



## Cobra's Developments in Floating Offshore Wind



Introduction to Grupo ACS

Introduction to Cobra

- *Description of Cobra's Floating Technology*
- *Status of Cobra's Floating Technology*
- *The Flocan 5 Project*



*World Leaders in infrastructures...*

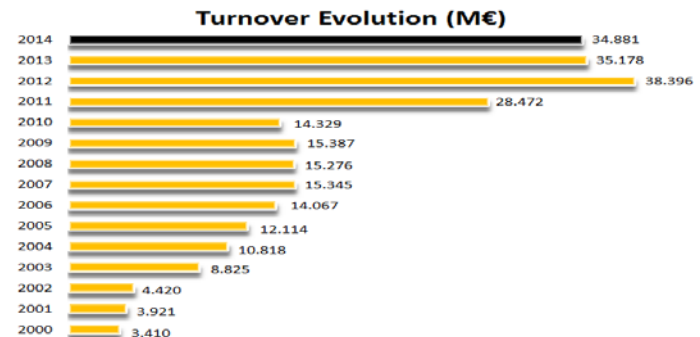
## The World's Leading Infrastructure & Concessions Developer



- Engineering contractor and greenfield developer with annual revenues over €35bn.
- Grupo ACS provides civil and industrial engineering in the fields of: civil works, building, energy, oil & gas, mining, environment and support services.
- Present over the 5 continents with a stable presence in 50 countries, employing 160,000 people.
- Through a worldwide, decentralized and flexible, multi-brand and multi-product structure.
- Long term strategy looks for global leadership and cultural integration towards efficiency and financial strength .



