Ports Energy and Carbon Savings

Deliverable 3.11.5

* Installation Report Floating unit

* Preliminary testing report about floating trial in the Port of Oostende

Project No. 2S03-009

With the financial support of

Author

NAME	ORGANISATION
Ing. Timmerman Yvon	Blue Power Synergy

Revision history

REVISION	DATE	AUTHOR	ORGANISATION	DESCRIPTION
	20/06/2021	YT	BPS	Original

Table of contents

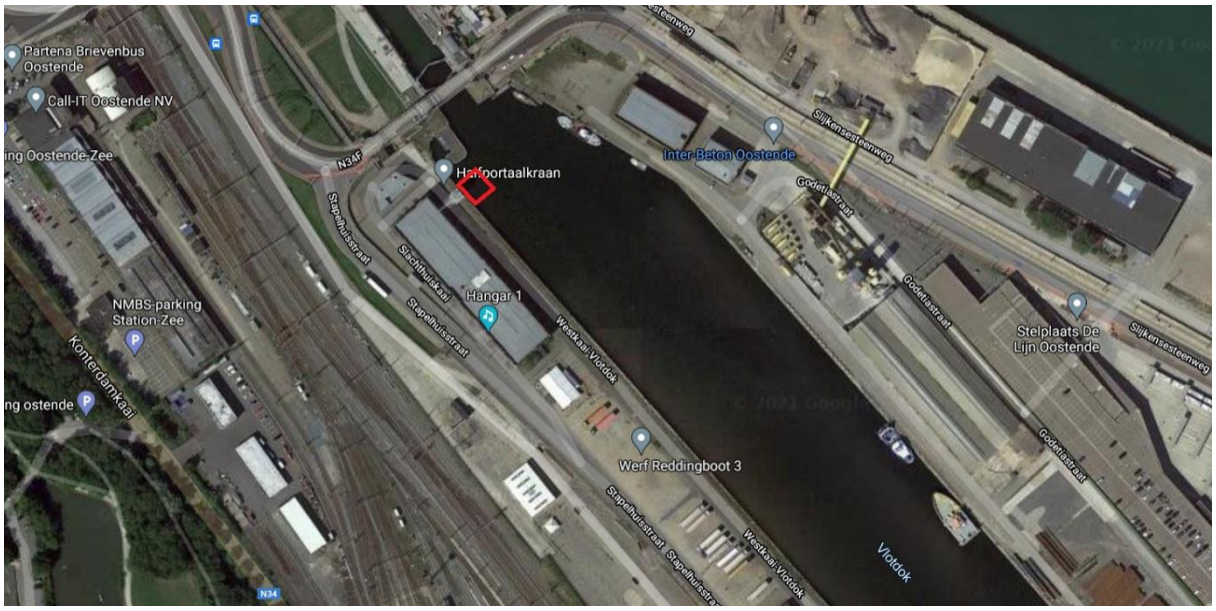
1. Introduction

This report explains the installation of the unit on location H1 in the Port of Ostend.

2. Installation on location H1 Ostend

2.1. Location:

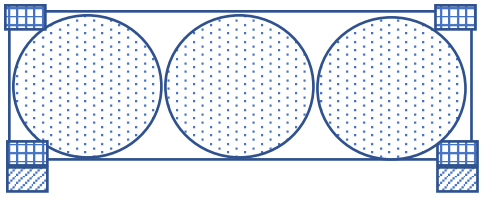
For the floating test the location in 'Vlotdok' was chosen. This so the installation mooring would not have the influence of tides. This was a last minute location change with Hellevoetsluis not being able to deliver the original testing location due to internal issues + COVID 19 crisis that further delayed everything. A location in the front-port of Ostend was studied, but due to the last minute push to still realize the floating tests, choices needed to be made to act fast. On Location H1 a Go could be realized fast with Port authorities while front port needed anchorage works which would implement Federal and Provincial procedures for which the project had no time for.



