



wind& water works Floating Offshore Wind Webinar
The Netherlands & Occitanie

28th of June 2021

Marie Tchakerian, Region Occitanie Sea

Director







CCITANIE EOLIEN FLOTTANT EN HER

Offshore wind energy deployment in the Netherlands

Ruud de Bruijne, Netherlands Enterprise Agency (RVO)



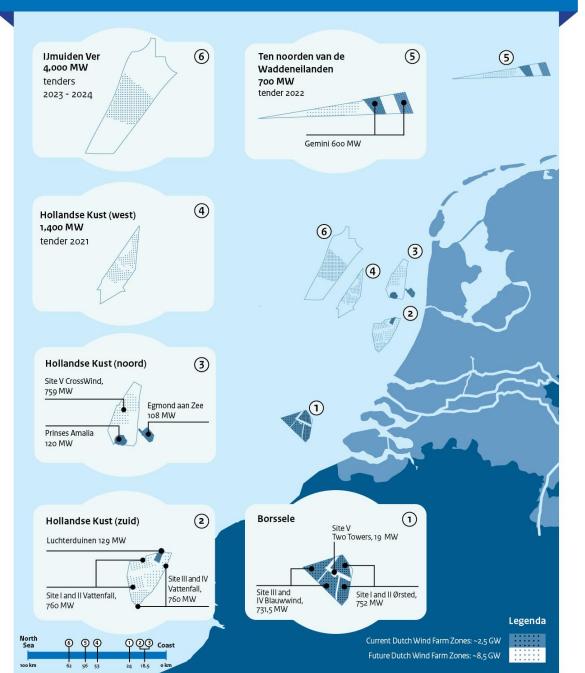
The Netherlands at a glance

- Strong supply chain
- Excellent ports
- Good wind resource
- Shallow waters (<40 m)
- Easy soil conditions (sandy)
- Hurricane, earth quake and tsunami free





Dutch Offshore Wind Farm Zones

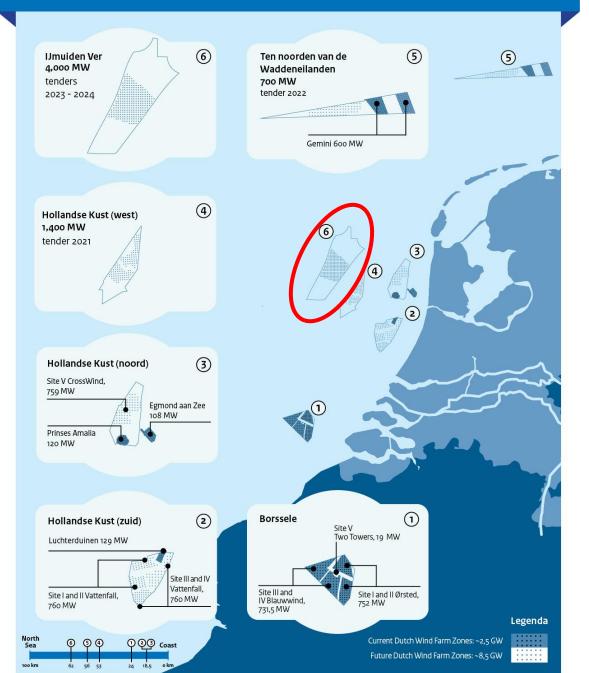




Roadmap 2030

- 11.5 GW, on track
- Call for more: + 2-10 GW

Dutch Offshore Wind Farm Zones





Roadmap 2030

- 11.5 GW, on track
- Call for more: + 2-10 GW





Roadmap 2030: key succes factors











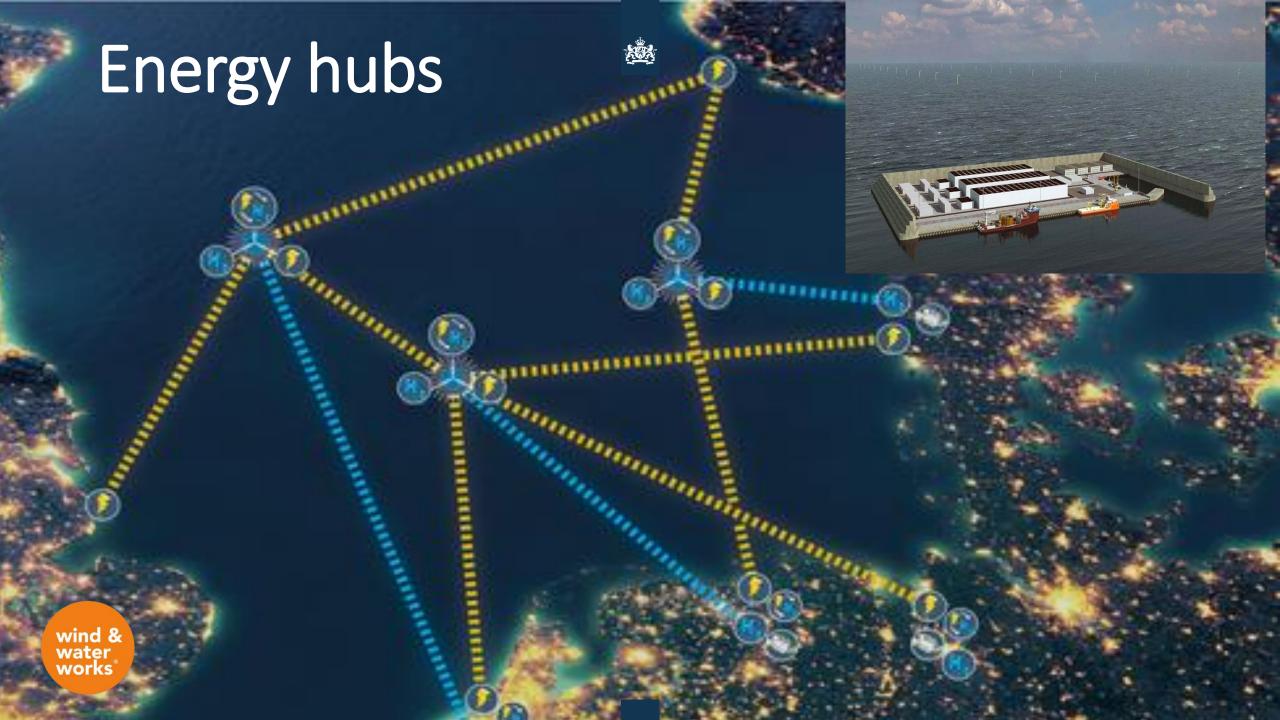


Roadmap 2040

- 27 GW (minus add-on Roadmap 2030) Considerations:
- Selection new wind farm zones
- Phase development of zones in time
- Take demand side into account
- Accommodate major (H₂) initiatives









Floating Offshore Wind Webinar
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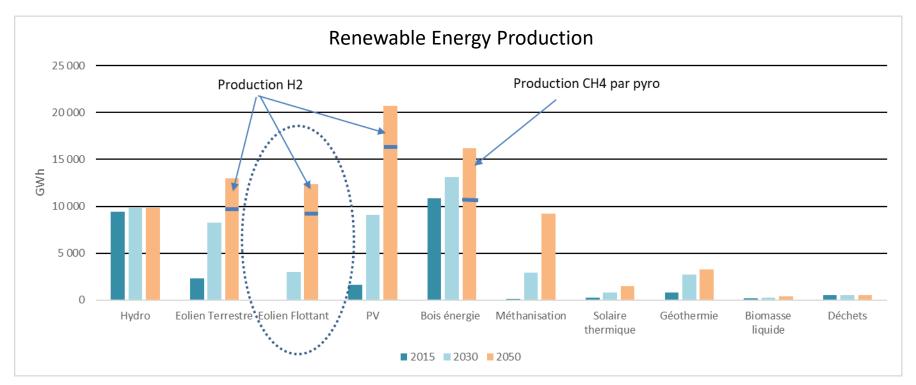