**2015 Turnover: 34,925 Million €**



# Introduction to Grupo ACS



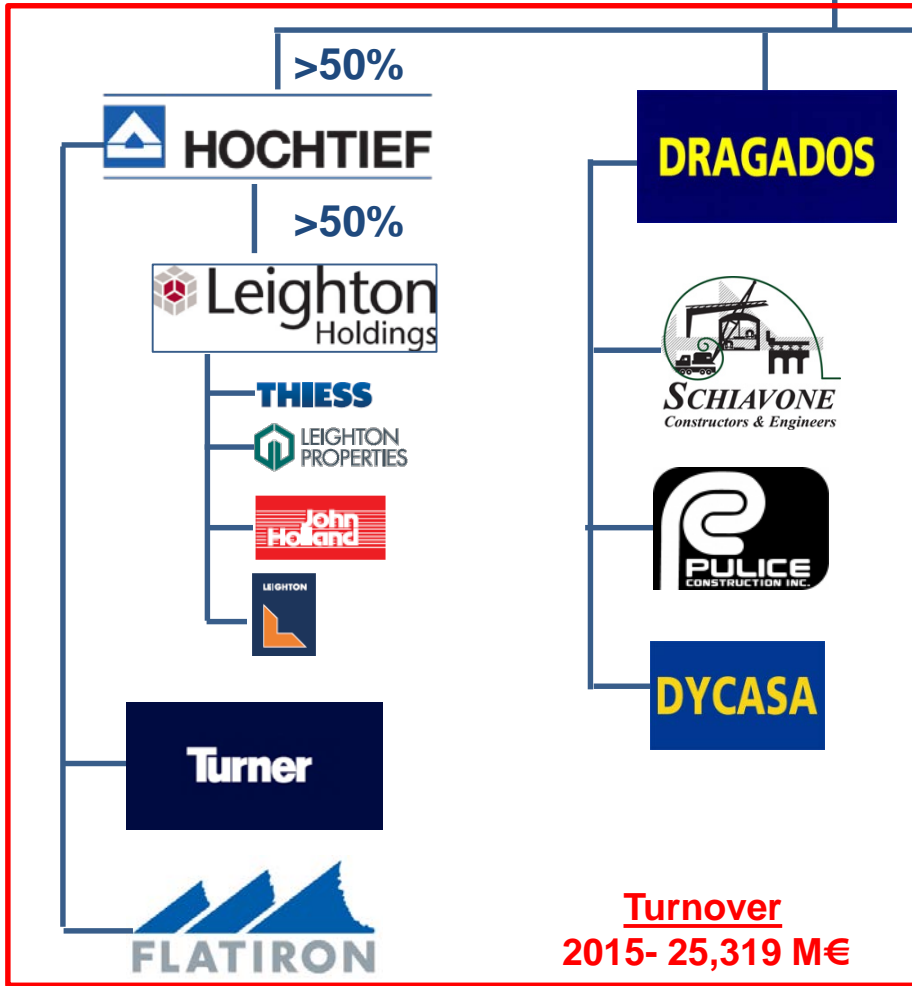
## Construction



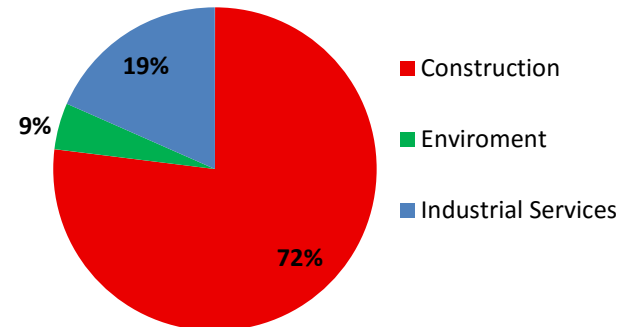
## Environment



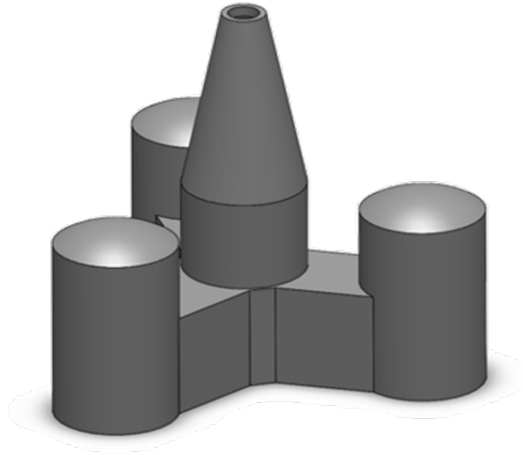
## Industrial Services



Turnover 2015- 3,139M€



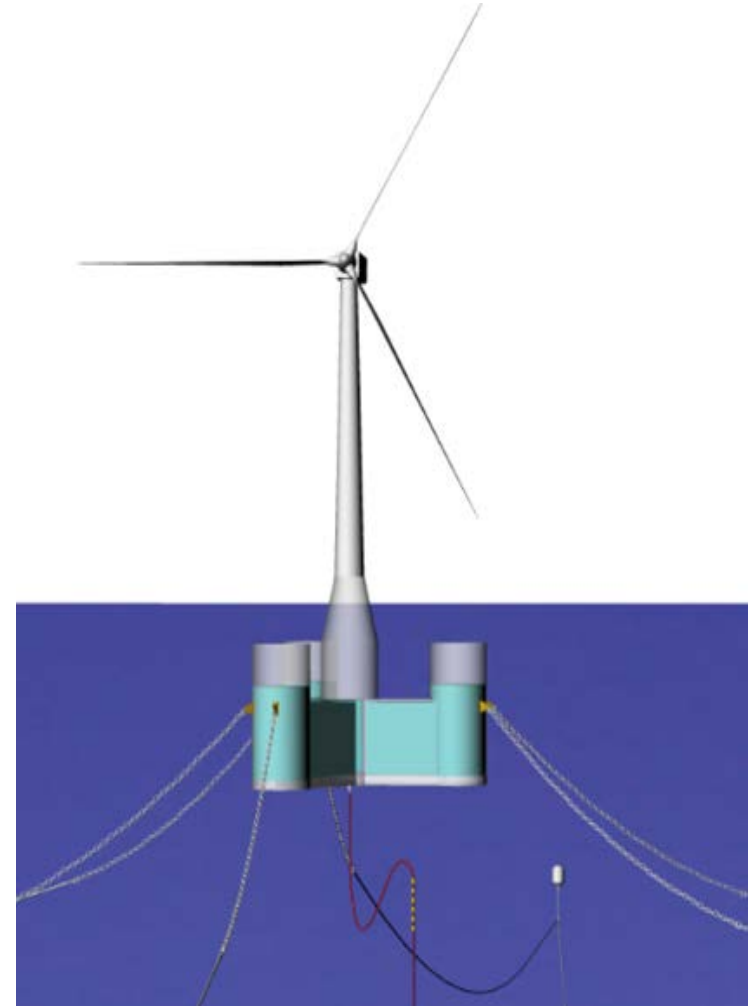
□ The platform consists of a central cylinder which provides structural continuity to the tower and three outer cylinders which provide metacentric stability and buoyancy during transport and operation. The cylinders are joined to the central cylinder by pontoons. The lower slab and solid ballast tanks in the bottom of the structure bring down the center of gravity to ensure adequate stability in installed condition.