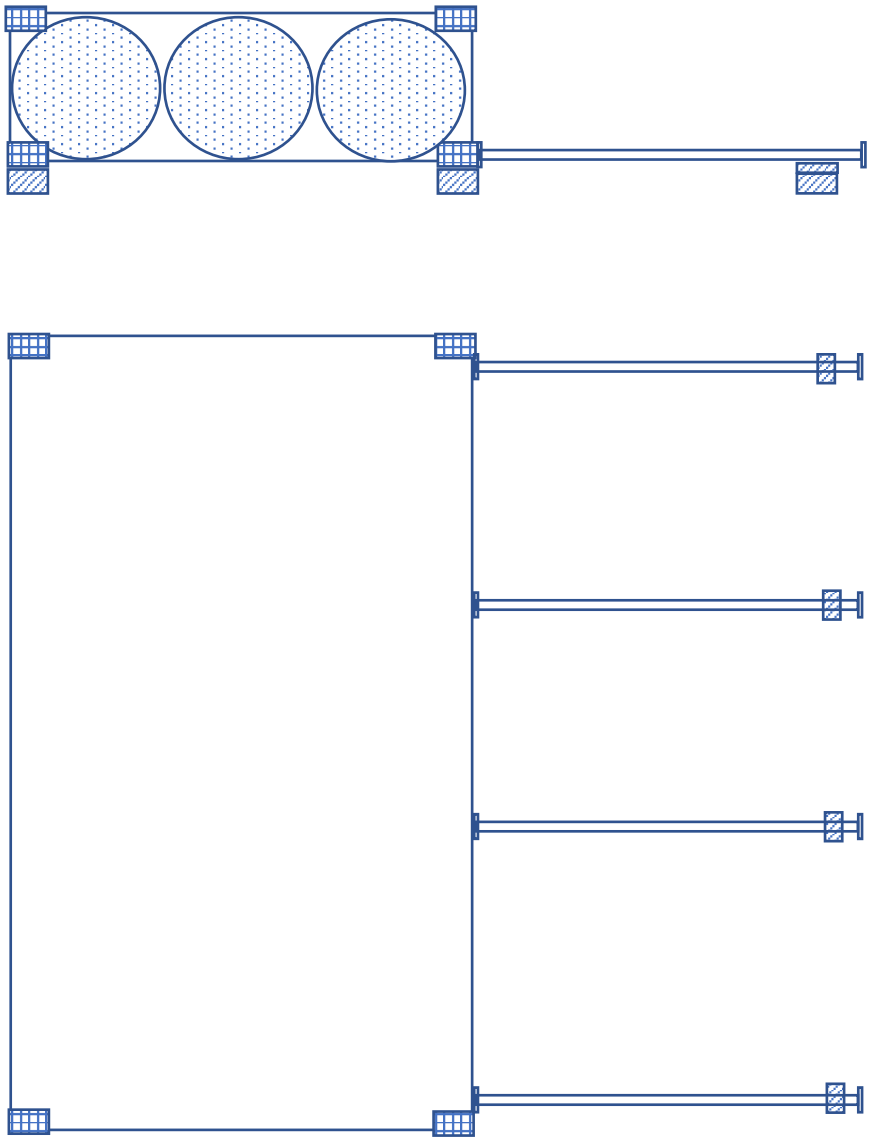
2.2. Installation

The modular construction of the unit makes the assembly easy and fast.

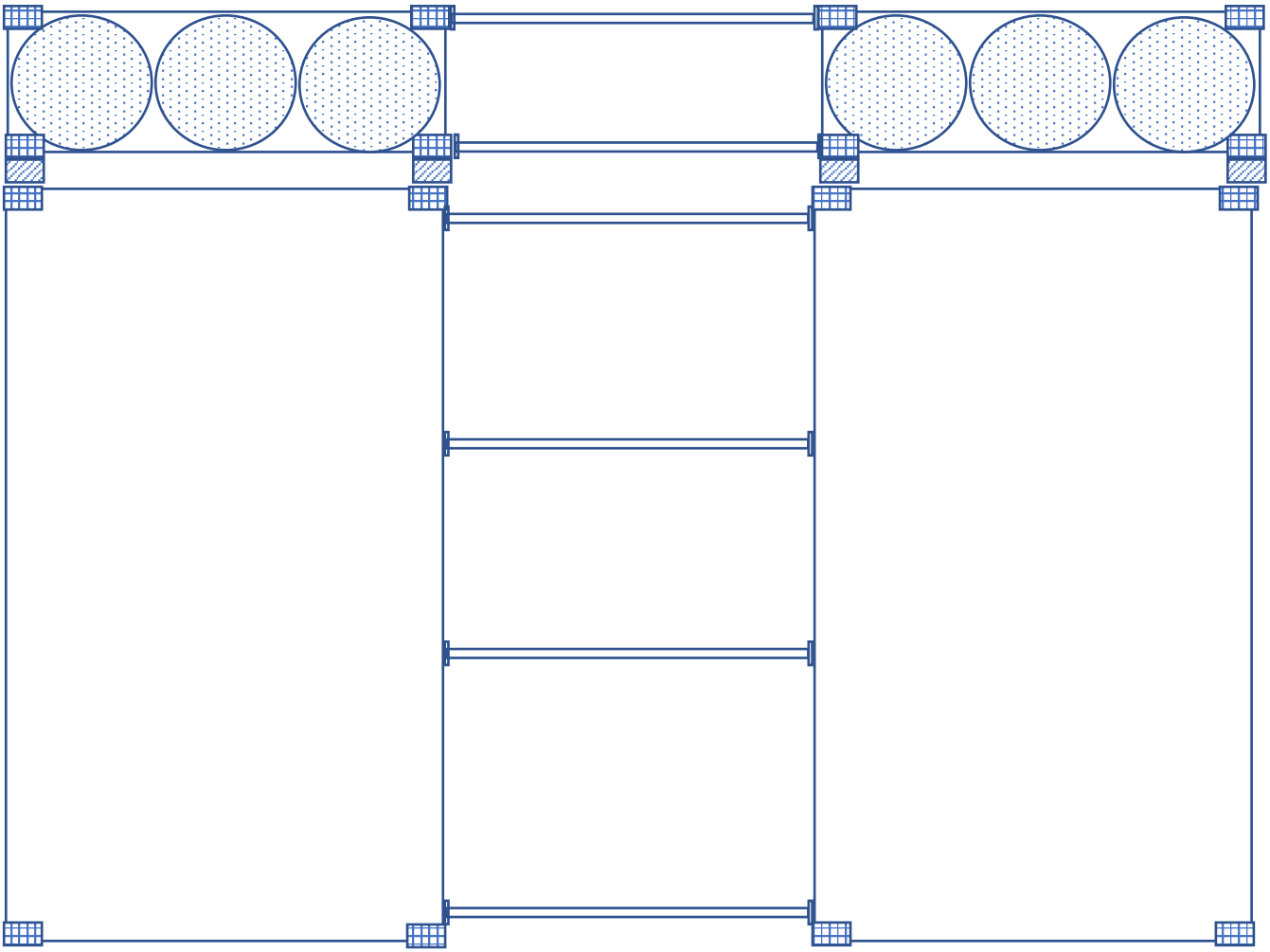
First step was to place the first pontoon container level on the ground on location.



