



**CLIPPER**  
Interreg Europe



European Union  
European Regional  
Development Fund

# **ROUND TABLE #2**

## **OPPORTUNITIES FOR DIVERSIFICATION IN SMART AND GREEN MARITIME INDUSTRIES**

# INFORMATIONS

- The profiles of this round table's speakers are available on the Imagina platform
- You can ask your questions in the chat : we will ask them to the speakers at the end of the session
- The replay of this session will be available online right after
- Don't forget to register and take part to this afternoon networking session !

# PÔLE MER BRETAGNE ATLANTIQUE

*Anaïs TURPAULT*





# TURKU UNIVERSITY OF APPLIED SCIENCES

*Ilkka RYTKÖLÄ*

**TURKU AMK** 

TURKU UNIVERSITY OF  
APPLIED SCIENCES



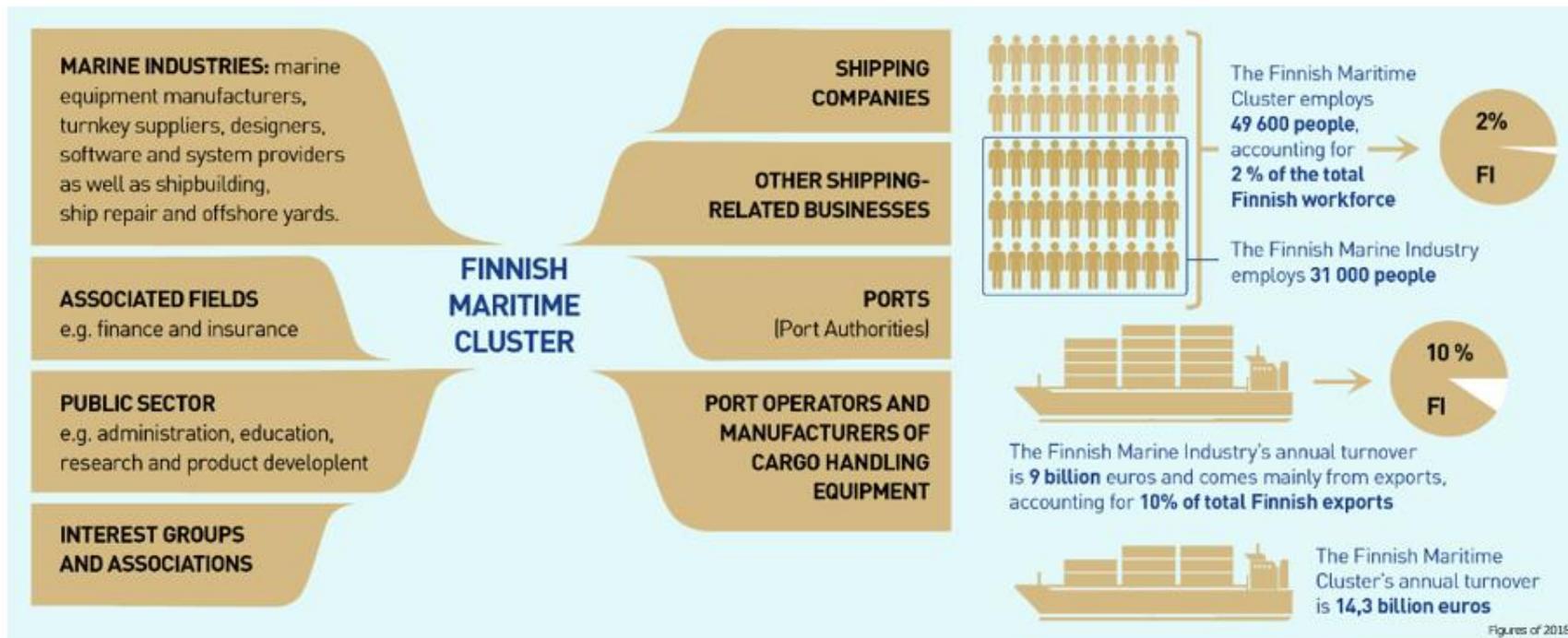


# Finnish Maritime Industries – Turku University of Applied Sciences – Smartship projects

Ilkka Rytkölä M. Sc. Naval Architect  
Senior Advisor – Marine Technology



# Finnish Marine Cluster





# Finnish expertise – Some examples



**Aker Arctic**  
Arctic development,  
design, engineering,  
consulting and testing  
services

**NAPA**  
Design &  
Operations  
Solutions

**Elomatic**  
Concepts and  
engineering

**Furuno Finland Oy**  
Integrated navigation bridges

**Almaco**  
Turnkey Interior areas



**Evac**  
Complete  
cleantech Solution

**IBM**  
Visual and audio recognition,  
AI, cybersecurity and  
blockchain solutions

**Marioff**  
High-pressure water mist  
fire protection technology  
HI-FOG®

**MacGregor**  
Handling marine cargoes,  
vessel operations, offshore  
loads, crude/ LNG transfer  
and offshore mooring

**Lamor**  
Oil spill  
response and  
environmental  
solutions



**ALUMINIUM AND STAINLESS MOBILE MODULES**

Mobimar

**CABINS, BATHROOMS AND RELATED EQUIPMENT**

Antti-Teollisuus  
Parmarine  
Piikkio Works

**CATERING EQUIPMENT**

Kavika  
Metos  
SeaKing

**COMPONENTS AND MATERIALS**

Hentec  
Joptek Composites  
Kempfi  
Lautex  
Mesekon  
nora flooring systems  
Paroc  
Planson United  
SBA Interior  
SSAB Europe  
Tebul

**ENGINEERING AND TECHNICAL CONSULTING**

Allstars Engineering  
Comatec  
Deltamarin  
Elomatic  
Foreship  
SDS Aura

**ELECTRICAL SYSTEMS AND COMPONENTS**

Atexor  
Caverion Finland  
Helkama Bica  
Hella Lighting Finland  
LST Group  
Promeco Group  
Protaccon  
Takorna  
Trafotek

**ELEVATORS**

Kone

**ENERGY AND ENVIRONMENT**

Alfa Laval Aalborg  
Blu Ocean Solutions  
Evac  
GS-Hydro  
Oilon  
Onninen  
Valmet  
Wärtsilä

**FIRE PROTECTION**

Marioff Corporation  
Saajos

**HVAC SOLUTIONS AND COMPONENTS**

Halton  
Koja

**NAVIGATION SYSTEMS**

Furuno Finland

**PROPULSION SYSTEMS**

ABB  
EIE-Maskin  
Rolls Royce  
Steerprop  
TEVO  
We Tech Solutions

**SOFTWARE, SAFETY AND ENERGY**

NAPA

**SHIPYARDS**

Arctech Helsinki Shipyard  
Meyer Turku  
Rauma Marine Constructions

**SURFACE TREATMENT**

FSP Finnish Steel Painting

**TURNKEY PROJECTS**

ALMACO Group  
APX-Metalli  
E.U. -Adhoc Project  
Joptek Composites  
Kaefer  
Merima  
Huuha  
NIT Naval Interior Team  
Orsap  
RR Site Service  
R&M Ship Technologies Finland  
S A Svendsen  
Shipbuilding Completion