□ The **SEMI-SPAR HYBRID CONCEPT** combines the **ADVANTAGES** of the **SEMI-SUBMERSIBLE** technology during the construction and t&i phases, and the **SPAR** advantages during operation

□ The floating structure will have an **active ballasting system** which will regulate the draught and contribute to decrease the mean tilting angle generated by the wind thrust in order to maximize energy production.

□ Depending on local site conditions (tides and maximum wave heights  $H_{max}$ ) **it could be deployed in sites with water depths above 50-60m.**



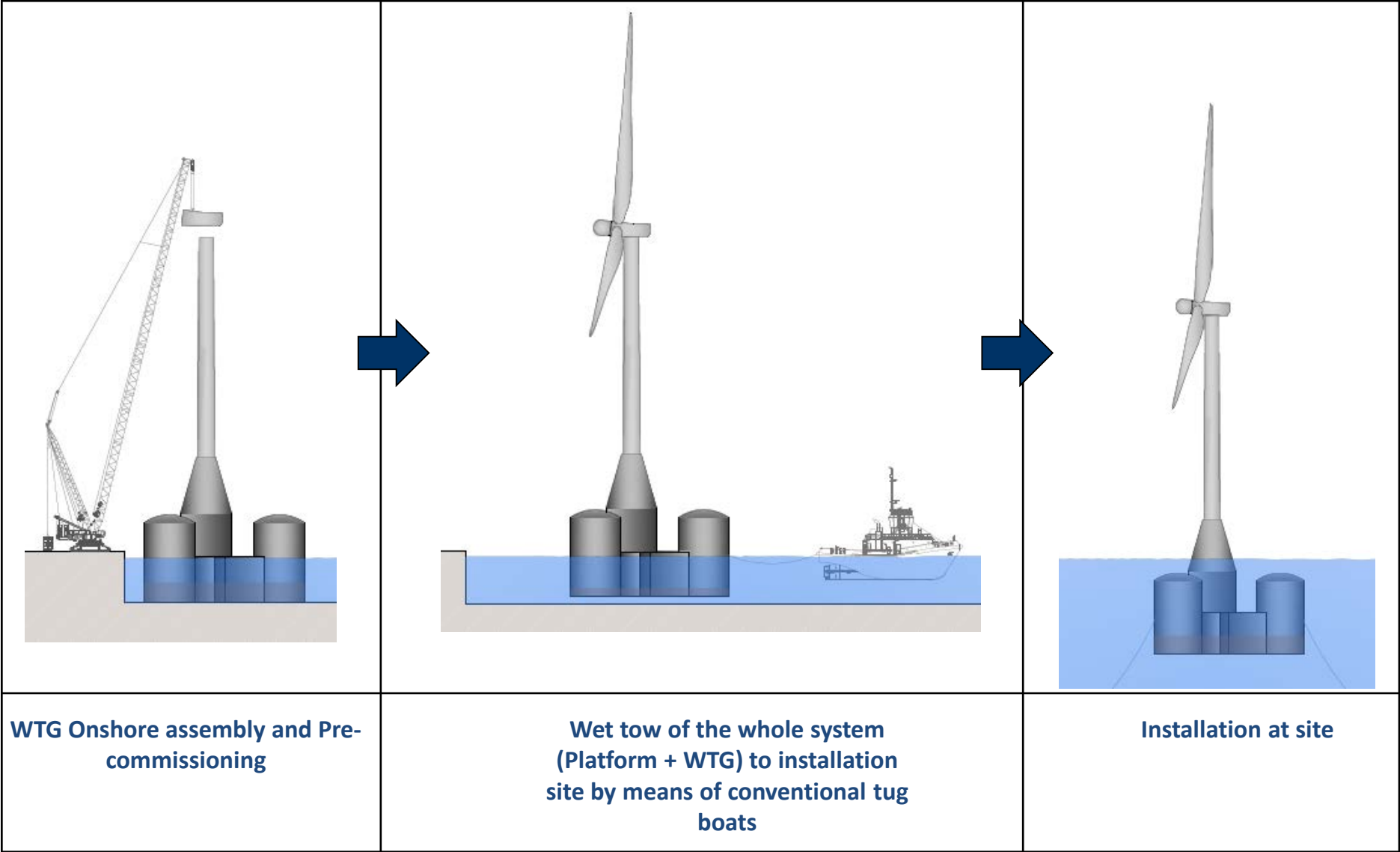
## In Port

## In Operation

- SELF STABLE IN ALL PHASES