Regional Objectives



2030: 800 MW, 10% of the renewable production

2050: 3 000 MW, 22,5% of the renewable production

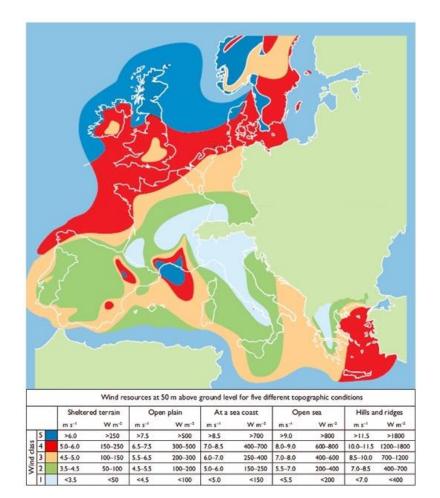


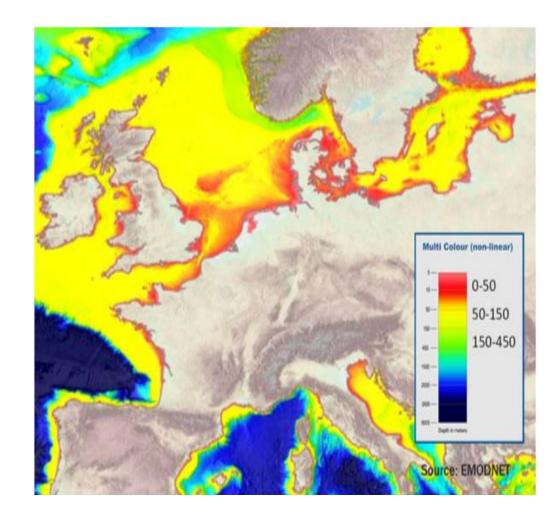






The floating offshore wind dynamic in Europe







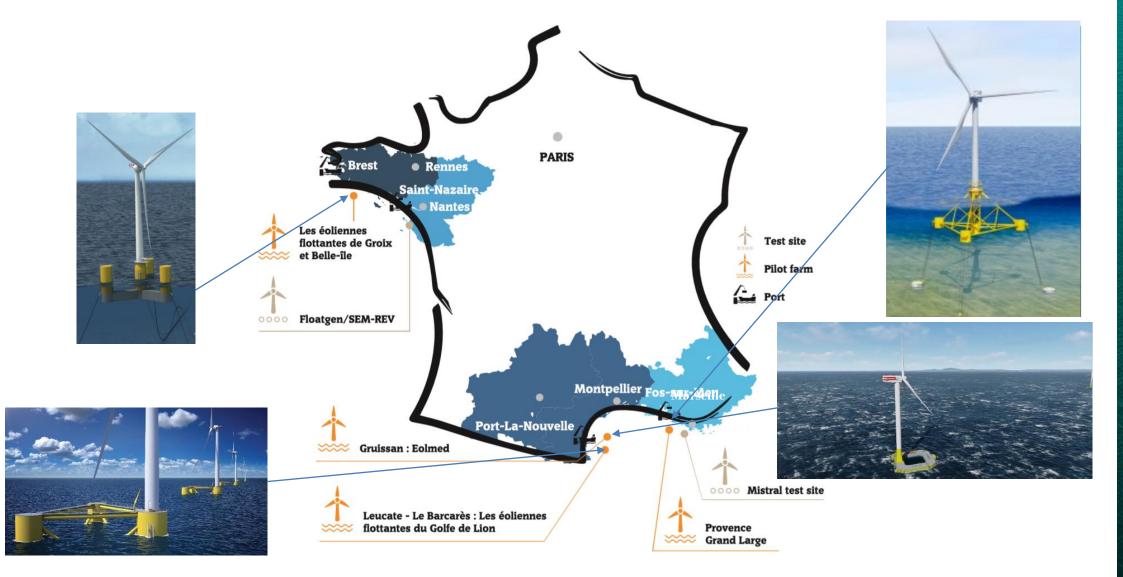








The floating offshore wind dynamic in France







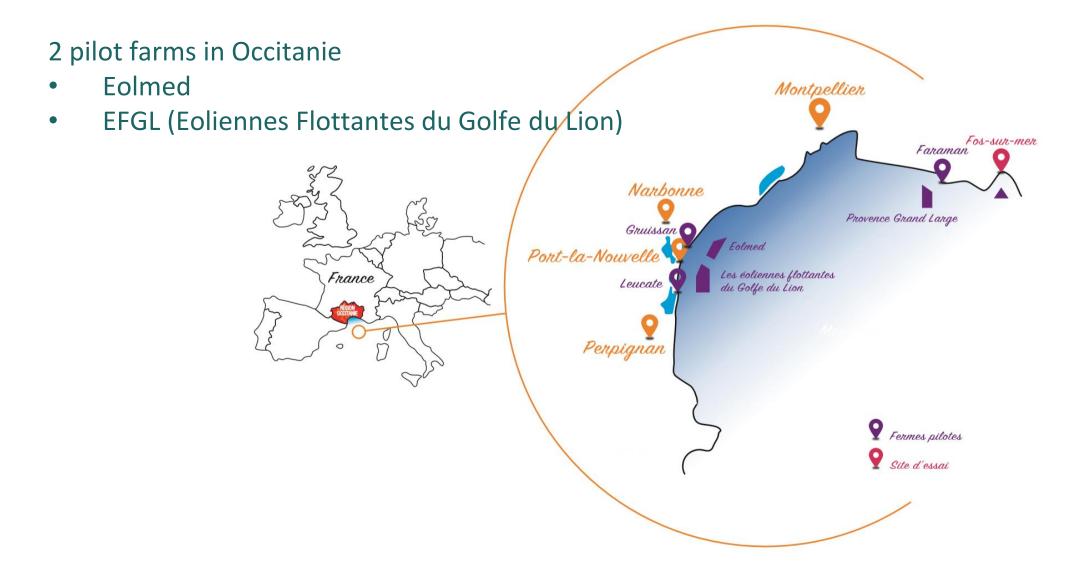








The floating offshore wind dynamic in the French Mediterranean sea











Tendering process in France

- Public debate: identifying the project zone
- Environmental studies: done before the call for tenders and by the State
- **Competitive dialogue:** specific tendering process
 - Preselection of candidates based on financial and technical criteria
 - Dialogue with the candidates to draft project specifications
 - Relaying the final project specifications to the candidates
 - Submitting of tenders, tender appraisal, and award

Milestone toward 2030

2021:Public debate for 2x250MW floating wind farm / Offshore 2028: First 250 wind quay 2022-2023: MW Pilot farms commercial delivery 2015: Pilot /Environmental deployment(2 farm farms tenders studies x30MW) deployment 2019: Start of **2022:** Call for 2024-2025: 2030-2031: the Port-La-Call for tender 500MW tender Nouvelle commercial commercial commercial farms farms 500 MW farm extension (2x250MW) (to be deployment confirmed)