Next the lower row of connecting sections between the pontoon are placed in their position (4). The upper 4 are set ready nearby for further assembly.



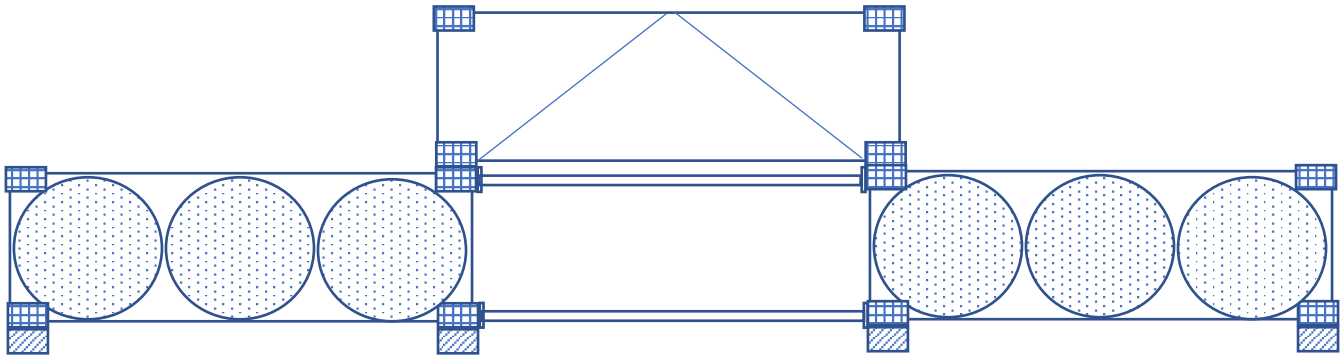
Then the second pontoon container is placed in position parallel with the first with the exact distance of the connecting rods. While still hung on the crane the connecting rods are bolted and fixed. This is done by starting on one side and moving graduately to the other. First making sure all sections are placed with long bolts. Once all pieces are in place these long bolts are replaced with smaller ones and everything fixed tight.



