Base Load Power Hub (BLPH)

HANDLING, PACKING, SHIPPING, STORAGE AND PRESERVATION PROCEDURE

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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.

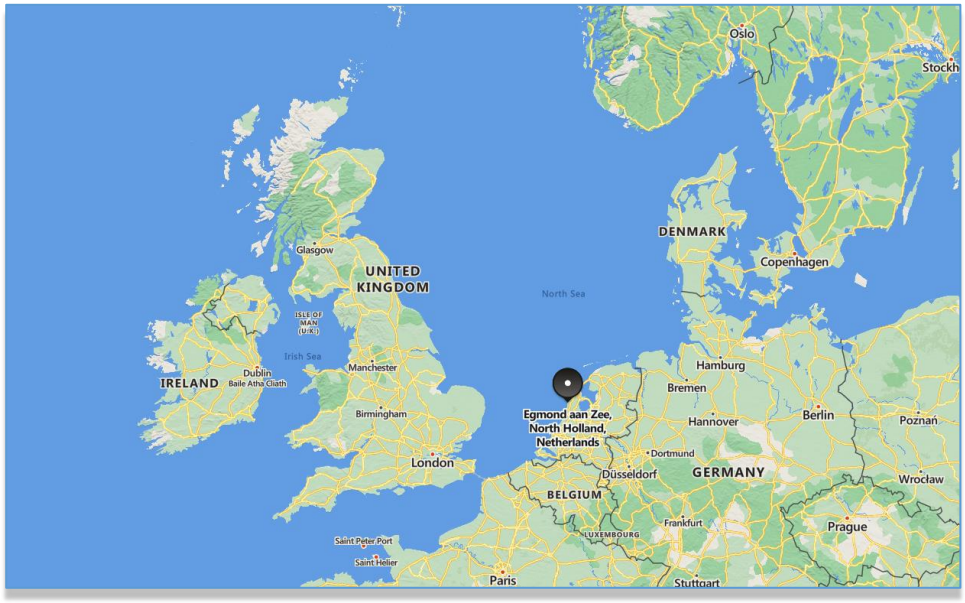


Figure 1 HOLLANDSE KUST NOORD WIND PARK Location Map



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.

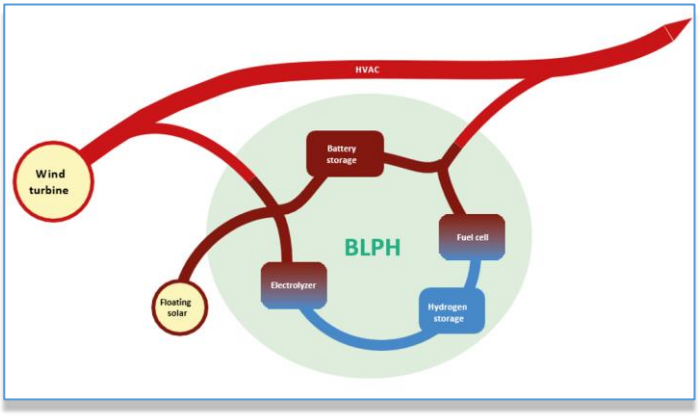


Figure 3 – BLPH Concept

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

The loading and unloading of the material must be carried out to ensure the integrity of the material during all phases of handling, positioning and fixing. The loading and unloading can be carried out by crane or forklift, the choice is dictated by the characteristics of the material and the type of transport vehicle / container sent for loading.

2.1 DEFINITIONS AND ABBREVIATIONS

Table 1 - Definitions and Abbreviations

3 GENERALITY

3.1 LIABILITY

The loading responsibility and the risk is related to the Inconterms® 2010 rules indicated in the contract. It might be on Seller's or on Buyer's charge, in accordance with the Incoterms rule chosen.

The unloading responsibility and risk is always up to the Buyer.

4 PACKING TYPES

4.1 PACKING FOR TRUCK ("DOMESTIC PACKING").

The domestic package is required for transport by truck. It consists of a polyethylene sac that has the purpose to protect the material from the dust, but not from the water or humidity.