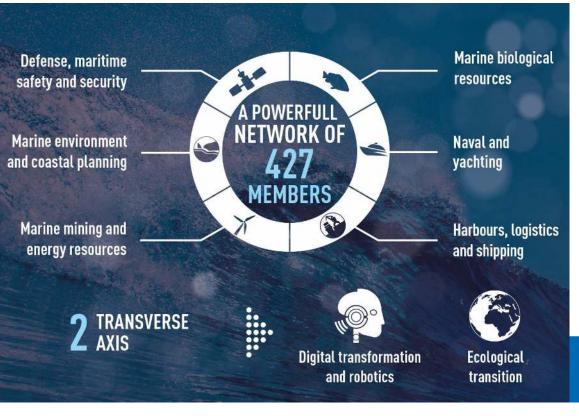






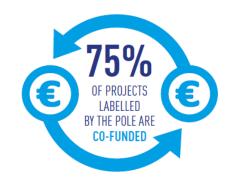


The role of Pôle Mer Méditerranée, sea innovation cluster



30 STRUCTURING PROJECTS LABELLED FOR A R&D BUDGET OF 1310 M€







28 LABELLED PROJECTS FOR 1062 M€

== 316 PROJECTS FINANCED FOR AN AMOUNT OF FUNDING OBTAINED OF 771 M€



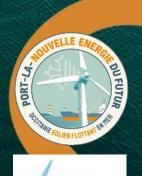
37 EUROPEANS LABELLED PROJECTS

LABELLED TRAINING PROGRAM









Occitanie Value Chain





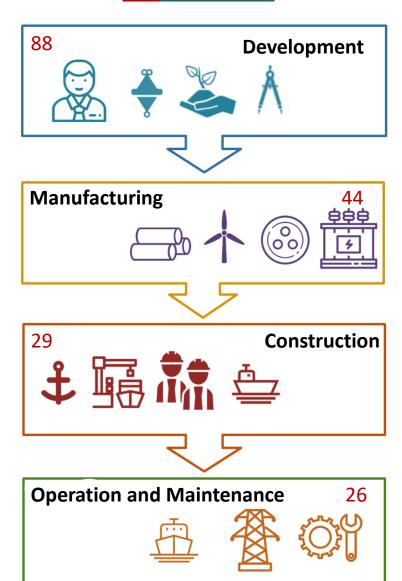






And **25** Academics and laboratories

170 Companies

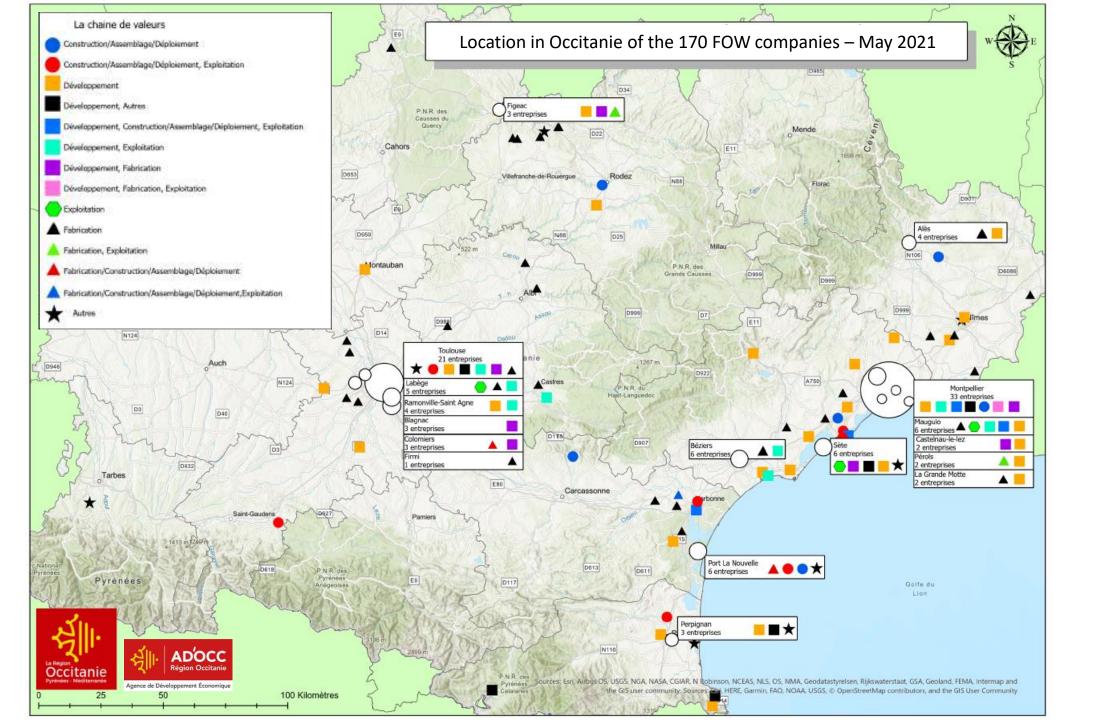










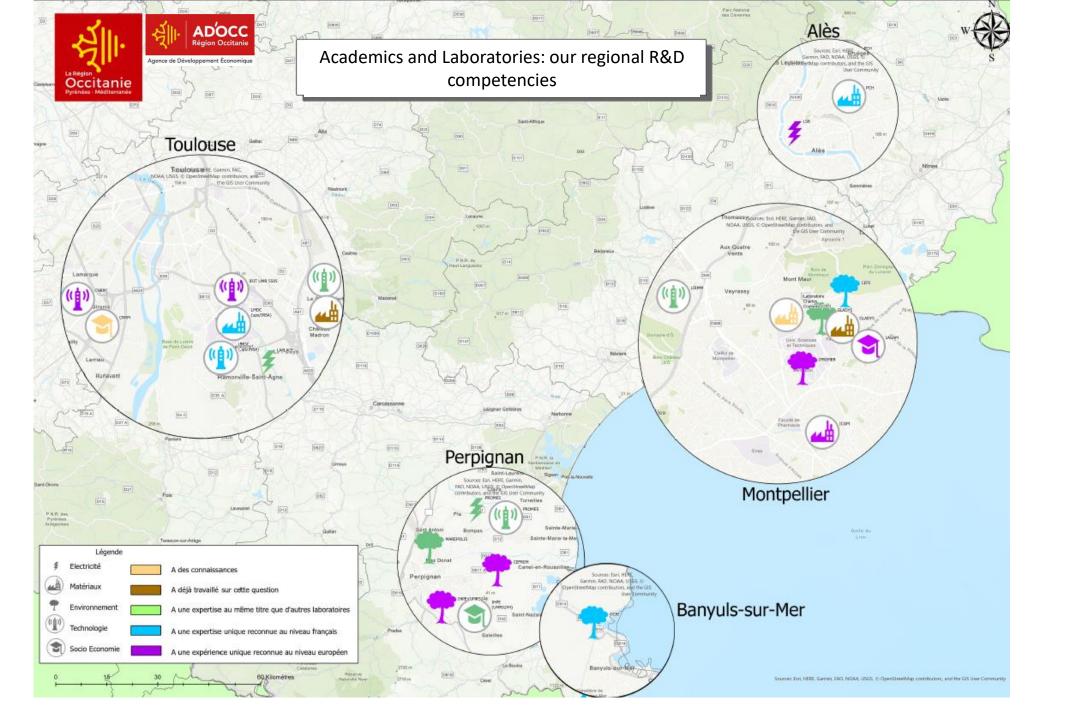














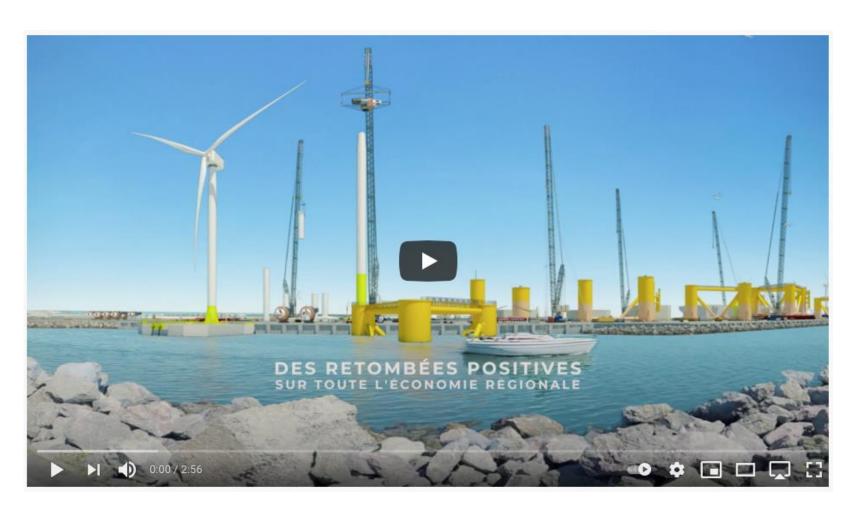












https://youtu.be/7EYQPsaTsyo











Promoting floating wind across Europe



PELAGOS

Promoting innovative networks in marine renewable energy

PELAGOS' aim is to establish a permanent Cluster of national HUBs in the Blue Energy sector, where technical expériences are shared.

https://pelagos.interreg-med.eu/



ELBE+

European Leaders of Blue Energy

ELBE Alliance aims to contribute positioning Europe as the world technological and industrial leader in Blue Energy, with a special focus on offshore wind, wave and tidal energy.

http://www.elbealliance.eu/home



MISTRAL

Creating a transnational community of Mediterranean blue economy clusters

This project aims to strengthen a transnational to:

- make marine knowledge and sustainable innovation the key drivers for Blue Growth,
- support MED clusters to become an excellent intermediary of knowledge for increasing blue economy,
- design and implement sustainable development trajectories harmonized with the MED regions Smart Specialization Strategies.

https://mistral.interreg-med.eu/









Your contacts in Occitanie:

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FLOW supply chain developments

Dutch part of the North Sea:

- Shallow waters in Dutch part of the North Sea (<40m);</p>
- > Sandy soil conditions;
- = floating offshore wind more expensive than bottom fixed offshore wind in the Netherlands

Massive growth potential for floating wind:

- Carbon Trust report worldwide potential 70GW by 2040
- New projects planned in France, UK, Ireland, Norway, Portugal, Spain, Italy, Sweden, Japan, South Korea, US West Coast..







Dutch FLOW supply chain

- Tender proposals
- Consortium
- Contracting Structure
- Financing
- Environmental Impact Ass.
- Power Purchase Contracts

Project development

- Wind turbine supply
- Support structure supplier
- System engineering
- Intra array cabling
- Export cable
- Mooring & anchoring
- High Voltage Offshore Station

Technology supply & development

- Logistics on land
- Logistics offshore
- Transport & Installation vessels for foundations, mooring, wind turbine (components), inter array cables, export cables, HV station
- Commissioning

- Access systems for personnel, small components, heavy components
- HSE protection system
- Maintenance planning system, preferably condition based
- Performance monitoring
- Environmental monitoring
- Re-use of foundations
- Recycling/Re-use
- Remanufacturing

Transport & Installation

Operation & Maintenance

End-of-life solutions

Project design

- Site characterisation
- Integrated wind farm design: wind farm lay-out, wind farm control, wind turbine rating & dimensions
- Intra array cabling
- Export connection
- Grid connection
- Integrated support structure & transport concept

Pre-competitive R,D&D

- Wave and wind characterization
- Fluid / structure interaction between wind turbine and floater
- Integrated wind farm design: wind farm layout, wind farm control,
 wind turbine rating & dimensions
- Loads during transport and installation





Project Development

Developers:

> Shell - 100% owner of Eolfi → specialised in floating wind projects

Financing:

Green Giraffe – financing floating wind demonstration projects







Disclaimer: this overview only provides a selection of Dutch companies active in the floating wind sector and is by no means intended as a complete overview



Technology supply & development

Wind Energy Conversion Systems:

- > 2B Energy two-bladed downwind turbine
- > Ampyx Power airborne wind energy systems
- Seawind floating wind energy technologies

<u>Support structures:</u>

- Damen hulls floating platforms
- MonobaseWind design floating foundations
- Sif Group / KCI the Engineers tubulars floating platforms







Disclaimer: this overview only provides a selection of Dutch companies active in the floating wind sector and is by no means intended as a complete overview

Technology supply & development

Engineering:

- > Blue H Engineering floating foundation technology
- > **Bluewater** floating wind systems
- > GustoMSC/NOV Tri-Floater
- Iv Offshore & Energy floating substations
- > **SBM Offshore** floating EPCI contractor
- Sowento engineering studies
- TWD design of support equipment systems

Cables:

- > Boskalis cable laying
- > **TKF** subsea cabling

Disclaimer: this overview only provides a selection of Dutch companies active in the floating wind sector and is by no means intended as a complete overview







Technology supply & development

Anchoring & Mooring

- > **DPM** mooring lines
- > **GN Rope Fittings** fabrication of mooring systems
- Mooreast anchors
- > **SPT Offshore** suction embedded anchors
- Seatools mooring monitoring system
- > Vryhof mooring solutions







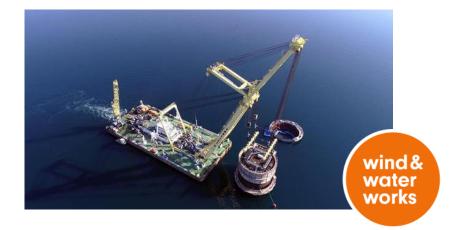


Transport & Installation

- Big Lift
- Boskalis
- > CAPE Holland
- > HMC Heerema
- > IHC IQIP
- > Mammoet
- Van Oord









Operation & Maintenance

- > Ampelmann motion compensated access systems
- Barge Master motion compensated gangways
- > BoltLife monitored maintenance free bolted connections
- Lankhorst Ropes manufacturer of synthetic, fibe and steel wire ropes
- Safeway motion compensated gangways
- TWD maintenance for floating wind turbines









Project Design

- > **Deltares** characterization of waves
- > **TNO** design specifications
- > Various engineering companies



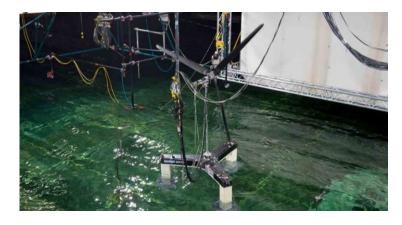


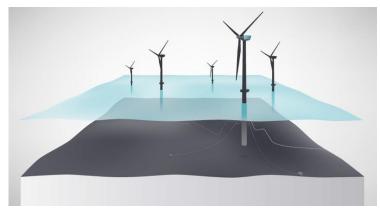


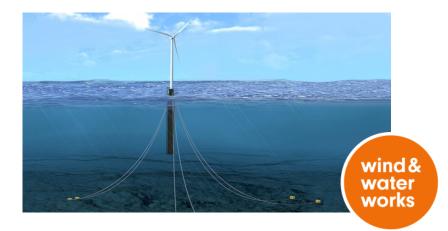


Pre-competitive R,D&D

- Deltares characterization of waves
- > **DOB-Academy** education for professionals
- Fugro geo-data specialist
- MARIN floating wind modelling & testing
- TNO applied research in floating wind
- > **TU Delft** research in floating wind







Floating Wind @ MARIN

Time line

- First involvement in 2003 (drijfwind) together with ECN TNO and Gusto
- Up to 2010 model test with floater alone
- Missing important coupling effect between Hydro and Aero forces and motions
- 2011 a high quality wind setup was developed within MIP project
- Model tests with a geometrical scaled wind turbine of the NREL 5MW (large scale effects)
- 2012 development of thrust scaled NREL 5MW wind turbine
- 2015 involvement in multi turbine platforms
- 2018 model tests with software in the loop
- 2018 development of thrust scaled DTU 10MW wind turbine
- 2019 Modelling the turbine with a ducted fan
- 2021 development of thrust scaled NREL 15MW wind turbine
- 2021 Modelling the turbine with a Multi-ducted fan

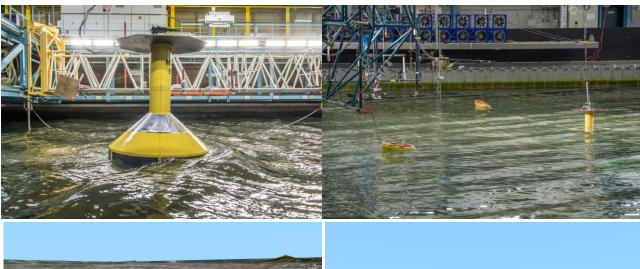


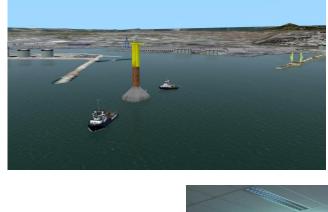




OPTIMIZING THE OPERATION @ MARIN

- Determine the most optimum way to perform the operation:
 - transport,
 - Installation
 - 0&M
- Determine the workability
- Train the operation in the simulator









FULL SCALE MONITORING OF FLOATING WIND FARMS

- Integrated digital twins of floater structures, mooring and cable for integrity management
- Design, procurement and installation of monitoring systems
 - Hull structures
 - Mooring
 - Motions and positions
- Low cost GPS-based mooring failure detection
- Mixed high/low fidelity monitoring within a wind farm for optimal cost/accuracy
- Bringing to floating wind over 20 years of experience in integrity management from Oil & Gas



Courtesy of Saipem







EFGL Project : Main highlights









- Pre-commercial project, awarded after a call for project from French Government
- Strong and proven partnership OW and CDC, being partner in other French Bottom Fixed Offshore Wind projects
- Off Leucate Le Barcares (French Mediterranean sea)
- 3 off Vestas 164 10MW Turbines 30 MW total power
- WindFloat Floating foundation Grid connected 66kV
- 16 to 18 km offshore (8.6 to 9.7 nautical miles), ≈ 70 m water depth, strong wind (~10 m/s)
- Planned COD : 2023 and lifetime ≥ 20 yrs

Les principaux acteurs du projet





FLOATING FOUNDATIONS

Design, Fabrication, Towing and Installation







WIND TURBINES

Supply, Delivery, Assembly, O&M





CONNECTION

To French Grid



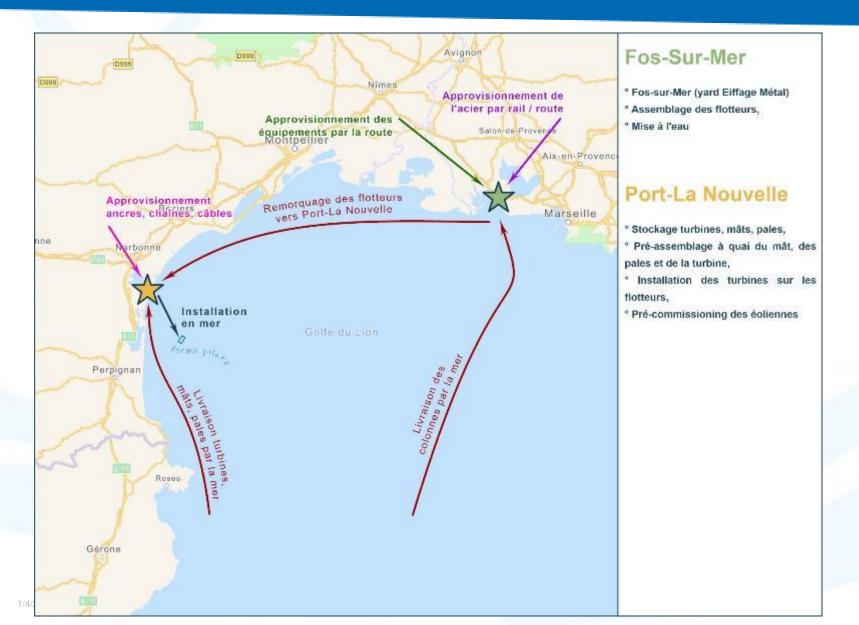


Project Management by LEFGL

LEFGL will also be in charge of operating the Floating Wind Farm

1/4/2022

Industrial Organisation





- Fos-Sur-Mer (Eiffage Métal Yard)
 - Delivery of Pre-fabricated columns and other items by sea and road
 - Floater assembly
 - Float out prior to towing
- Port-La-Nouvelle (Harbour)
 - Delivery of Mooring items (chain, rope, anchors...)
 - Delivery of WTG items by Sea
 - WTG assembly on Floaters
 - Pre-energization commissioning

The needs of the Project Leader - Construction and Installation Phase



Procurement and Fabrication

- Inspections / QAQC (client representative)
- HSE
- Civil Work
- Project Management and Control
- IT (Doc Control)
- Communication & concertation

Installation and Commissioninge

- MWS
- HSE
- Weather Forecast
- Lifting, Manutention
- Maritime and Harbour Logistics (heavy loads)
- Diving upport Vessel for light work, ROV,
- Crew Transfer Vessel(CTV)
- Project Management and Control
- IT (Doc Control)
- Communication & concertation

1/4/2022

Potential needs of Floater provider (1/3)

Floaters Fabrication and Assembly



- Fitting, Welding
- Scaffolding, lifting equipment
- E&I
- Piping
- Machining
- Dimensional Control
- Painting
-





Potential needs of Floater provider (2/3)



Floater Load-Out

- Specialised Engineering Offices
- Heavy Manutention Tools
- Barges, Tugs
- Ballasting Operations
- Divers
- ...