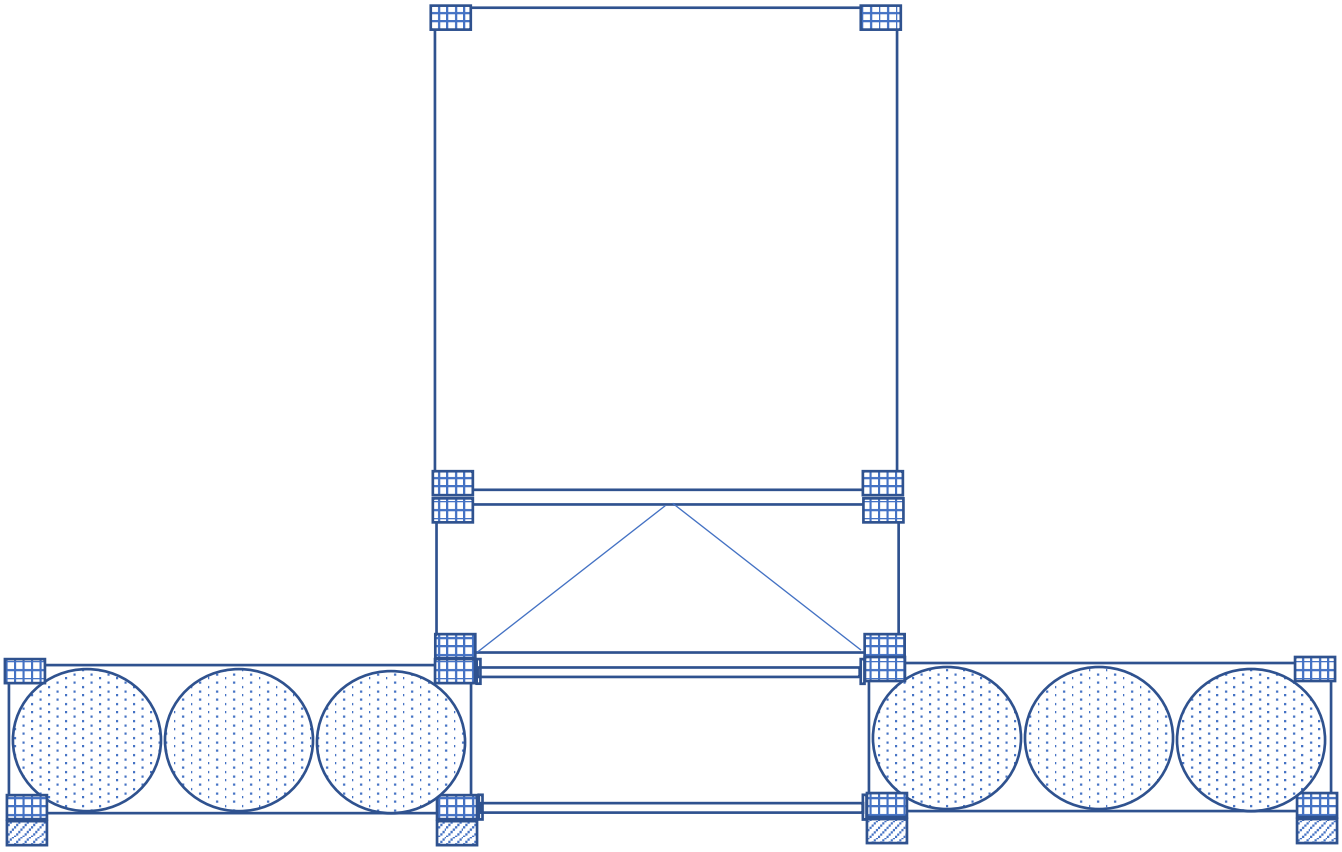
As the pontoon base is finished it can be placed in the water by use of crane.

Once in the water the pontoon is moored. 2 Springs + fore and aft mooring rope.

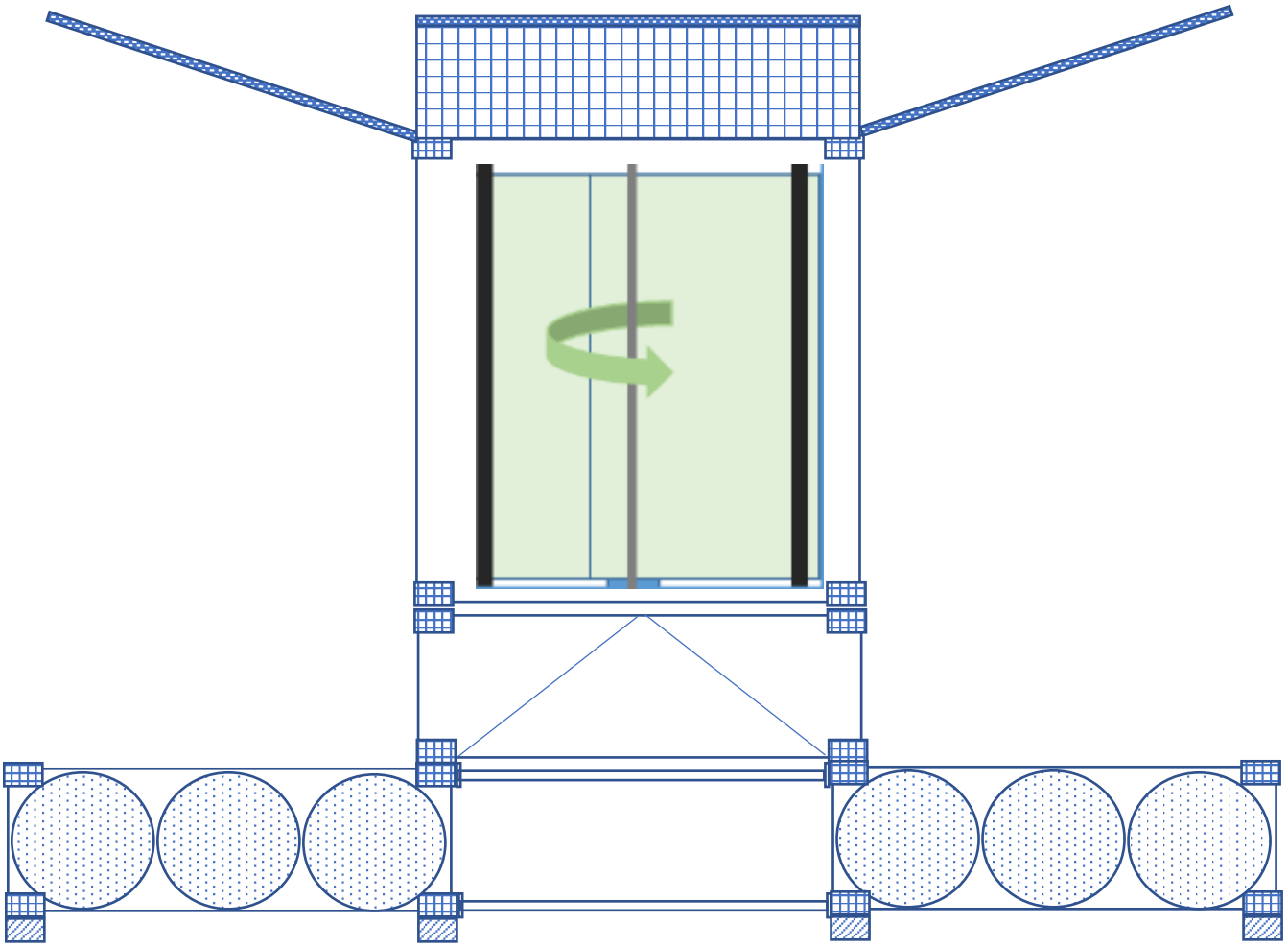
Next step: The energy container assembly.
For this we start by taking the technical container and placing it on its blocks on the pontoon.
During this operation we noticed more flex in the middle than intended. This was noted, the adjustable crossbeams need to be tightened. This was planned and done the next day as it would not affect further assembly.