4.2 SEAWORTHY PACKING

The seaworthy packing is a case or a crate that has the purpose to protect the material during the sea freight.

This packing is made according to the Customer's Specification if any, otherwise according to our Specification ST-PACKINGS, rev. 4 dated 06/2017

4.3 AIR PACKING

The air packing is a case or a crate that has the purpose to protect the material during the air freight.

This packing is making according to the Customer Specification if any, otherwise according to our Specification ST-PACKINGS, rev. 4 dated 06/2017

Oversize material can be shipped by air freight without packing, but this must be agreed with the Airline Company.

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5 MEANS OF TRANSPORT TYPES

5.1 CLASSIFICATION

For the transport is possible to use the following means of transport:

- Open truck (using tarpaulin to cover the material)
- Canvas covered truck
- Open top container
- Box or high cube container

The choice of the means of transport is strictly related to the type and size of packing.

6 LOADING AND UNLOADING INSTRUCTIONS

6.1 GENERALITY

Loading and unloading of the material depends on the type of packing and on the type of vehicle.

6.2 LOADING OF THE DOMESTIC PACKING

Material with a domestic packing can be loaded only on a truck.

The loading on the truck of the material with a domestic packing must be carried out from the top, by or bridge crane hanging up the 4 eye bolts fixed on the transformer top, using chains.

The transformer must be properly fastened at the truck bed with suitable belts or chains: n. 4 for each transformer.

It's absolutely forbidden to lay or to put nearby any object on the transformer. The transformer can absolutely not be transshipped.

For cast-resin transformer only:

The transformer must be placed on the truck being with its longer side in direction-of-travel and may absolutely not be placed in the opposite direction.

The transformer unloading must be carried out strictly by crane or bridge crane. The lifting procedure consider to use chains long enough to obtain an angle of 60°, not bigger. It is not advisable to use forklift for the unloading operation.

The material must be covered during the transport and if the transformer height allows it, it is advisable to use a truck with canvas cover instead of covering the transformers itself with tarpaulin.

6.2.1 Drawing for unloading and handling of a domestic packing

Transformer without enclosure



Transformer with enclosure.



Remove the plate in the center of the roof and hang up the 4 eye bolts fixed on the transformer top, using chains.

6.3 LOADING OF THE SEAWORTHY AND AIR PACKING

Material with a domestic packing can be loaded on a truck or on a container. Loading and unloading activities of the seaworthy packing can be performed both by crane or bridge crane and forklift. In this case the choice of the means of transport is linked to the size and weight of packages.

The maximum dimension for canvas covered vehicles are m 12,60 x 2,40 x 2,50, Besides these dimensions, it's necessary to use a platform truck.

We strongly recommend you to cover the packages during the transport in order to preserve the packaging as longer as possible.

6.3.1 Loading and unloading of an Open top Container

For loading and unloading of Open Top Containers, both 20' and 40', it's mandatory to use crane or bridge cranes, since the operations are carried out from the top of the container.

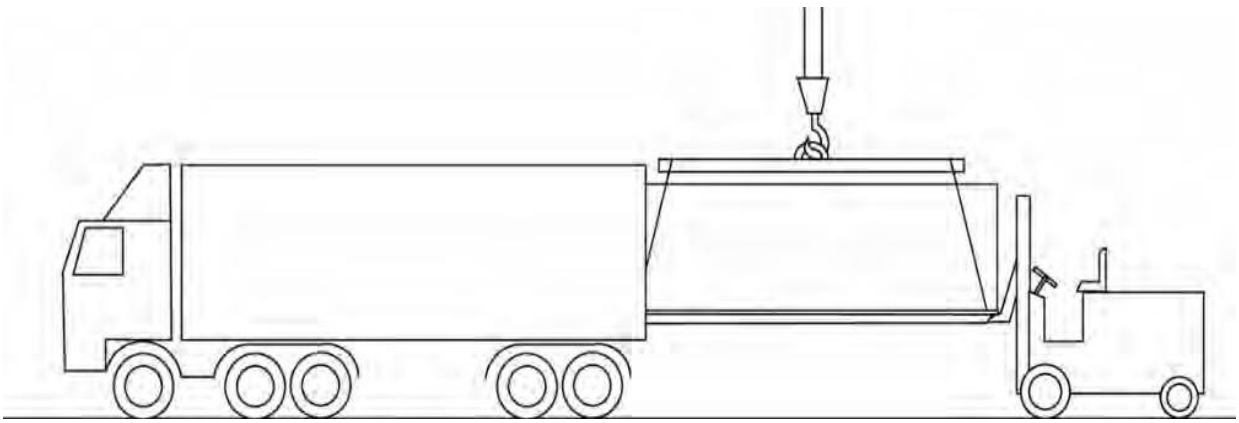
For operation such as opening and closing the container cover tarpaulin, it is required the use of PPE, for example platform lift or special stairs.