Towing of Floaters to Port-La-Nouvelle

- Stevedores in Fos-Sur-Mer
- Tugs
- Fenders, Gangway
- Stevedores in Port-La-Nouvelle

• ...





WTG Assembly in Port-La-Nouvelle

- Ballasting Operations
- Lifting and handling operations
- Security
- Accomodation, Offices

...





Potential needs of Floater provider (3/3)



Moring Pre-Lay and Floater Hook-Up on Site

- Anchor Handlers
- Tugs
- Divers
- Ballasting Operations
- Commissioning Operations
- Chains
- Cables,
- Anchors

• ...









Potential needs of the WTG supplier (1/3)





General Works

- Project Management Scheduling and Integration
- Specific HSE training
- Site offices
- Storage area (in and out door)
- Accomodation
-

Specific Transport Means, Storage, WTG Components Lifting...







Potential needs of the WTG supplier (2/3)





WTG Assembly in Port-La-Nouvelle:

- Riggers
- Technicians
- HSE advisor, QA/AC
- Project Management
- Lifting tools and logistics
- Accomodation
- Scaffolding, generators

- ...







1/4/2022

Potential needs of the WTG supplier (3/3)





Offshore Commissiong / Reliability test

- Commissioning Technicians
- Offshore Work Coordination
- Crew Transfer Vessel(CTV)







Needs during operational phase



During exploitation phase (inc. IMR and O&M)

- CTV, Tugs, Suooprt Vessels (Diving and Subsea Construction), ROV, Divers...
- O&M Base, with offices and storage area
- Technical Team, IMR
- Lifting and Logistics
- Marine Coordination in case of Heavy Maintenance

- ...











Thanks for your attention





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www.info-efgl.fr Facebook : efglLeucateleBarcares Twitter : @EFGLgolfedulion

1/4/2022







From monopiles to floating foundations 1111

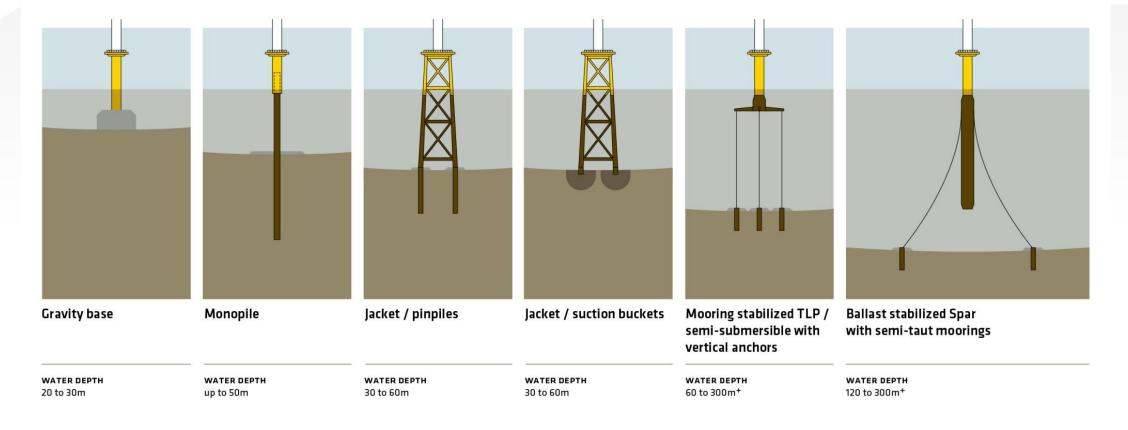
- L'embarras du choix
- HWAT vs VWAT
- Capacity factor: the key to succes?
- Sif's current strategy





L'embarras du choix

Confidential

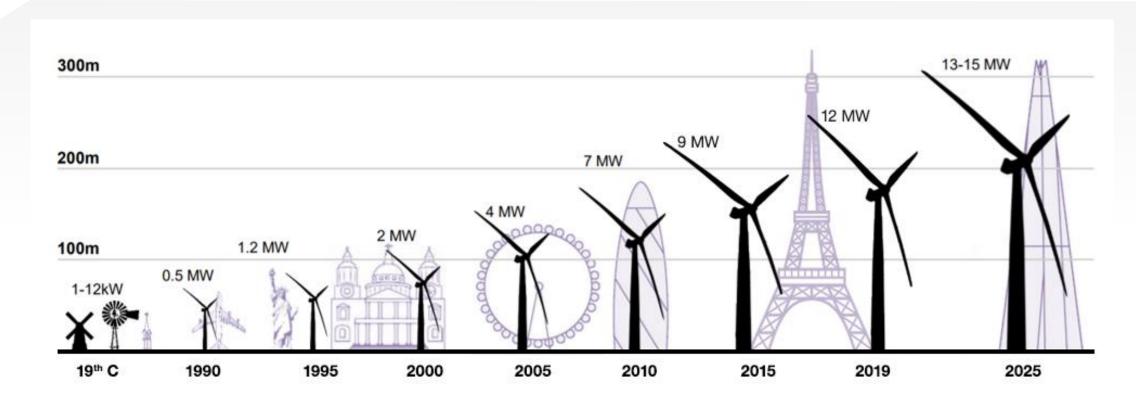


Capex 250 100 200 200 400 600



Where are we?

Confidential

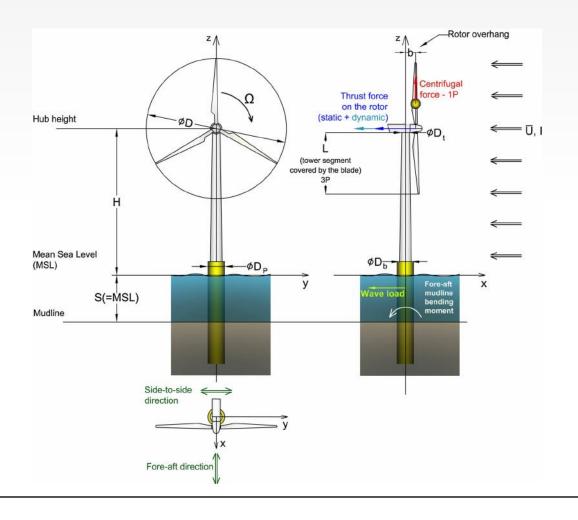




HAWT versus VAWT

Confidential

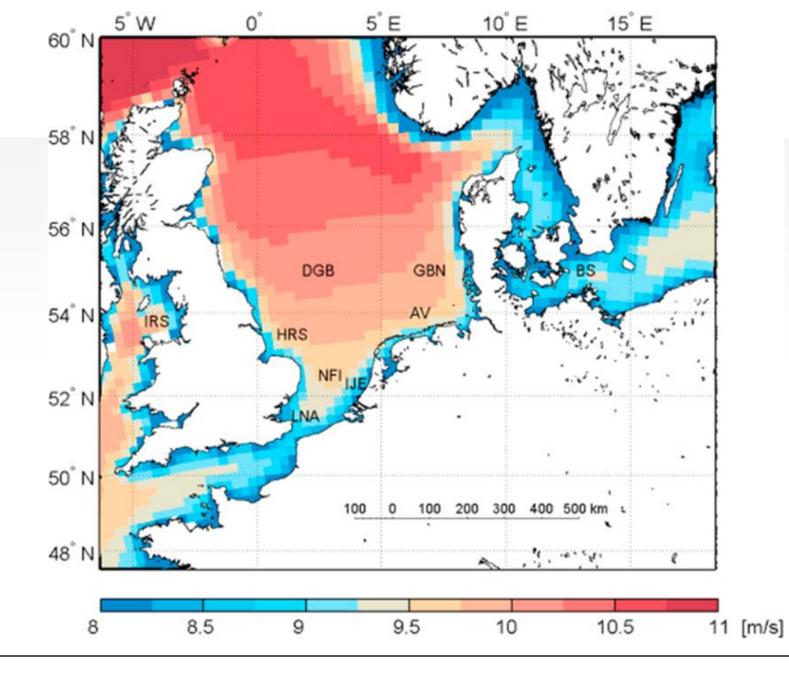
- HAWT has won the battle onshore 20 years ago
- Onshore HAWT power has increased from 500kW till 6 MW
- HAWT went offshore in 2 MW version → now 15 MW and counting...
- Is this really the best turbine to stick onto a floater?