Now that the base is placed we continue to the last container.
Finally the last piece, the energy container, is lifted and placed on top of the technical container.



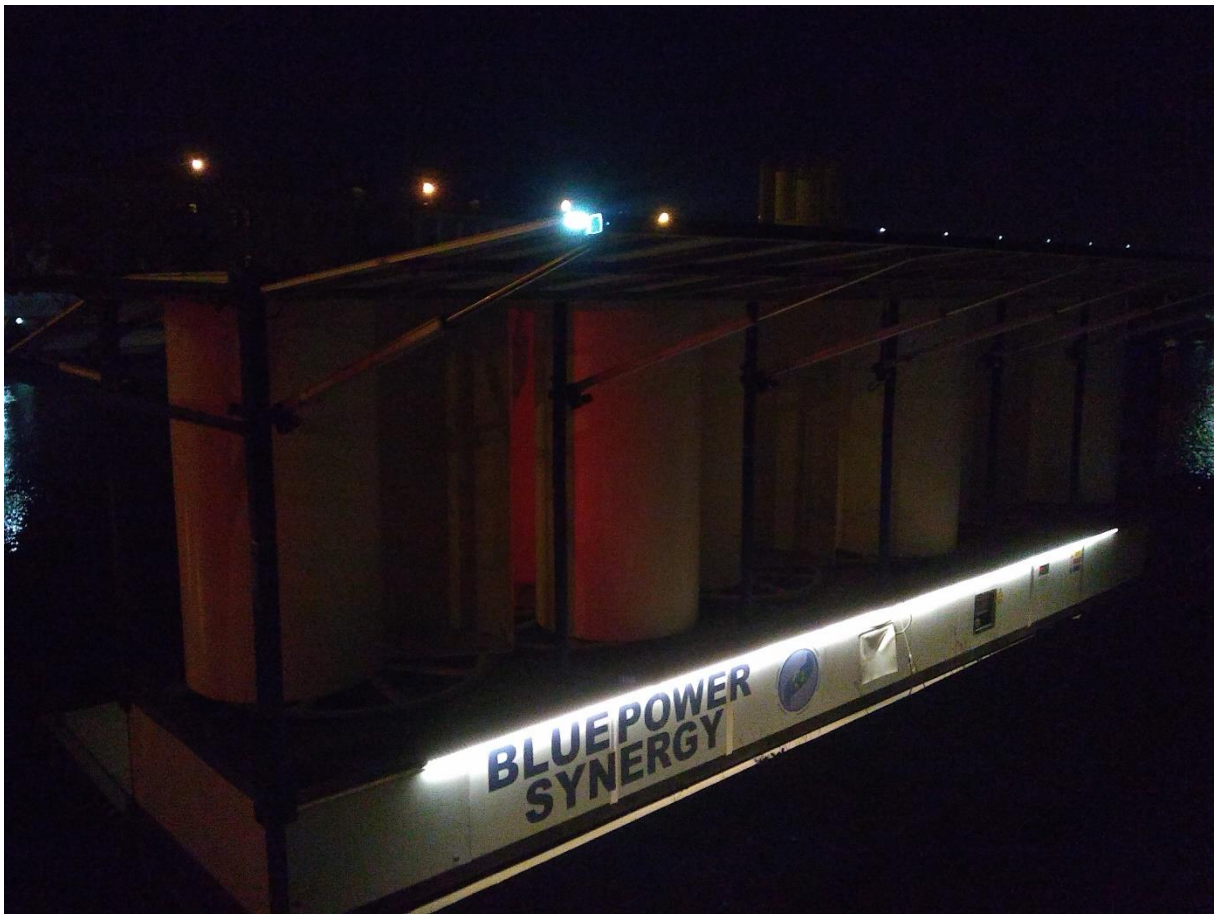
With all components in place the crane packs up and goes to his next job of the day. Last thing to do now is the opening of the container