- ENTIRELY MANUFACTURED IN CONCRETE
- LOW DRAUGHT DURING OPERATION (36m)
- EASY TO MANUFACTURE & ASSEMBLE
- WTG INSTALLATION & PRE-COMMISSIONING IN THE PORT
- NO NEED FOR HEAVY LIFT CRANE CAPACITY VESSELS, ONLY CONVENTIONAL TUG BOATS
- POSSIBILITY TO REDUCE DRAUGHT IN ORDER TO ENABLE HARBOUR MOBILIZATIONS

### Why concrete?

- Low construction and maintenance costs
- Design and construction flexibility
- Whole life performance
- Durable in Marine environment
- Local material

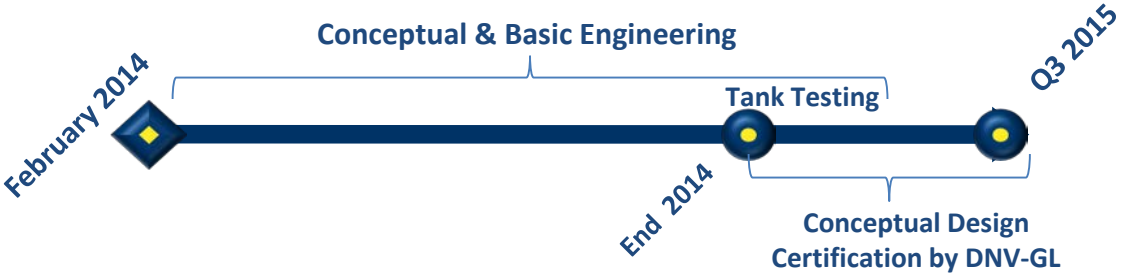
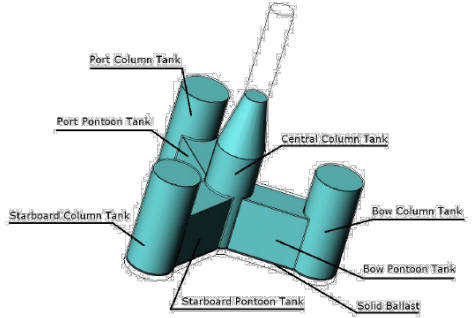
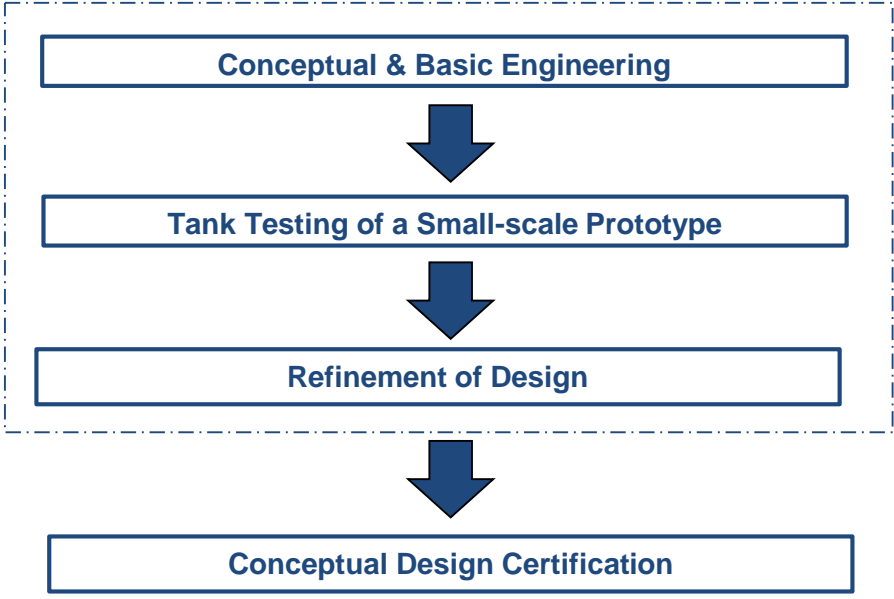
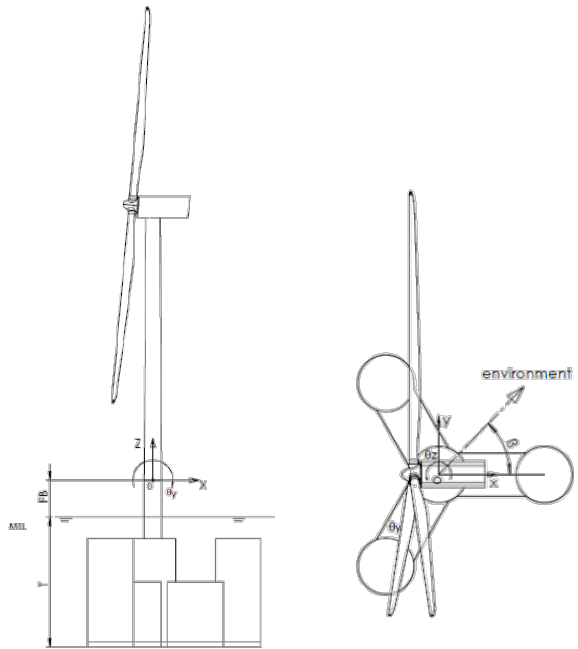