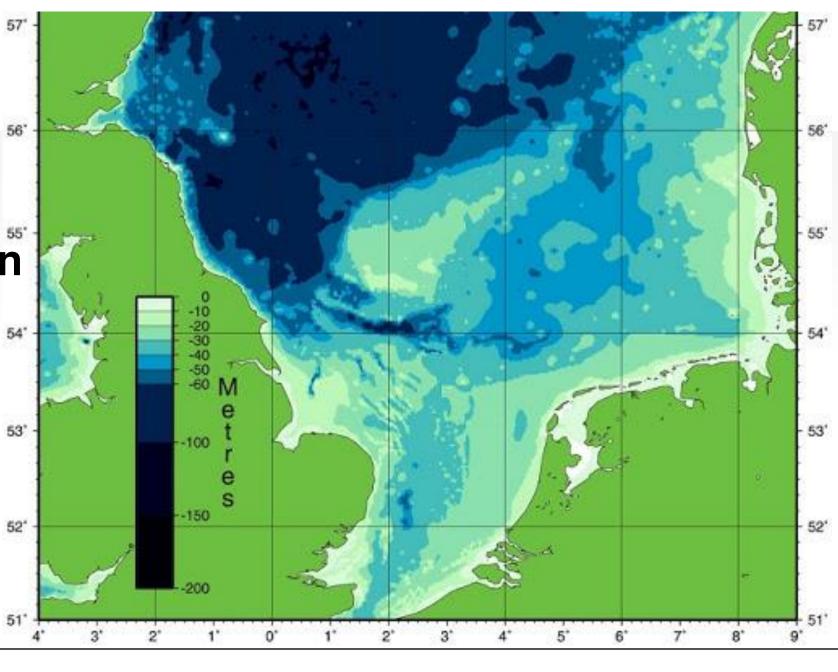
al

Capacity factor: the key to succes?





Water depth northern North Sea





SIF MAASVLAKTE >

From MP's to floaters: Sif's strategy ential





1-5 mononiles per week

MAX LOAD OUT CAPACITY

10 tons/m²

ANNUAL CAPACITY

300.000 tons

STORAGE AND TRANS-SHIPMENT AREA

62 hectares

DEEP SEA QUAY

400 meters length, 16,5 meter draught



We will stay tubular manufacturer in ential

- Sif will be sub-supplier of floatation tanks
- Using future MP production lines (11-12m diam.) to produce the high D/t tubulars for these floatation tanks
- Off-line automated welding of IRS and bulk heads.







EOLMED Project







Pilot Farm | EolMed

Max Power. **30 MW**

106 Millions KWh Production

Consultions 50 000 Hab.

Distance from shore 18 Km Raccordement 20 Km Water Depth 60 m $7 \, \text{km}^2$ Surface

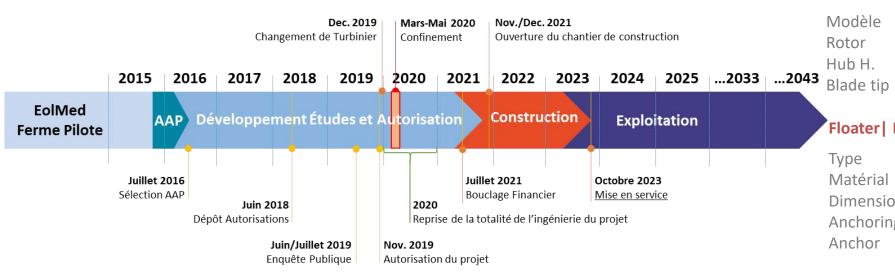
Dist. Inter-éol. 1500 m

Port La Nouvelle Base

Wind Turbine | Vestas

Modèle V164-10MW

164 m Rotor Hub H. 106 m 188 m



Floater | IDEOL

Barge Semi-Sub Type Béton ou Acier Matérial 45m/45m/17m Dimension Anchoring system Caténaire 3x2 Anchor **Drag Anchor**









GustoMSC

Floating Wind Event Occitanie



June 28th, 2021





GustoMSC NOY

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Offshore Wind

Over 30 new build designs

Proven technology

Repetitive design

40 years designing jack-up vessels

Reliable delivery

Growing track record

Ongoing innovations

Custom design

GustoMSC | NOY

Tri-Floater introduction

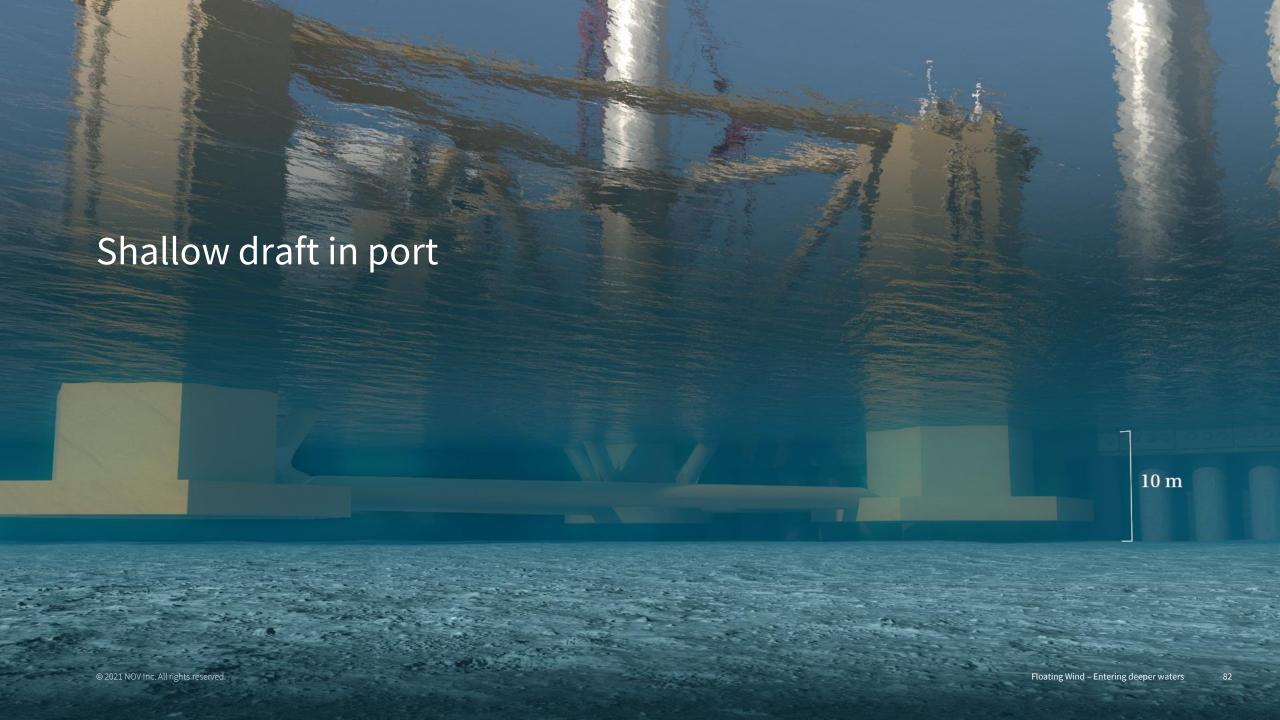
© 2021 NOV Inc. All rights reserved. Floating Wind – Entering deeper waters