**OTHER MEMBERS OF THE FINNISH MARINE INDUSTRY**

Admares  
Aker Arctic  
Ikonos  
Kvaerner Finland  
Lamor  
MacGregor Finland  
Machine Technology Center  
Turku  
Pemamek  
Priztech  
Stellio  
Technip Offshore Finland  
Uki Workboat



**Marine Industries offering for cruise vessels**

Meriteollisuus | Finnish  
Marine Industries

**MEIN SCHIFF 6  
TECHNICAL SPECIFICATIONS**

**Length over all:** 295,25  
**Breadth, moulded:** 35,80  
**Speed:** 21,4 knots  
**Gross tonnage:** 99 800

**Passenger capacity:** 2794  
**Cabins:** 1267  
**Crew:** 1061  
**Decks:** 16



## Finnish Marine Industries - Member Companies



9.6.2021

Meriteollisuus | Finnish  
Marine Industries

**Turku University of Applied Sciences is an inspiring community of 10,000 members – an innovative and multidisciplinary higher education institution, which creates international competitiveness and well-being for Southwest Finland**

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# BUSINESS FINLAND

# MarISOT

Maritime Immersive Safe Oceans Technology



MarISOT is a Business Finland funded project where focus is on

- Virtual safety training episodes
- Back end system

We are using latest virtual reality technologies such Varjo VR-2 and XR-3 devices

- Eye tracking data
- Combined with performance monitoring

TUAS budget around 700k€

Period: 2020/Q3 – 2022/Q2



## • Effectiveness of training

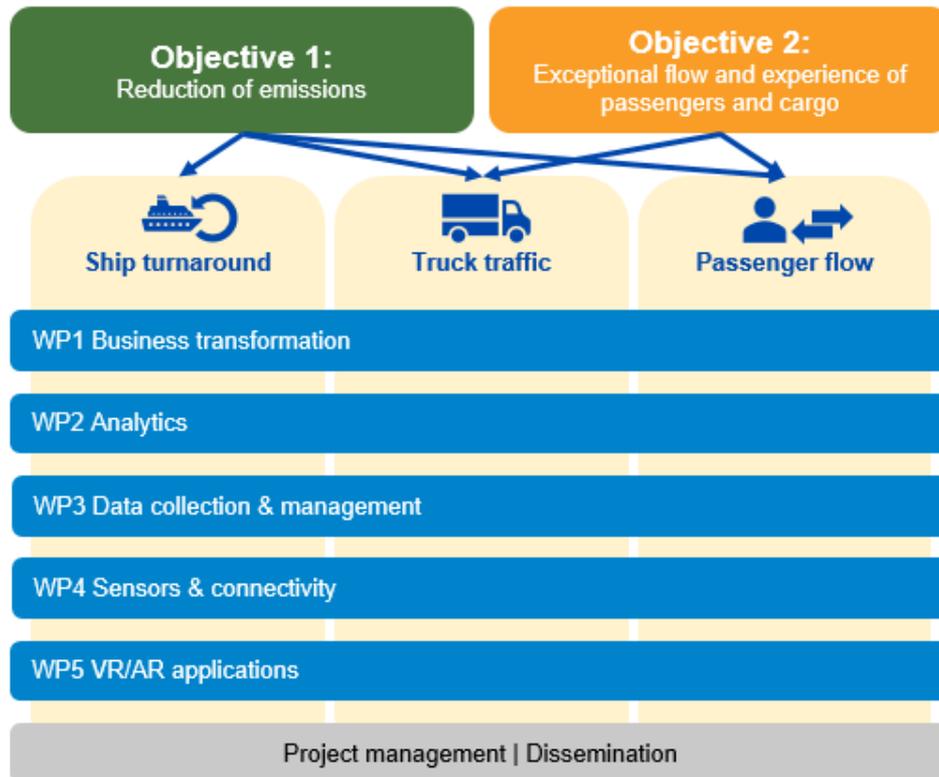
- To improve usability and user experiences and to increase the immersiveness, we can grab, hold, move, pinch, point or touch etc. objects in the virtual environment
- Eye tracking research of the basic cognitive processes in the VR is just emerging (Luimula et al., 2020)

# Smart Terminals (SMARTER)

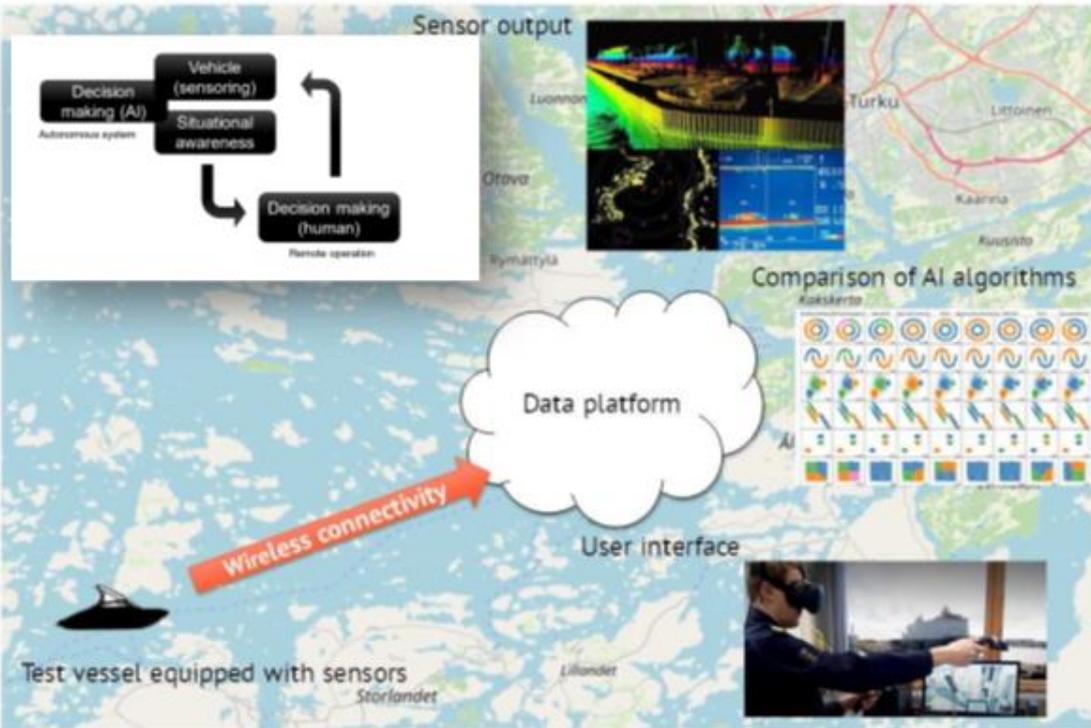
Replicable solutions for ropax terminals