2.3. Pictures:

Closed container:

Open assembly:

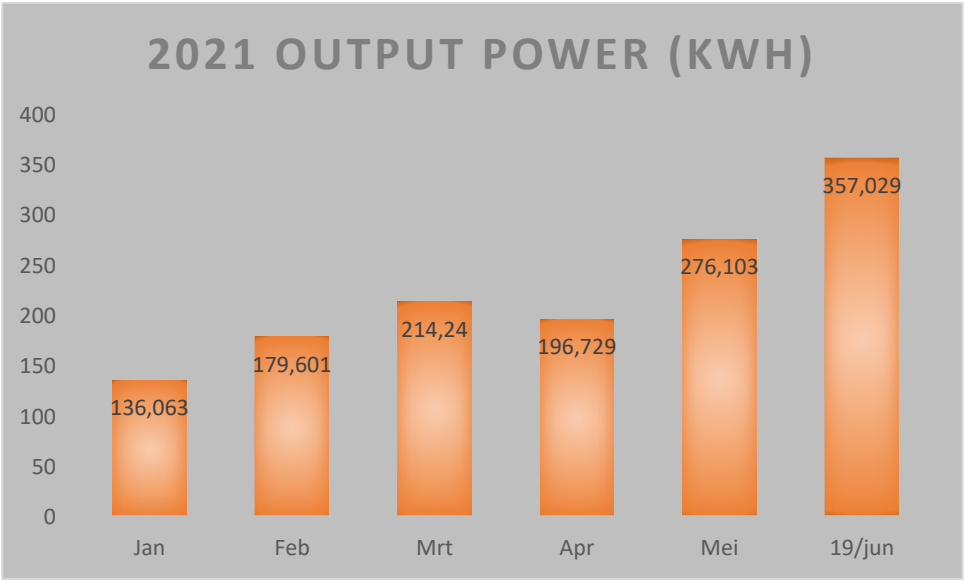


3. Pre-testing report about the first trial in the Port of Oostende

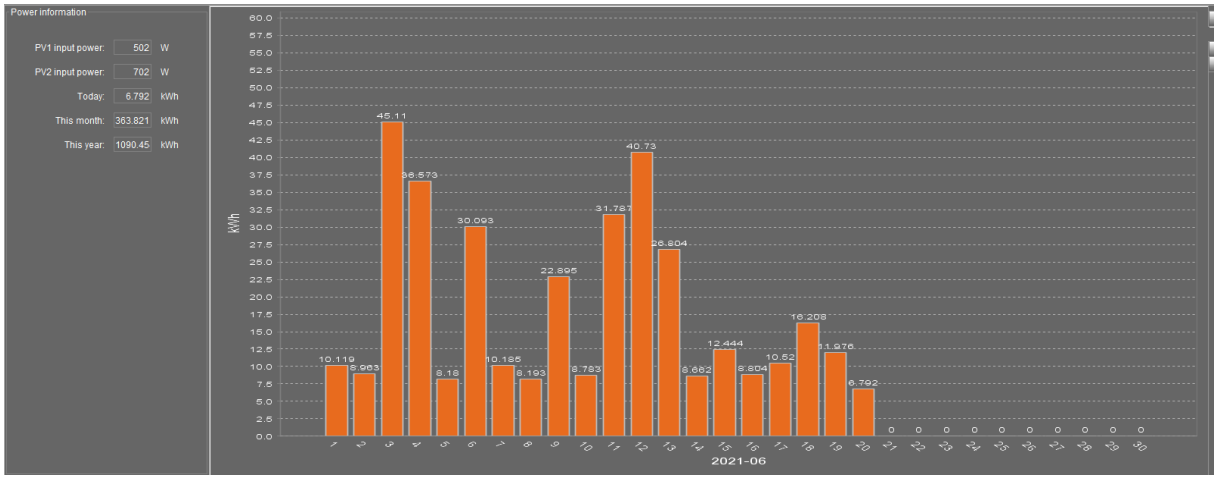
3.1. Solar:

The location is in front of a large building where the unit is moored at the quay. There is little exposure to wind and only a part of the day it can get sunlight. The measurements are thus reflecting unreal situation for exploitation of this kind of installation due to the COVID problem during testphase & non deployment in Hellevoetsluis.