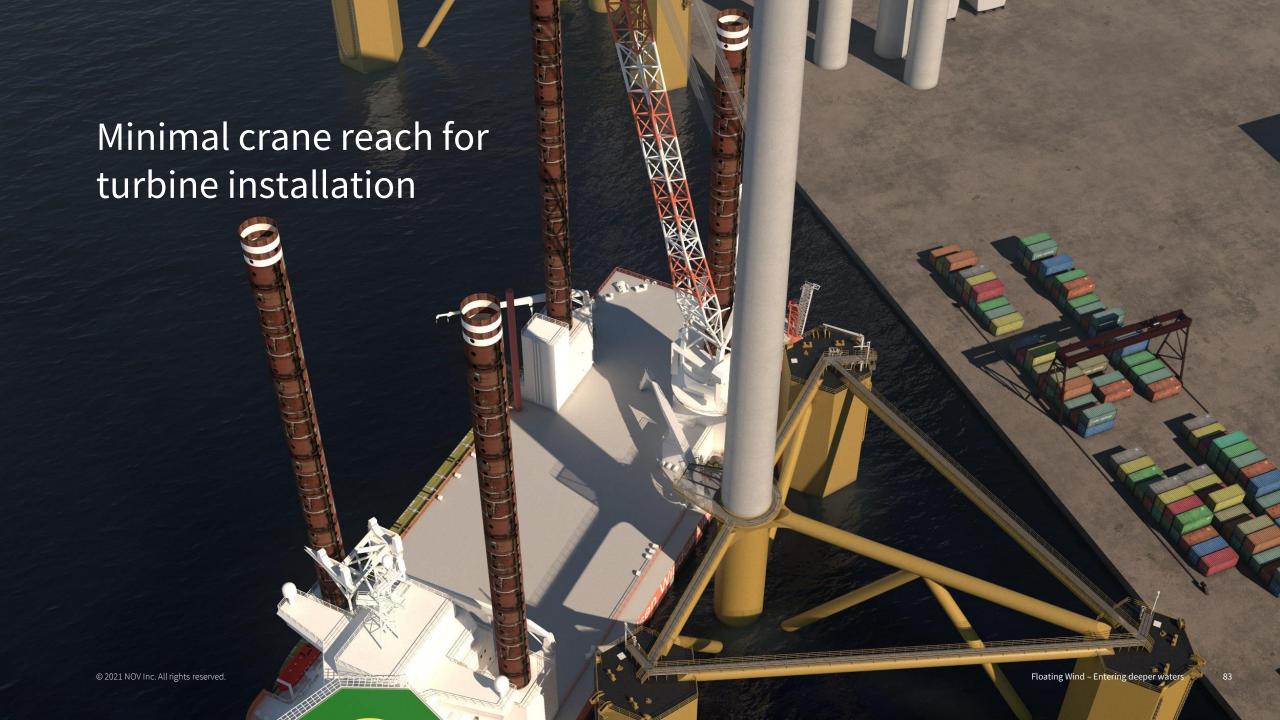












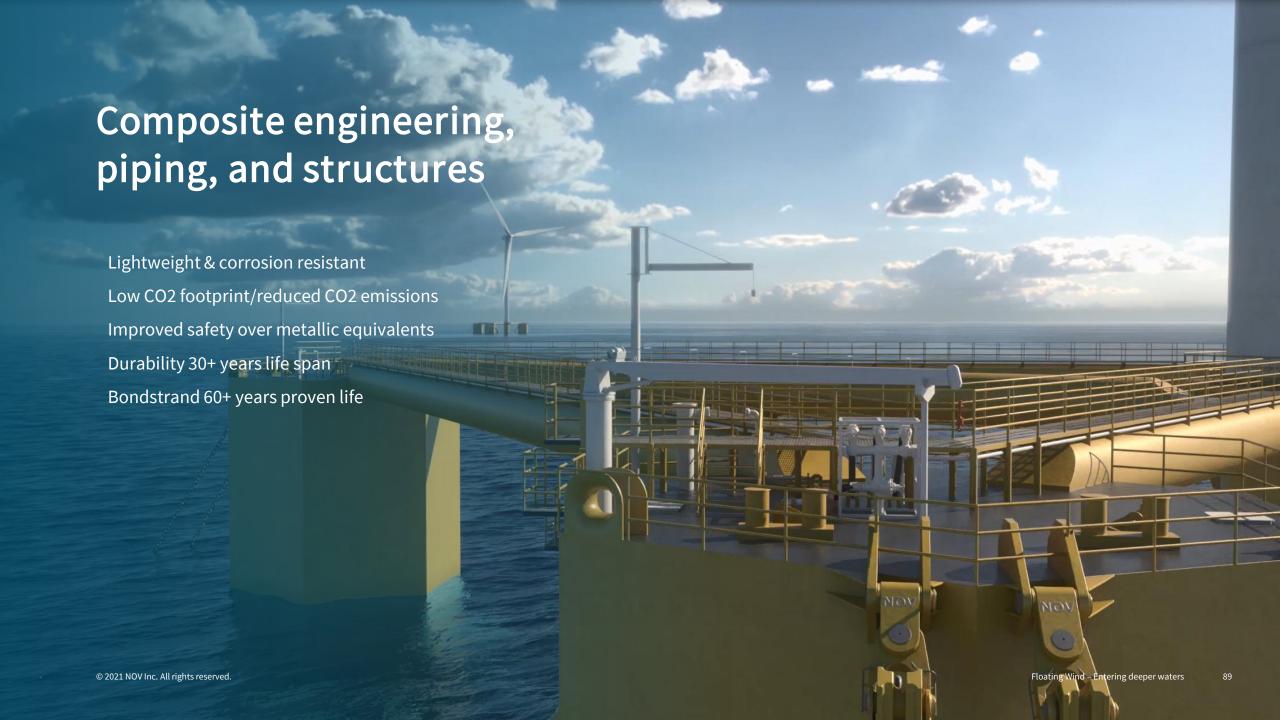


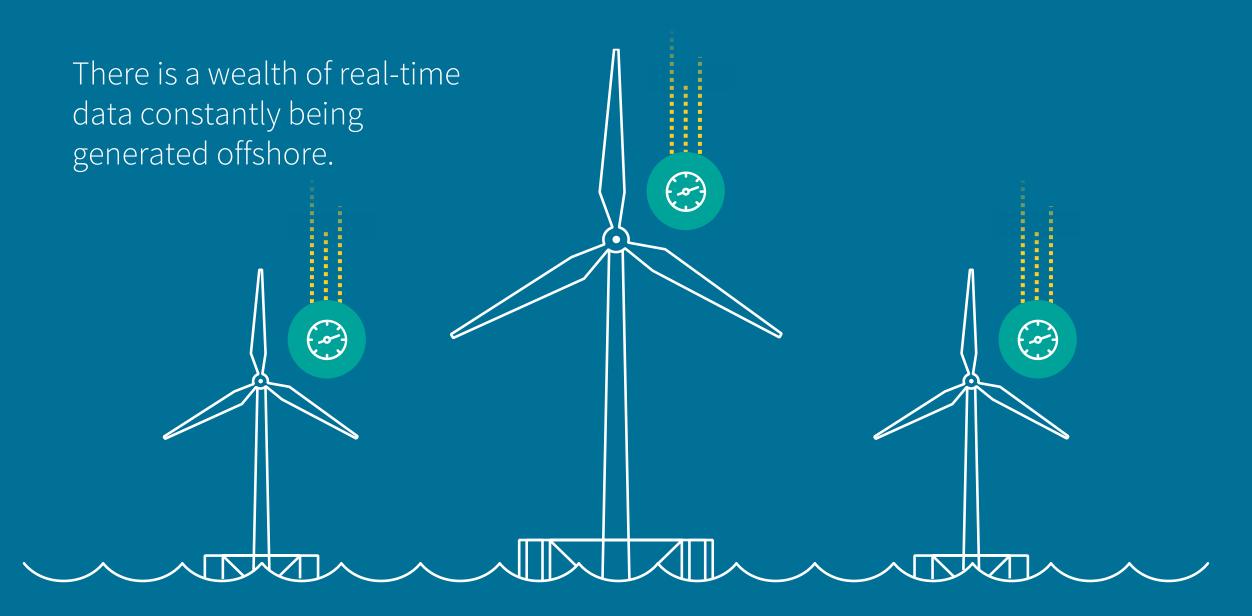




Mooring system Design and delivery of complete mooring system including anchors, mooring line and connectors Offshore installation support Complete life-cycle support © 2021 NOV Inc. All rights reserved. Floating Wind – Entering deeper waters







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Port-La Nouvelle

HUB FOR OFFSHORE ENERGY IN THE MEDITERANEAN SEA

June 28th, 2021



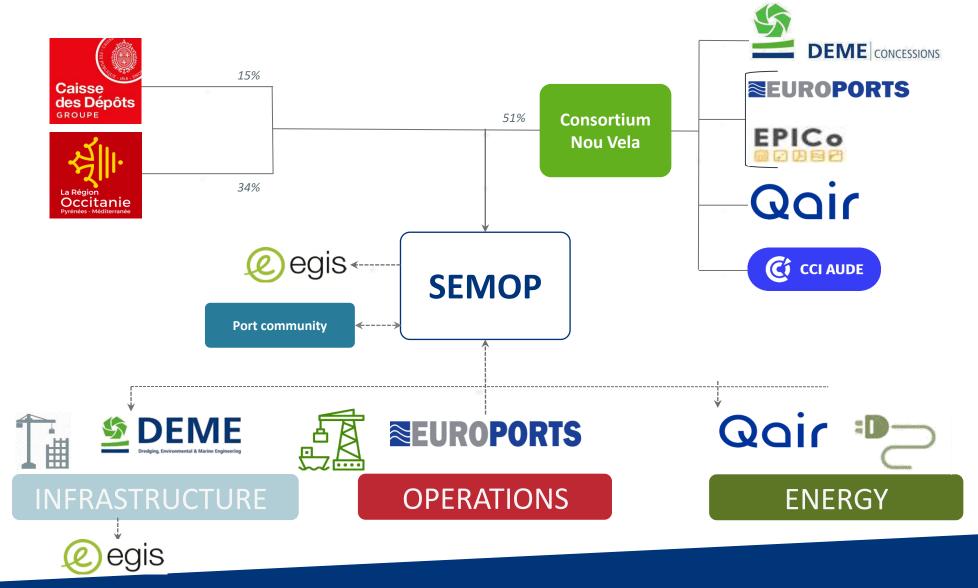
CONTENTS

- 1. SEMOP, the new concessionaire of the Port
- 2. The extension project & infrastructures
- 3. Dedicated terminal for the windmill operators
- 4. Services offered