Research project proposal  
Part of Sea4Value



- TUAS coordinating two work packages (WP4 and WP5)
- Combining expertise in 5G, IoT, VR, and AR
- Enabling digital twins in smart harbors
- Research activities with international harbors
- TUAS budget around 600k€
- Period: 2021/Q1 – 2022/Q4

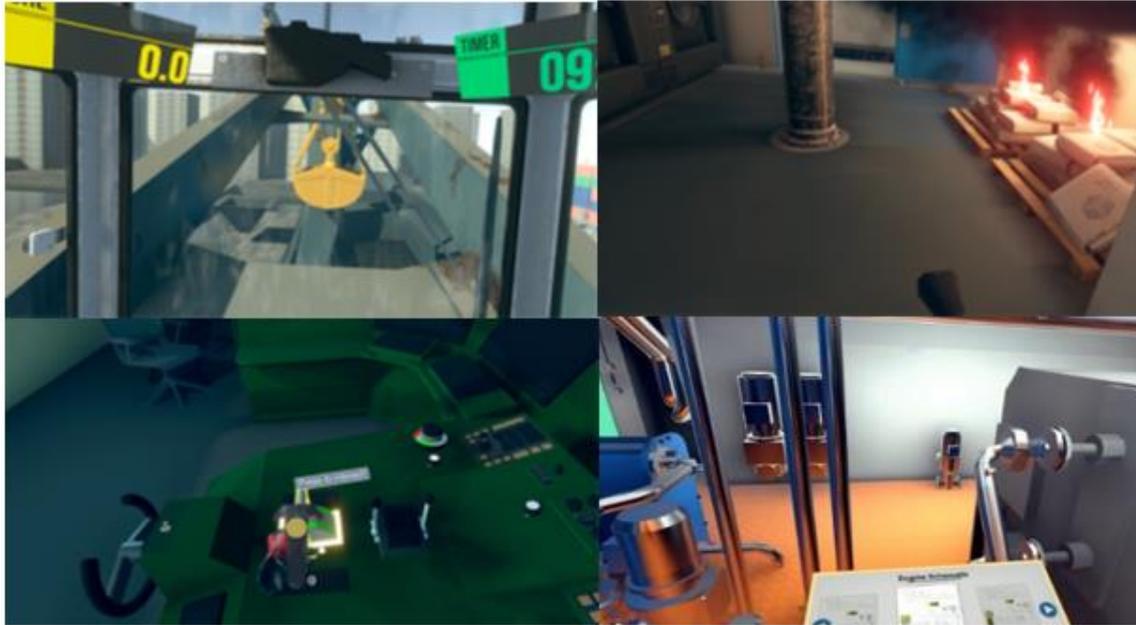


# Applied Research Platform For Autonomous Systems (ARPA)

Opetus- ja kulttuuri-ministeriö



Ministry of Education and Culture



# Applied Research Platform For Autonomous Systems (ARPA)

ARPA is a RDI project funded by Ministry of Education and Culture

- TUAS and Novia received around 1.4M€ funding

Research groups from TUAS ICT Unit focusing on smart connectivity, data platform, AI test facility, visualization, and user interfaces

TUAS budget around 1.2M€

Period: 2021/Q1 – 2023/Q4

Opetus- ja  
kulttuuri-  
ministeriö



Ministry of  
Education  
and Culture



# Kiitos

**Thank you! Grazie! Tack! Shukran! Merci!  
Danke! Dank U! Paldies! Takk! Gracias!  
Efharisto! спасибо! Hvala! Dziękuję!  
Obrigado! Aitäh! Tak! Köszönöm! Sağol!  
хвала! Асіў! Děkuji! Mulțumesc!谢谢!  
благодаря! Cảm ơn bạn! 고맙습니다!**





**NORSEPOWER**

*Konstantinos FAKIOLAS*



**NORSEPOWER**





# NORSEPOWER

PRESENTATION FOR CLIPPER  
CONFERENCE

KONSTANTINOS FAKIOLAS,  
DIRECTOR KEY ACCOUNTS  
NORSEPOWER OY LTD



# Contents

- **Bringing Sailing back to Shipping**
- **A transition to Green propulsion for ships**
- **Future Challenges**
- **Opportunities for Diversification**



# Bringing Sailing back to Shipping





## MISSION

To reduce the environmental impact of shipping through the commercialisation of innovative and modern sail power

## VISION

To set the standard in bringing sails back to ocean transportation, and empower shipping towards reaching the goal of zero carbon emissions



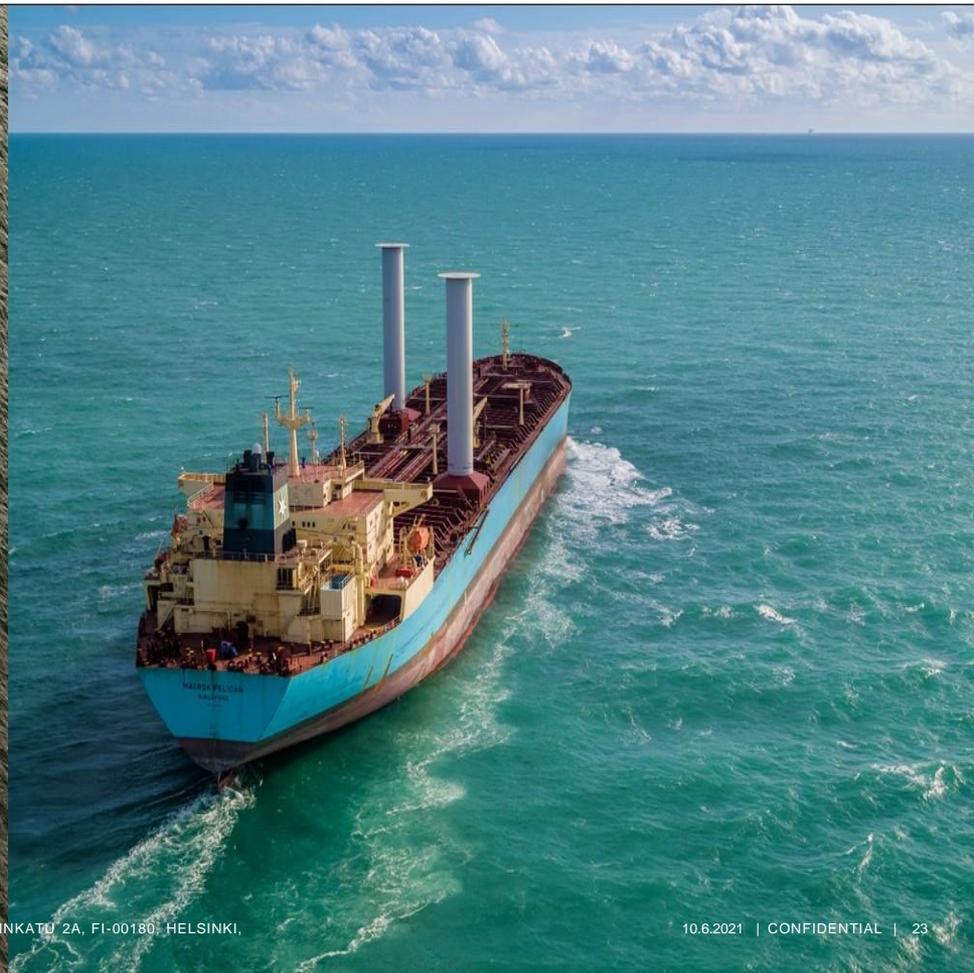
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NORSEPOWER