Early 2021 was also quite a dark period. But as the days become longer, significant changes can be seen. On this location there is little power offtake until May.



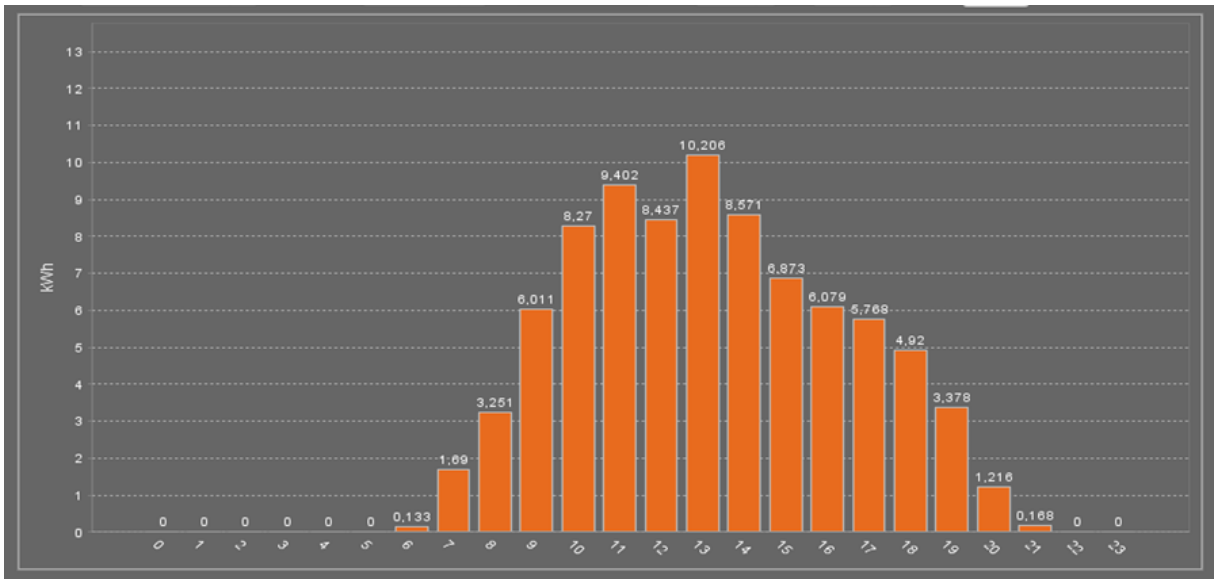
From April on we started to deliver power to the neighbor: a sport organization. Due to Covid there was first very little activity, but it allows for some off-take. As the Covid restrictions lowered in May/June consumption increased and better measurements were possible. The facilities started test openings & weekends. Those days we see the higher production which reflects the consumption as the batteries were full at start.



With full batteries production stops. For such periods the irradiation data from the sensor gives an theoretical output we could have had with partial empty batteries and or high consumption rate.

Simple example from full exposed location from 2020:

Production day when batteries were unloaded:

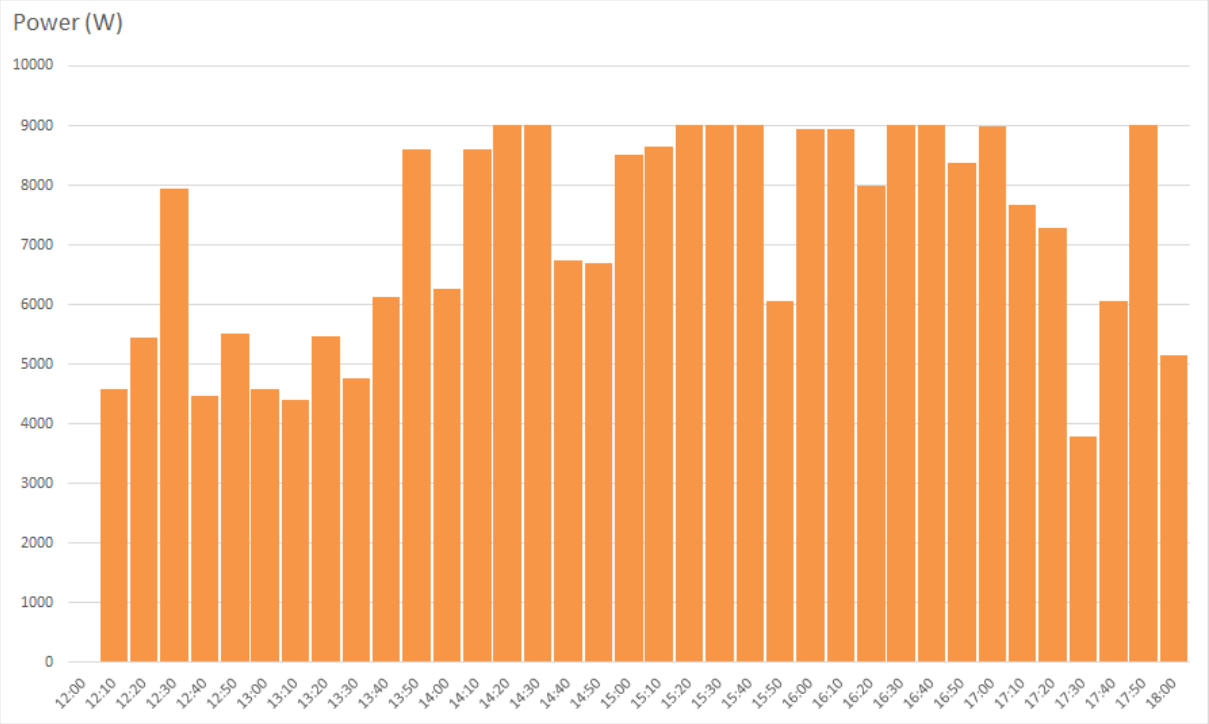


Irradiance	Surface	Theory	Max. pannel cap	Day production			Efficiency		
w/m²	m²	w/h	w/h	Theory	Max.cap	Reality	VS Theory	VS Capacity	Max. possible
202	96	19392	16000	465408	384000	84311	18,12%	21,96%	23%

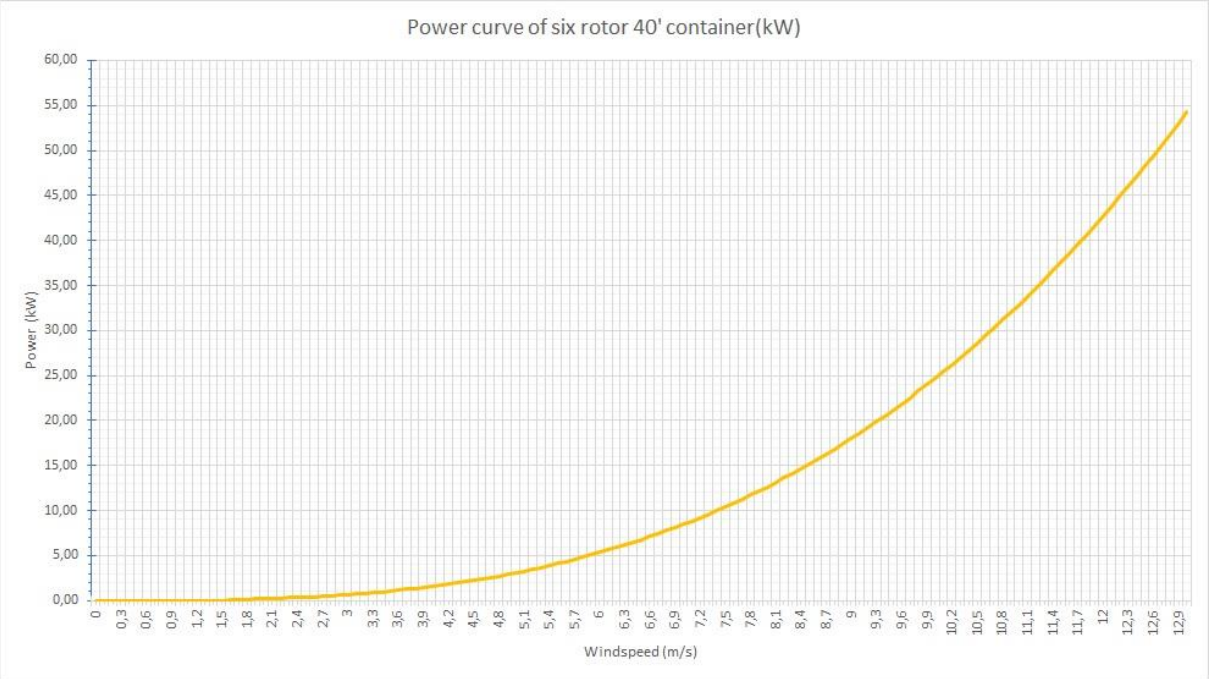
3.2. Wind Power

On this location the unit is too sheltered to benefit from windpower. Surrounding buildings and bridge. The turbines only turn when there is very heavy wind and even then often the wind comes from a sheltered point.

Example measurements from other location was:



Optimal power curve:



Around a 100Kwh a day can be harvested from wind with 6m/s average wind in the Ostend Location.