6.3.2 Loading of a Box Container

The loading can be carried out by forklift only or by combined lifting equipment. The choice of the best loading method is related to the size and the weight of the package and to the lifting force of the equipment.

Find below some drawings of the combined lifting and forklift lifting.

Combined lifting



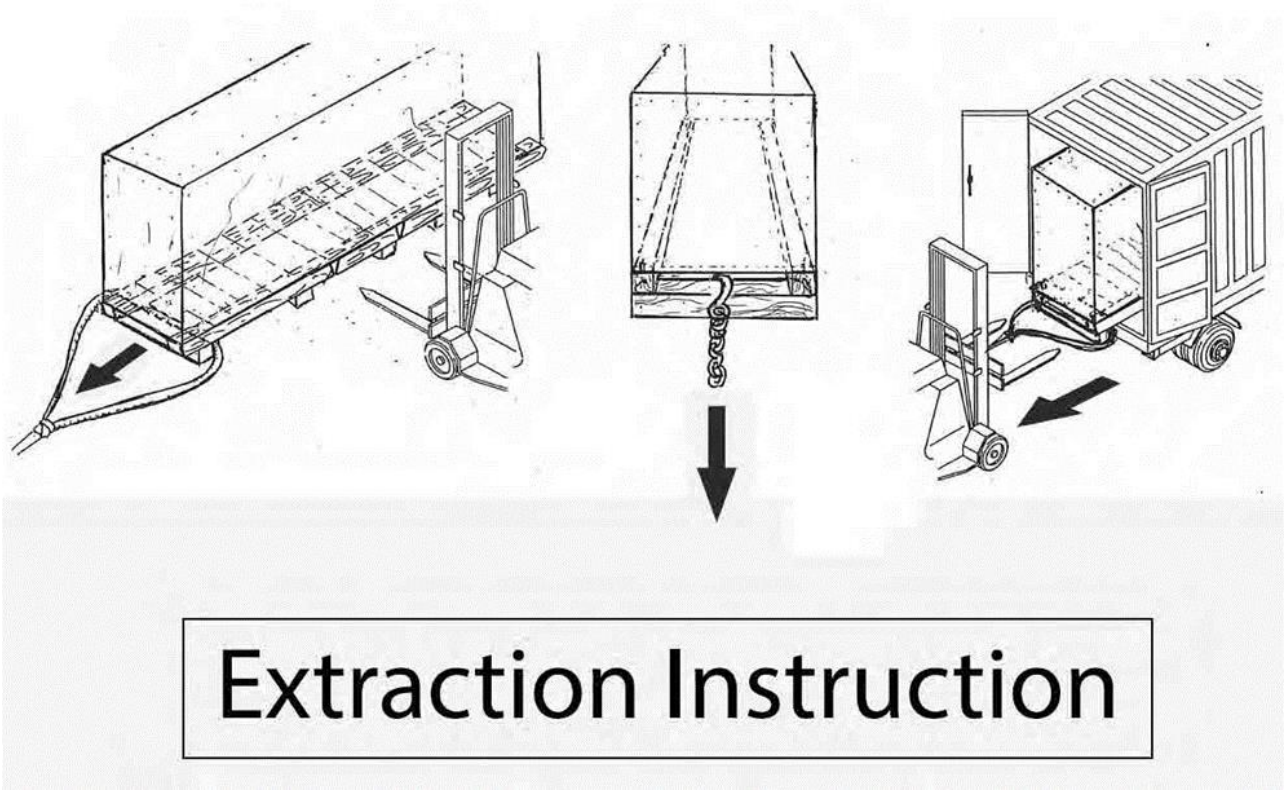
Forklift lifting



6.3.3 Box container unloading

Unloading activities can be carried out following the directions shown in the drawing below. It can be used bands or hooks that allow easy emptying of this kind of container.

Drawing of box container unloading

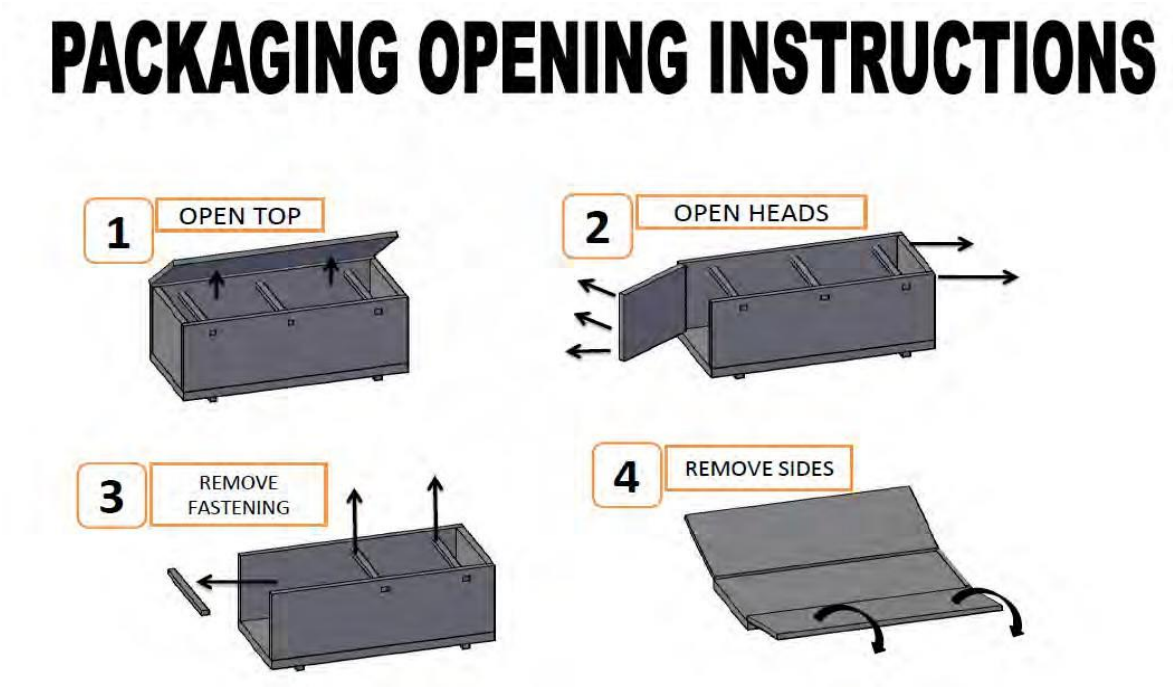


7 UNPACKING

7.1 SCHEME

The opening activities of a packaging must follow the scheme below.

The opening stages must be chronologically respected to avoid any possible damage to the material contained in the packaging.



8 STORAGE

8.1 DOMESTIC PACKING

The material must be stored in a dry and covered place that assures protection against water and dust. The storage temperature must not be lower than -25°C

8.2 SEAWORTHY PACKING

If the material is stored in an open area, the packaging is guarantee for 6 months.

If the material is stored in a dry and covered place that assures protection against water, the packaging is guarantee for 12 months. The storage temperature must not be lower than -25°C

8.3 AIR PACKING

The material must be stored in a dry and covered place that assures protection against water and dust. The storage temperature must not be lower than -25°C

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