# Modernized wind propulsion

Using the ocean winds to produce forward thrust that propels the ship through a mechanical Rotor Sail technology



# A Transition to Green Propulsion for Ships



# 5 ships, 4 different Rotor Sail sizes, 140.000+ hrs



# Key differentiators to enable Green propulsion



- Technological sophistication
- Voyage & Operational optimization
- Modern automation & digitalized tools:
  - Computerized simulation & optimization of full-scale prototype designs
  - Integration to an automated ship power management
- Synthesizing compatible green technologies





# Future Challenges



# Remaining barriers

- Industry capital (the conflict between owners and charterers)
  - Energy effectiveness of a ship is becoming the main factor behind the residual value of the asset
- Psychological barriers in adapting new technologies (conservatism, fear of the unknown)
- Cultural barriers to accept and adapt to different business & operational models
- Slowness of technology transfer within shipping sector (i.e. regulations, etc)



Photo: Artur Sylwestrzak,  
SC Connector



# Opportunities for Diversification



# Market potential and environmental aspects

- Rotor Sail technology can be retro-fitted to about **30 000 vessels**
- Typical average annual fuel savings are **5-20%**
- Global CO<sub>2</sub> emissions reduction potential is **82 Million tons of CO2 / year**
- Environmental sustainability compliance requirements drive improvements in efficiency of ship designs. Rotor Sail technology is part of the solution to enable zero carbon shipping.

## Examples of compatible ship types and market size (> 500 GT)



Source: Equasis Statistics, The World Merchant Fleet in 2018



# Future ship design concepts with Rotor Sails

Rolls-Royce, Autonomous bulker (Naples Sept. 2018)



- Benefits for wind propulsion:
  - Optimized hull form to improve wind flow
  - Autonomous operation with 100% system integration
  - No superstructures to disturb the wind flow
  - No crew on board means no visibility limitations
  - Low free board causes less flow disturbance
  - Slow steaming
  - Combined with carbon free fueled engines (i.e. batteries, fuel cells)





**NORSEPOWER**

**Thank you!**



QUALITY  
INNOVATION  
AWARD  
2019



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**GENERAL ELECTRIC (GE)**

*Cedric MARICOT*





**ONSHORE WIND**



**OFFSHORE WIND**



**LM WIND POWER**

# UNLEASHING LIMITLESS ENERGY



**DIGITAL SERVICES**



**GRID SOLUTIONS**



**HYDRO**



**HYBRIDS**

<b>\$15.6B</b>	<b>95+</b>	<b>40,000+</b>	<b>~50,000</b>	<b>25%+</b>	<b>90%</b>	<b>400+ GW</b>	<b>&gt;10%</b>
REVENUE	COUNTRIES	GLOBAL EMPLOYEES	WIND TURBINES INSTALLED GLOBALLY	OF WORLD'S HYDRO INSTALLED BASE	OF UTILITIES WORLD-WIDE USE GRID SOLUTIONS TECHNOLOGY	INSTALLED BASE THE WORLD'S LARGEST CLEAN ENERGY FOOTPRINT	OF GLOBAL RENEWABLE ENERGY CAPACITY IS PROVIDED BY GE TURBINES



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As of December 31, 2020

A composite image of offshore wind turbines. The left side shows two turbines in the distance on a blue sea under a clear sky. The right side is a closer view of a single turbine with a yellow substructure. A blue banner with the word 'OFFSHORE' is overlaid on the left, and a light blue banner with the word 'WIND' is overlaid on the right.

**OFFSHORE**

**WIND**



Halbode 150-6MW installation, at First US Offshore Wind Farm

# Saint-Nazaire, FRA

First offshore windfarm in France

Parc éolien  
en mer de S<sup>t</sup>-Nazaire

**Developer: EMF**  
(JV EDF Renewables & Enbridge)

**Windfarm:**  
80 HALIADE 150-6MW (48 0MW)

**Foundations:** Monopile

To generate **20% of local electricity consumption**

**Assembly:** 2020-21

**Installation & Commissioning:** 2022

**Operation & Maintenance:** 17 years

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GE factory - St. Nazaire



Marshalling harbour (port of St. Nazaire)



Nacelle assembly line

# Saint Nazaire

## Offshore wind plant

### By the numbers

- +400 employees as of today
- ~200 more employees expected for the ramp up of the Haliade-X starting in 2022
- Extension works ongoing



