH)**

Contract: **CW-I-WP4-2023-05**

Project ID	Doc. n°	Rev.	Rev. Date	Status	Class
123A90	**1724000887-COM-LIS-00016**	**Issued for Information**	26/11/2024	**IFI**	**3**

The equipment consists of the following units/components

1 Tag no.	n.a
2 Tag description	hydrogen vent
3 Manufacturer model/type no.	n.a
4 Manufacturer serial no.	-
5 No. of units	1
6 Quantity of parts FITTED / INSTALLED per unit/component	

Supplier: ENCORE THERMOENGINEERING SRL

PO Number: 1721002632

PO hydrogen vent

Contact Silvio Dagoberti

Address: Sede legale: Via San Damiano 9, 20122 Milano – Sede operativa: Via Cavriana 9, 20134 Milano

Supplier +39 02 30560114

Contact +39 327 9778080

E-mail: aftermarket@encorecombustion.com

WEB SITE

General Information:

MATERIALS DATA																					Commissioning spares	2 Years spares	
Item Number (total number of identical spares installed)		Description of recommended spare parts	Parts/drawing ref.			Material	Certificate Type (if applicable)	Certificate Reference (if applicable)	Shelf life (years)	Weight (net)	Weight (gross)	Volume	HS Code	ECCN Code	% US Content	Country of origin	Supplier part no.	Manufacturer part no.	Manufacturer name	Quantity ordered	Quantity ordered	Remarks
			Project Datasheet no.	Project Detail dwg. no.	Item ref.																		
7		8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	
1	1	GASKET	NA	1724000887-MAC-DD-00005	22	GASKET SHALL BE STAINLESS STEEL, SPIRAL WOUND, GRAPHITE FILLED, EPOXY-COATED CARBON STEEL CENTERING RING AND STAINLESS STEEL INNER RING.													TICI SRL	1	1		
2	1	STUD BOLT AND 2 NUTS	NA	1724000887-MAC-DD-00005	23	SA-193.B7/SA194.2H (HDG)													TICI SRL	1	1		
3	1	HEX BOLT	NA	1724000887-MAC-DD-00005	52	CS(HDG)													TICI SRL	1	1		
4	1	HEX NUT	NA	1724000887-MAC-DD-00005	53	CS(HDG)													TICI SRL	1	1		
5	1	GASKET	NA	1724000887-MAC-DD-00005	102	GASKET SHALL BE STAINLESS STEEL, SPIRAL WOUND, GRAPHITE FILLED, EPOXY-COATED CARBON STEEL CENTERING RING AND STAINLESS STEEL INNER RING.													TICI SRL	1	1		
6	1	STUD BOLT AND 2 NUTS	NA	1724000887-MAC-DD-00005	103	SA-193.B7/SA194.2H (HDG)													TICI SRL	2	2		
7	1	NUT	NA	1724000887-MAC-DD-00005	107	AISI316													TICI SRL	1	1		
8	1	HEX BOLT	NA	1724000887-MAC-DD-00005	116	AISI316													TICI SRL	1	1		
9	1	GRATING FIXING CLAMPS	NA	1724000887-MAC-DD-00005	237	CS													TICI SRL	4	4		
10	1	BOLT	NA	1724000887-MAC-DD-00005	238	8,8													TICI SRL	1	1		
11	1	HEX NUT	NA	1724000887-MAC-DD-00005	239	8													TICI SRL	1	1		
12	1	WASHER	NA	1724000887-MAC-DD-00005	240	CS													TICI SRL	1	1		
13	1	HEX HEAD BOLT	NA	1724000887-MAC-DD-00005	241	8,8													TICI SRL	5	5		
14	1	HEX HEAD NUT	NA	1724000887-MAC-DD-00005	242	8													TICI SRL	5	5		
15	1	FLAT WASHER	NA	1724000887-MAC-DD-00005	243	CS													TICI SRL	5	5		
16	1	HEX HEAD BOLT	NA	1724000887-MAC-DD-00005	244	8,8													TICI SRL	1	1		
17	1	HEX HEAD NUT	NA	1724000887-MAC-DD-00005	245	8													TICI SRL	1	1		
18	1	FLAT WASHER	NA	1724000887-MAC-DD-00005	246	CS													TICI SRL	1	1		
19	1	LADDER CLIP	NA	1724000887-MAC-DD-00005	247	EN10025 S275 JO													TICI SRL	1	1		
20	1	HEXAGONAL HEAD BOLT	NA	1724000887-MAC-DD-00005	408	8,8													TICI SRL	1	1		
21	1	TYPE G- HEXAGONAL HEAD BOLT	NA	1724000887-MAC-DD-00005	409	8,8													TICI SRL	1	1		
22	1	HEXAGONAL NUT	NA	1724000887-MAC-DD-00005	410	8													TICI SRL	1	1		
23	1	FLAT WASHER	NA	1724000887-MAC-DD-00005	411	CARBON STEEL													TICI SRL	1	1		