# Status of the Technology: Stage 1



☐ To date, Cobra has performed, with very satisfactory results, the conceptual & basic engineering of its platform, including tank testing of a small-scale prototype and certification of its conceptual design.

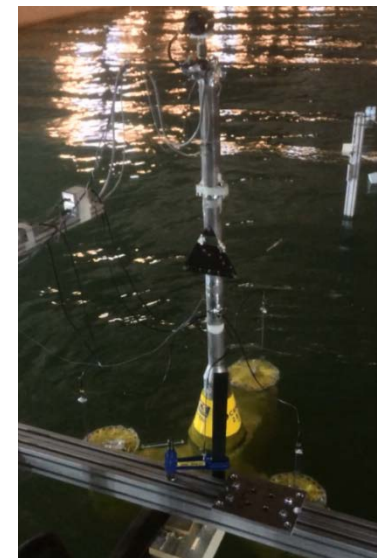
5 MW WTG, North Sea conditions:  $H_s=14.2$  m,  $V_w=51.5$  m/s







Partially financed by:

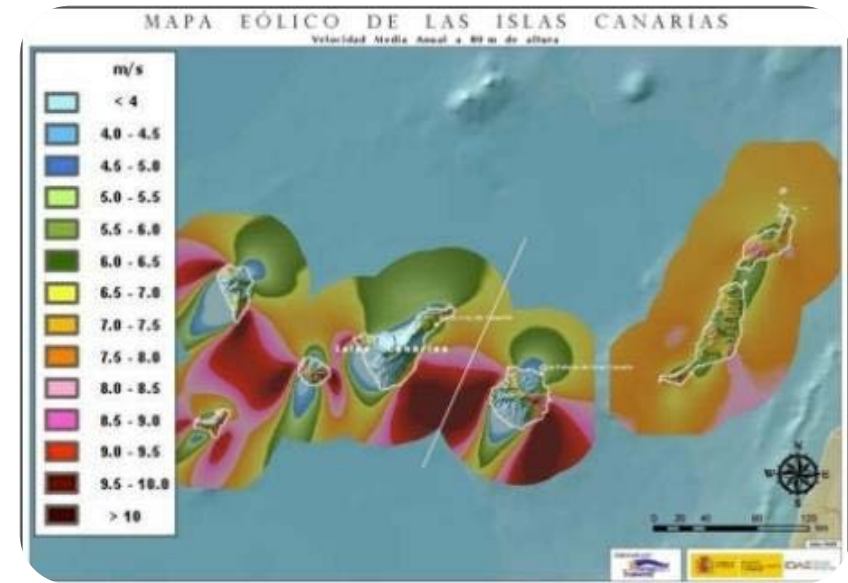


$H_s = 14,2$  m,  $T_s = 18,8$ s

❑ In May 2013, Cobra submitted a proposal (with the approval of the Spanish Authorities) to the NER 300 Program launched by the European Commission regarding a **25MW floating offshore wind farm** (FLOCAN 5) which is promoting in Gran Canary Island. The wind farm originally consisted of 5 floating structures with **5MW WTGs**.

*NER 300: 300 million allowances reserved in new entrants reserve (NER) of EU-ETS for the financing of commercial-scale CCS and innovative RES demonstration projects. The 300 million allowances will be distributed in two rounds.*

- ❑ In July 2014, the European Commission granted Cobra a total amount of **34M€** to FLOCAN 5
- ❑ FID to be made in 2018
- ❑ Expected entry into Operation: 2020



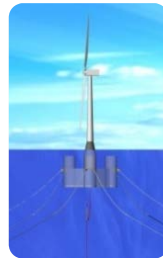
- ❑ Total Power Capacity – At least **25MW**
- ❑ **6 MW Wind Turbine Generators.**
- ❑ Testing at a wide range of water depths

## Location

- Pozo Izquierdo
- SE Of Gran Canaria

## Water depth

- 50-120m



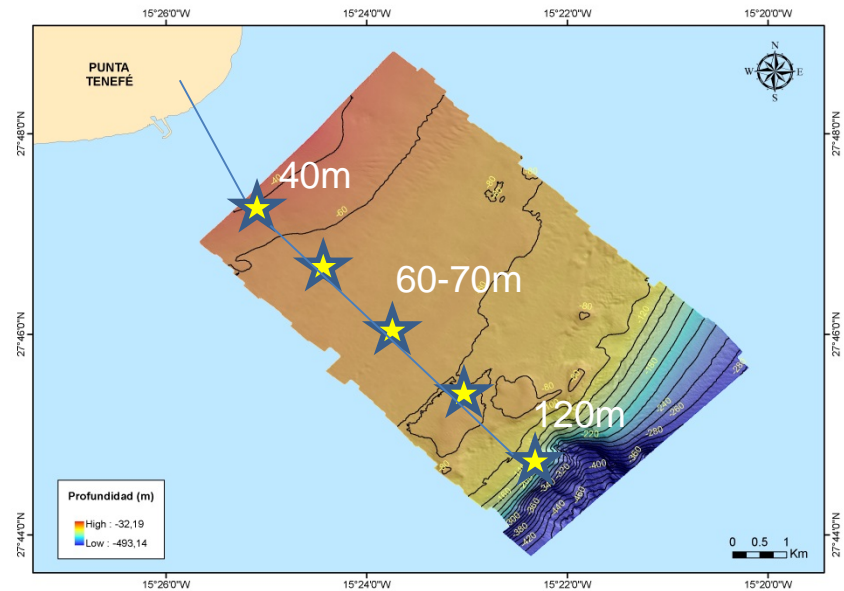
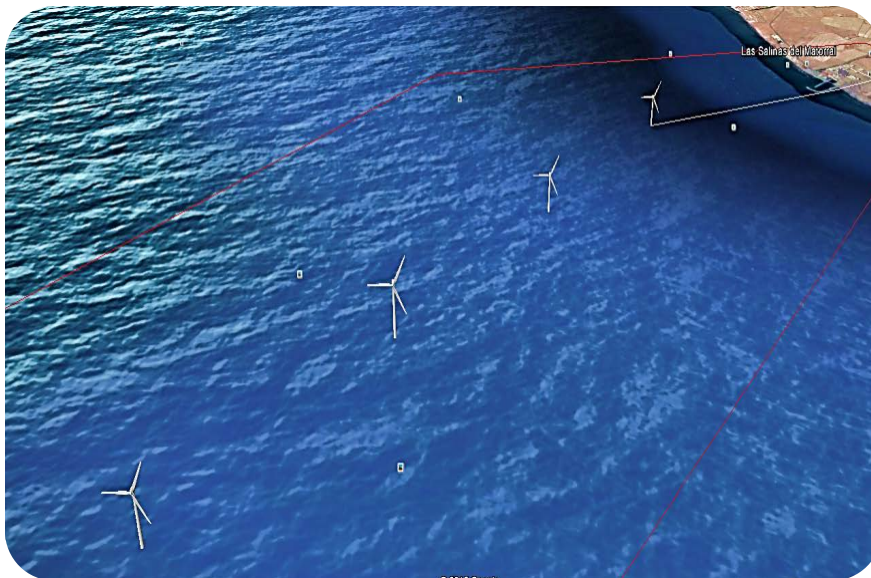
Cobra