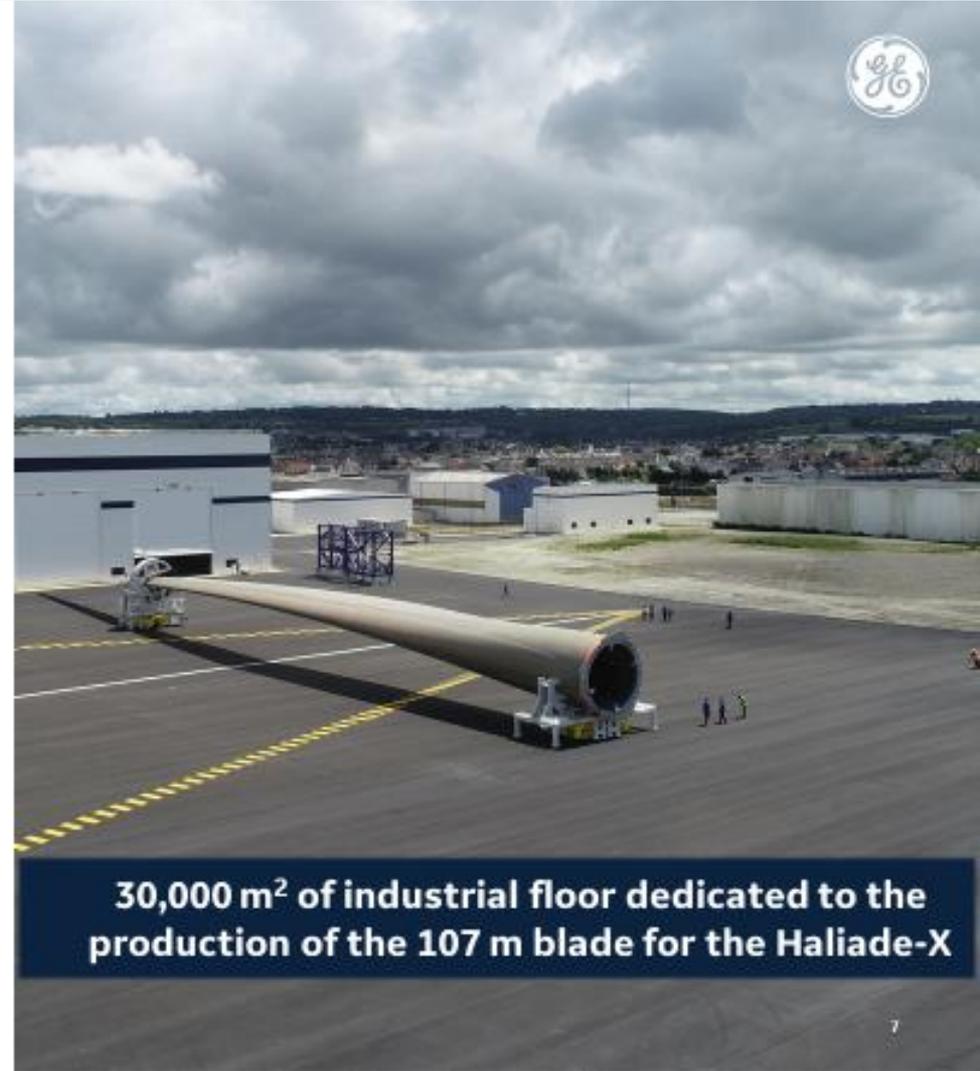
**Upcoming milestone: completion of assembly of 50 nacelles of the Haliade 150-6MW for the first offshore wind farm in France**

# Cherbourg

## LM Wind Power Plant

### By the numbers

- 450 employees as of today, hiring 300 more in 2021 ... we expect to employ 750 people by the end of the year.
- Set up to provide sets of blades for the world's largest offshore wind farm located in the UK ... Dogger Bank (3.6 GW)



# Example of Partnerships with French suppliers and R&D labs



Example of Partnership for development an offshore wind cluster

## French R&D partnerships



- ✓ Member of **IRT Jules Verne**, specialized in advanced manufacturing technologies, and **EMC2**, industrial cluster: **Involvement in 8 collaborative projects with SME and R&D lab for +3.6 M€ since 2013** in the field of surface treatment technologies against corrosion, composite technologies, robotics, health monitoring of welded mechanical structures and loosening of bolted connections. Launch of **+18 M€ (5M€ LM) project** to develop 100% recyclable composite wind turbine blades.



- ✓ Member of **Neopolia** and **Pasca**: launched projects with local suppliers to co-develop innovative solutions (re-design of support frames and Heli-pad, E-stack,...) to reinforce GE competitiveness



- ✓ Member of the **West Atlantic Marine Energy Center** and **Bretagne and Pays de la Loire marine science cluster**



Mobilizing industries, university and economical actors toward Zero carbon Energy transition



Thank You!



**D-ICE**

*Sylvain FAGUET*



**D - I C E**  
ENGINEERING



# CLIPPER Round Table #2

D-ICE Engineering

# About D-ICE

We are a team of PhDs & Engineers aiming to solve real & complex industrial challenges for Maritime & Energy industries.

## D-Team



## Main ambitions



Develop & Produce Clean Energy



Reduce Greenhouse emissions



Improve Safety at Sea



Technical & Commercial Partnerships

Multiconsult

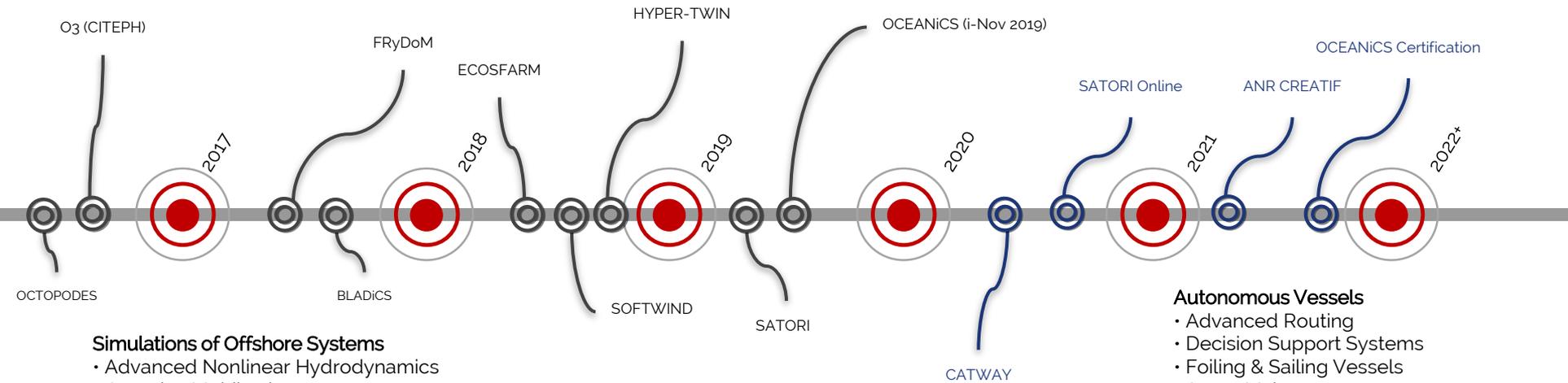


## Key figures

- Founded in 2015
- Offices in Nantes & Paris (France)
- Turnover about ~850k€ (2019)
- 17+ clients / 46+ projects
- 100% independent

*Hydrodynamics. Robotics. Control Systems. Artificial Intelligence. Software Engineering. Ice Mechanics.*

# R&D Roadmap



Scientific Developments

## Simulations of Offshore Systems

- Advanced Nonlinear Hydrodynamics
- Complex Multibody
- Digital Twins
- Cables Modelling
- Ice Structure Interactions

## Artificial Intelligence & Advanced Control

- Nonlinear Control
- Deep Learning
- Nonlinear Optimization
- Advanced Robotics
- Big Data Analytics