5. Positioning



1. SEMOP PORT-LA NOUVELLE



2. THE EXTENSION PROJECT AND INFRASTRUCTURES



3. DEDICATED TERMINAL FOR WINDMILL OPERATORS





Infrastructures

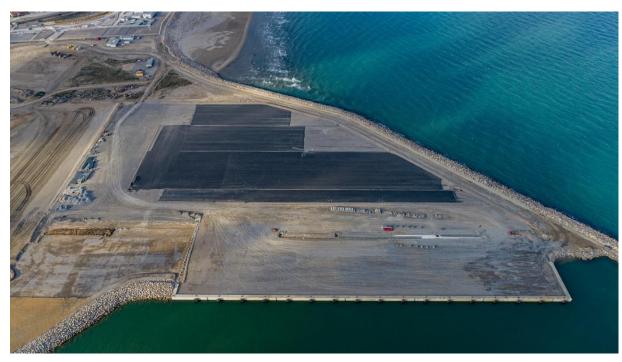
- Heavy load wharf for assembly and launching
- 2 Heavy load wharf to import and receive assembling elements (turbines, cradles, ...)
- 3 Activity and Storage area (15ha)
- 4 Production and Assembly area (16ha)
- Operational wind farm maintenance base

Operations

▶ Logistics operations ensured by Euroports & DEME

3. DEDICATED TERMINAL FOR WINDMILL OPERATORS & CONTRACTORS





Dedicated quay and yard in a nutshell

> 250m length

> Thickness: 1m

➤ 15 to 37m large

> 7,000 m3 of concrete

> 700 tons of steel

> Surface: 7 Ha

➤ Bearing capacity: 5 to 30 t/m²

22 months works: sept. 2019 till July 2021

Quay delivery: mid-July 2021



4. SERVICES OFFERED - WINDMILL TERMINAL

Interfaces management between windmill development players, industrial activities and port activities

Land operations on the terminal

- surfaces management,
- Land operations management,
- Storage and racking,
- Land deliveries management (road and rail),
- other services (offices, workshops...),

Services to ships

- Loading/Unloading / stevedoring,
- Shipping agency,
- Transit and logistics services,



4. POSITIONNING



2 floating offshore wind farm pilots right in front of Port-la Nouvelle out of the 3 wind farm pilots off the French Mediterranean coasts

Port-la Nouvelle, the only Mediterranean port offering all together:

- Deep water,
- Heavy load quay,
- Space for construction, launching and assembly
- Rail/road connectivity



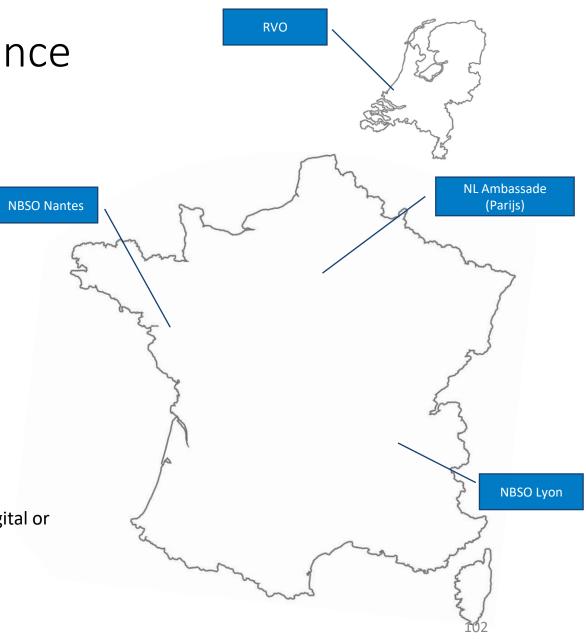


Economic netwerk of The Netherlands in France

- The Embassy of The Netherlands in Paris
- NBSO Nantes
- NBSO Lyon
- RVO, The Netherlands Enterprise Agency

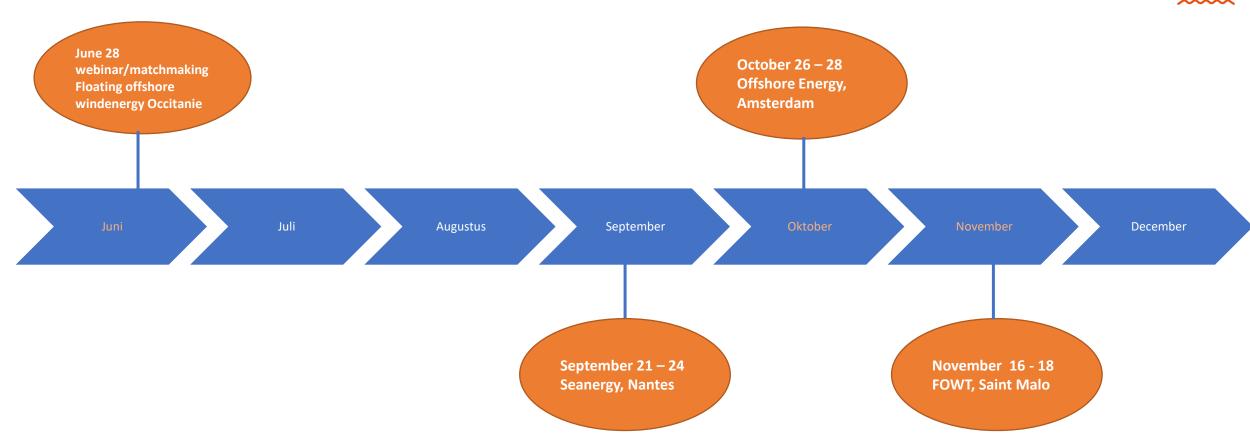
What do we do?

- Promoting NL-FR partnerships
- Practical support to Dutch companies with export plans
- Identification of business opportunities
- Trade questions and market information
- Participation in events: NL Lounges at Trade Fairs, economic missions (digital or physical), Webinars/Seminars etc.
- Cooperation with French Regions, organizations and companies



Event planning 2021 offshore wind in France





Trade Fairs Seanergy and FOWT



- > Trade fair, Technical visits, B2B meetings, conferences
- ➤ NL Lounge with 10 Dutch companies
- ➤ Organisation of side events for NL and FR companies:
 - NL and Occitanie: follow-up of this webinar, meet and great participants in real life
 - Matchmaking event Dutch and French companies



- ➤ Plenary sessions, Meet the buyer and B2B meetings
- ➤ Small NL booth and NL delegation
- > Organiation of side events:
 - 16th of November, matchmaking reception with French regions
 - We are looking into organising a matchmaking session between NL and FR companies



Energy Executives Training 2021

About the EET programme

- The Energy Executives Training is a programme offered by the Dutch Ministry of Foreign Affairs together with the Netherlands Enterprise Agency (RVO) and trade organisations.
- EET welcomes international business managers and government officials working in the sustainable energy sector to **build partnerships** with Dutch entrepreneurs.
- In 2021, the programme will be committed to Floating Offshore Wind and hydrogen.
- We invite a select group of foreign senior managers and government officials for an exclusive 4-day high-level knowledge and networking programme from 25-28 October 2021.
- The programme is linked to the **Offshore Energy Exhibition and Conference (OEEC)** in Amsterdam, that takes place from 26-28 October.



Programme outline

A high-level programme comprising of masterclasses, networking events, G2G and B2B meetings, and company visits during the OEEC 2021. There will be room for 1-on-1 meetings.

Monday 25 Oct

Company site visits (floating offshore wind)
Networking & social programme

Tuesday 26 Oct - OEEC

Offshore Wind Masterclass Networking & social programme

Wednesday 27 Oct – OEEC

Knowledge sessions floating offshore wind (optional) Hydrogen Masterclass Networking & social programme

Thursday 28 Oct - OECC

Company site visits (hydrogen and offshore wind)







Selection process

EET provides an opportunity for French and Dutch parties to deepen their relationship and further explore the potential of floating offshore wind for projects as well as future alliances in international context.

- The EET-programme is limited to approximately 10-15 senior managers / government officials. The Netherlands Enterprise Agency will conduct the final selection of participants.
- If you have any questions or are interested, please email to: m.reinders@nbso-nantes.fr (Mrs. Maret Reinders).



wind& water works

Thank you for your participation!

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