## Distance to Shore

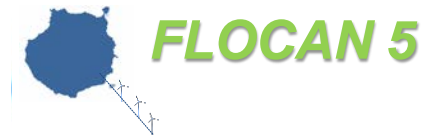
- 2- 8 km

## Meteorological Data

- > 10m/s
- > 800 W/m<sup>2</sup>
- Capacity Factor- More than 45%



# SCHEDULE: FLOCAN5



**Permitting and FID**



**Engineering and testing**



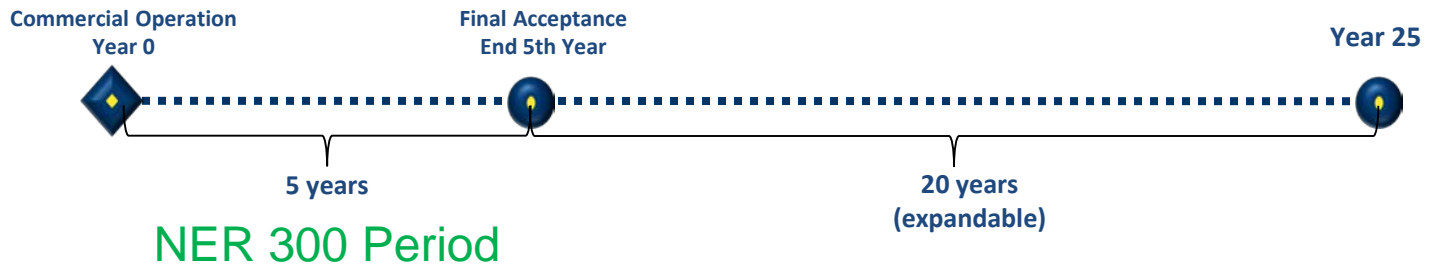
**Construction**



**NER300 deadline**



## Once in Operation:



## ❑ Vocation towards bringing innovative technology into commercial projects:

- Pioneers in building thermo solar plants with energy storage capacity (dispatchable energy plants)
- Pioneers in implementing CSP plants with Tower Technology
- Pioneers in hybridizing CSP with Biogas

## ❑ Strong experience in Wind and Offshore projects.

❑ Determination to **reduce** the **costs in offshore wind** related to the foundations and installation procedures.



A photograph of an offshore wind farm with several wind turbines in the ocean under a blue sky with light clouds. The water is a deep blue, and the sky is a lighter blue. The turbines are dark grey or black with three blades each. One turbine in the foreground is very close, showing its tower and nacelle. Other turbines are visible in the distance, some slightly out of focus.

**THANK YOU FOR YOUR ATTENTION**

Jaime Altolaquirre Mc Crumlish  
Business Development  
ACS Industrial Services and Energy  
Email: [jaltolaquirre@acsindustria.com](mailto:jaltolaquirre@acsindustria.com)



**ACS**

Industrial Services and Energy