Fields of Application

## Autonomous Vessels

- Advanced Routing
- Decision Support Systems
- Foiling & Sailing Vessels
- Smart Maintenance

## Marine Operations

- Arctic Technologies
- Transport / Installation / Maintenance
- Decommissioning

## Marine Renewable Energy

- Floating Wind Turbines
- Wind Farms
- Innovative Systems

# CTV Performance study (2021)

Project Performance analysis of a CTV design

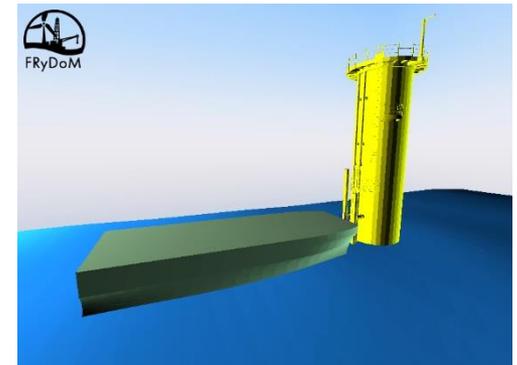
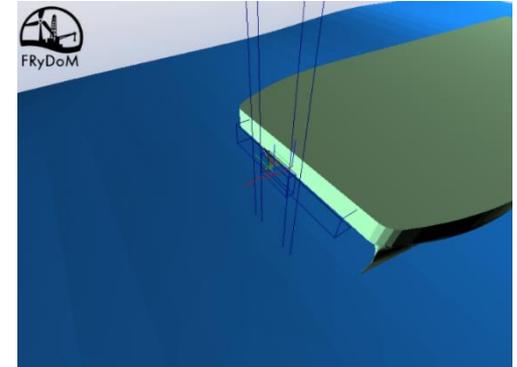
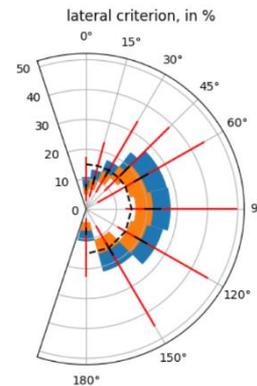
Client MAURIC (France)

Scope of work

- Meshing preparation
- Hydrodynamic databases
- Time domain simulations
- Sensitivity study
- Statistical criteria evaluation

Expertise

- Data science
- Hydrodynamics
- Multiphysics simulation



# Statistical Weather Routing (2018)

Project Statistical weather routing

Client Neoline

- Scope of work
- ~1200 historical optimal routes
  - 3 studies to evaluate ship operational profile
  - 3D polar : speed and route optimization
  - Dashboard visualization
  - Environmental conditions and ship performance statistics

- Expertise
- Routing algorithms
  - Data analysis



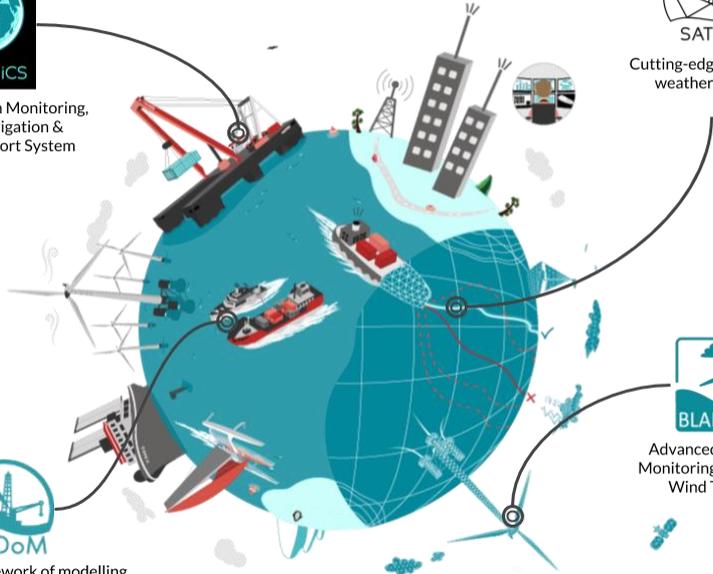
# Our Products



Next-generation Monitoring, Control, Navigation & Decision-support System



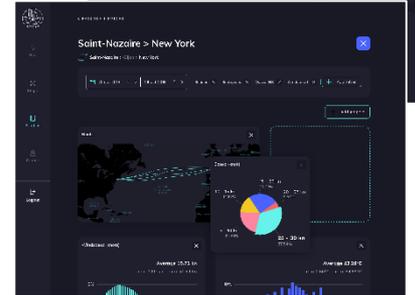
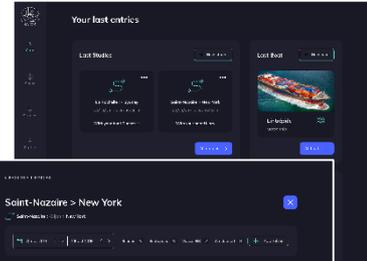
Advanced Framework of modelling & simulation of offshore systems and marine operations



Cutting-edge statistical weather routing



Advanced Control & Monitoring of Offshore Wind Turbines



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# WINDAR RENOVABLES

*Manuel Ignacio PEREZ*



**WINDAR**  
renovables



Windar renovables

# CLIPPER Conference

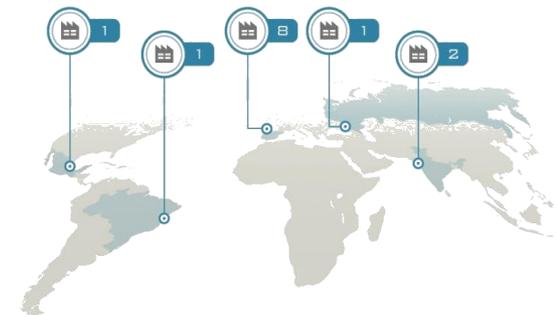
*Innovation to  
global solutions*

# 1 Company presentation



WINDAR is an **international company** belonging to a industrial group 100% private, owned and under the control of **Grupo Daniel Alonso** whose headquarters are in the north-west of Spain (Asturias region). WINDAR renovables offers global solutions for manufacturing of **wind towers** for wind turbines and **offshore foundations**.

Thanks to our historical progress and **sustainable experience** in the manufacturing of tubular steel structures, WINDAR renovables, has become a **global leader**. Due to our expertise, we are a **reference company** ahead of the most important wind turbine manufacturers in the world.



## 2 WTG References

We collaborate in the generation of wind, clean and renewable energy in substitution of energies that use traditional combustion fuels.

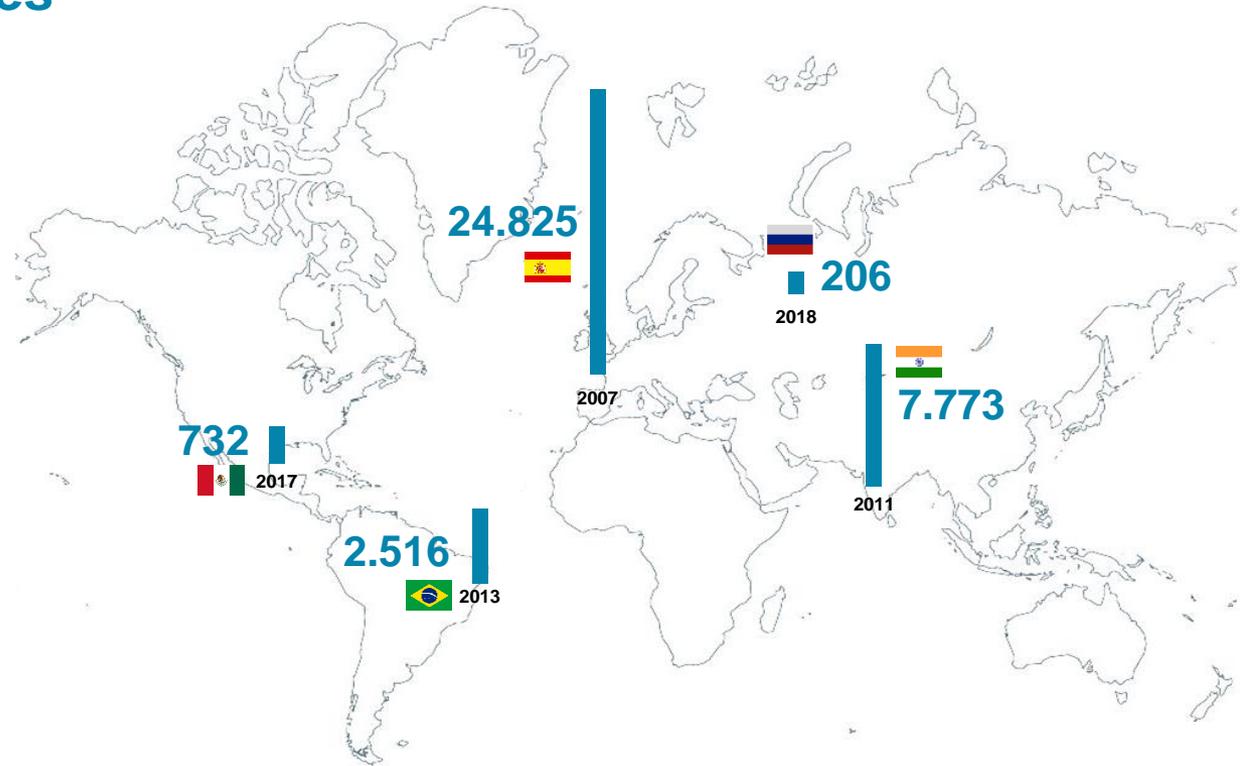
We evaluate our contribution as a responsible company by calculating the contribution based on our annual production and households supplied with renewable energy:

3.191.000

Households (offshore)

11.998.000

Households (onshore)



36.052

Sections manufactured

9.013\*

Towers in the market

24,34 GW

Onshore wind power

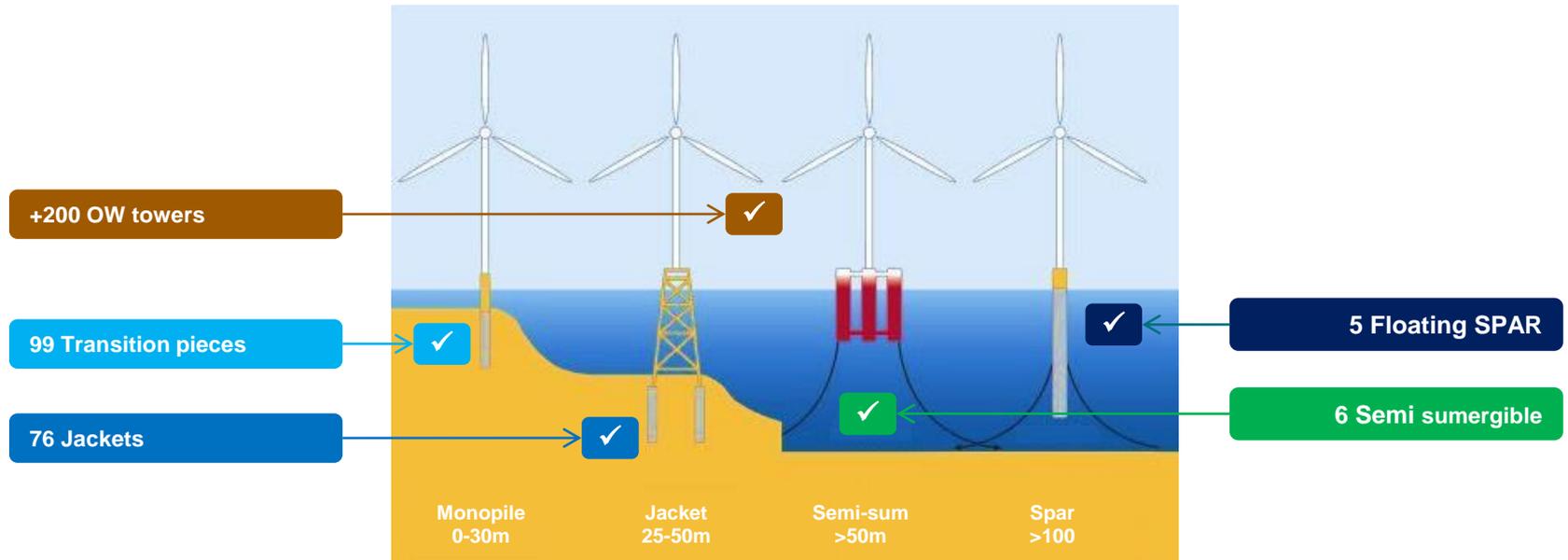
2,32 GW\*\*

Offshore wind power

Values 2019, considering average \* 4 sections/tower. In case of foundations equivalence \*\* towers + foundations

### 3 OW References

We are the only company in the world that has manufactured all types of offshore foundations



## 4 Technology and Innovation

The company has within the corporation, with a company called **WINDAR TECHNOLOGY AND INNOVATION** specially dedicated to providing industrial technology and innovation services to the different companies and production centers of the company, as well as to the development of our clients' products.

This company is made up of a technical team of professionals with extensive experience in the field of wind energy.

**Windar Technology and Innovation offers the following services to its clients:**

- Product engineering,
- Manufacturing engineering,
- Development & improvement processes,
- IT (information technology),
- R&D (research and development)

### PRODUCT AND MANUFACTURING ENGINEERING

Historically, our company has extensive experience of more than a decade in the manufacture and development of wind components for wind turbine.

This experience has allowed the company to add the design and calculation engineering activities of wind towers for wind turbine generators to its scope, offering a complete service to our clients around the world.

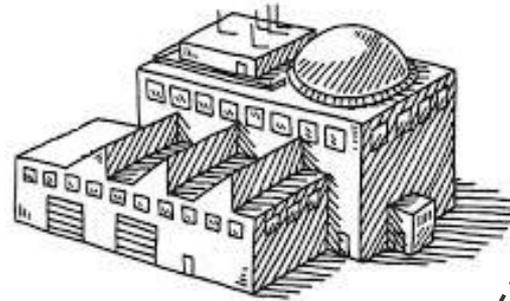
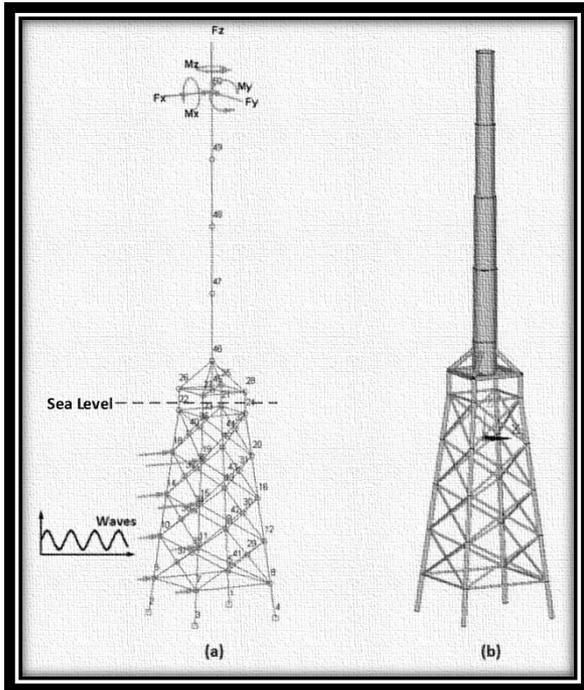
### PROCESS DEVELOPMENT AND R&D

The company continuously analyzes its production processes to carry out their **optimization** as much as possible, for which,

- a) **Innovate in its design,**
- b) **Automate manufacturing processes,**
- c) **Designs specific machinery for that purpose,**
- d) **Explore technological innovation,**
- e) **Train your employees in the use of new technologies**

We are concerned with training our employees in all stages of manufacturing, teaching them about the effectiveness of new steps in the process and the use of new media for that purpose.

## 4 Technology and Innovation



**OPERATION**

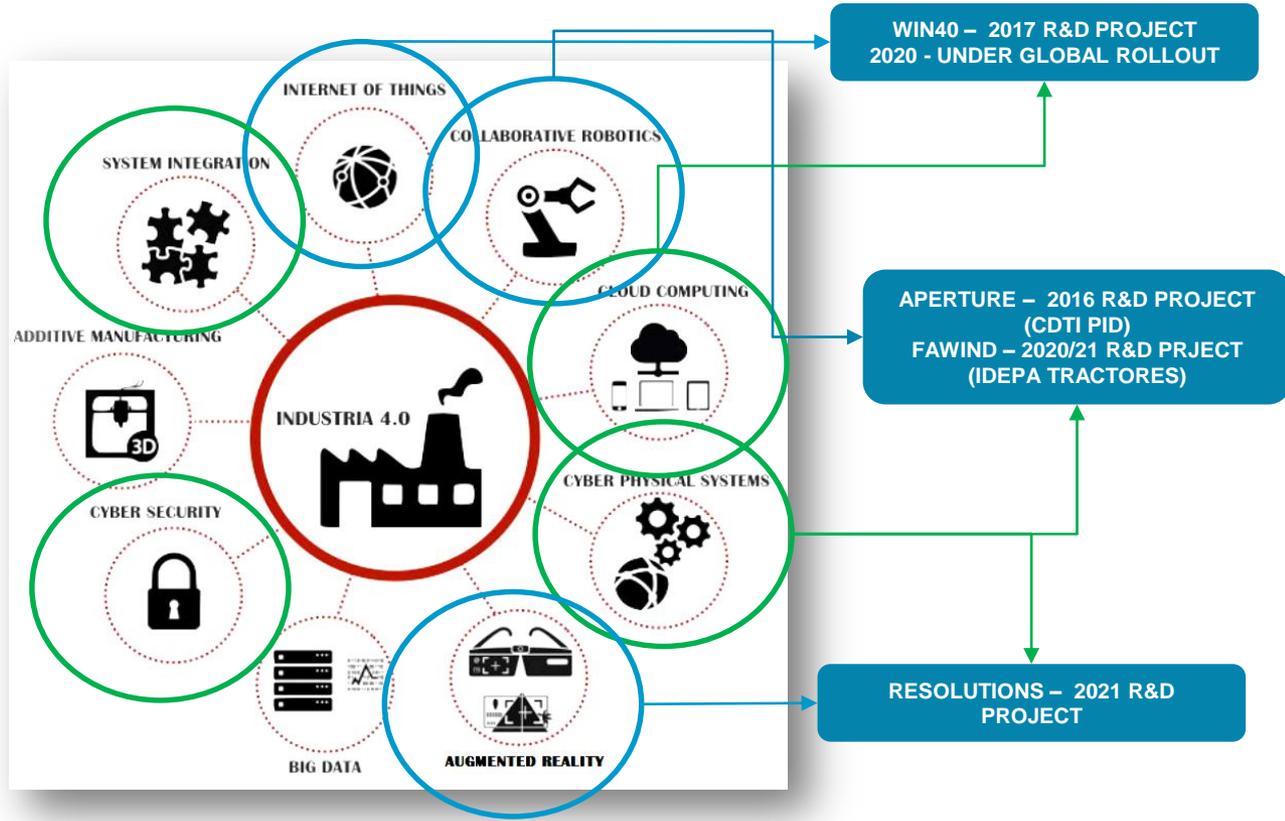
**MANUFACTURING**



**ENGINEERING**

**MONITORING**

# 4 Technology and Innovation





**WINDAR**  
renovables



Phone.:+34 985.560.090 | [www.windar-renovables.com](http://www.windar-renovables.com) | GPS (+43° 34' 0.09", -5° 55' 21.08" / 43.566691, -5.922521)

AVENUE CONDE DE GUADALHORCE, 57-59 AVILÉS, 33401 PRINCIPALITY OF ASTURIAS. SPAIN

**Q&A**

**DO YOU HAVE ANY QUESTION?**



**DON'T HESITATE TO USE THE CHAT**

**CONCLUSION**

# **REGION PAYS DE LA LOIRE**

*Charles DELALONDE*

