

French test beds for floating wind : Present contributions & Upcoming evolutions

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DeepWind Conference - 2021

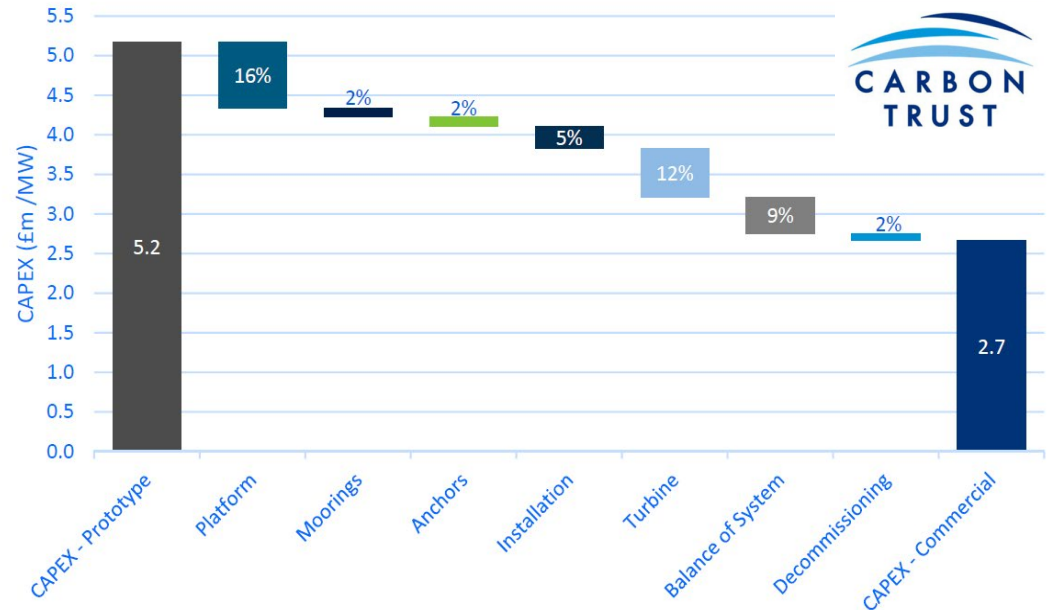
French test beds for floating wind : Present contributions



Open Sea Test sites – Test beds for prototypes

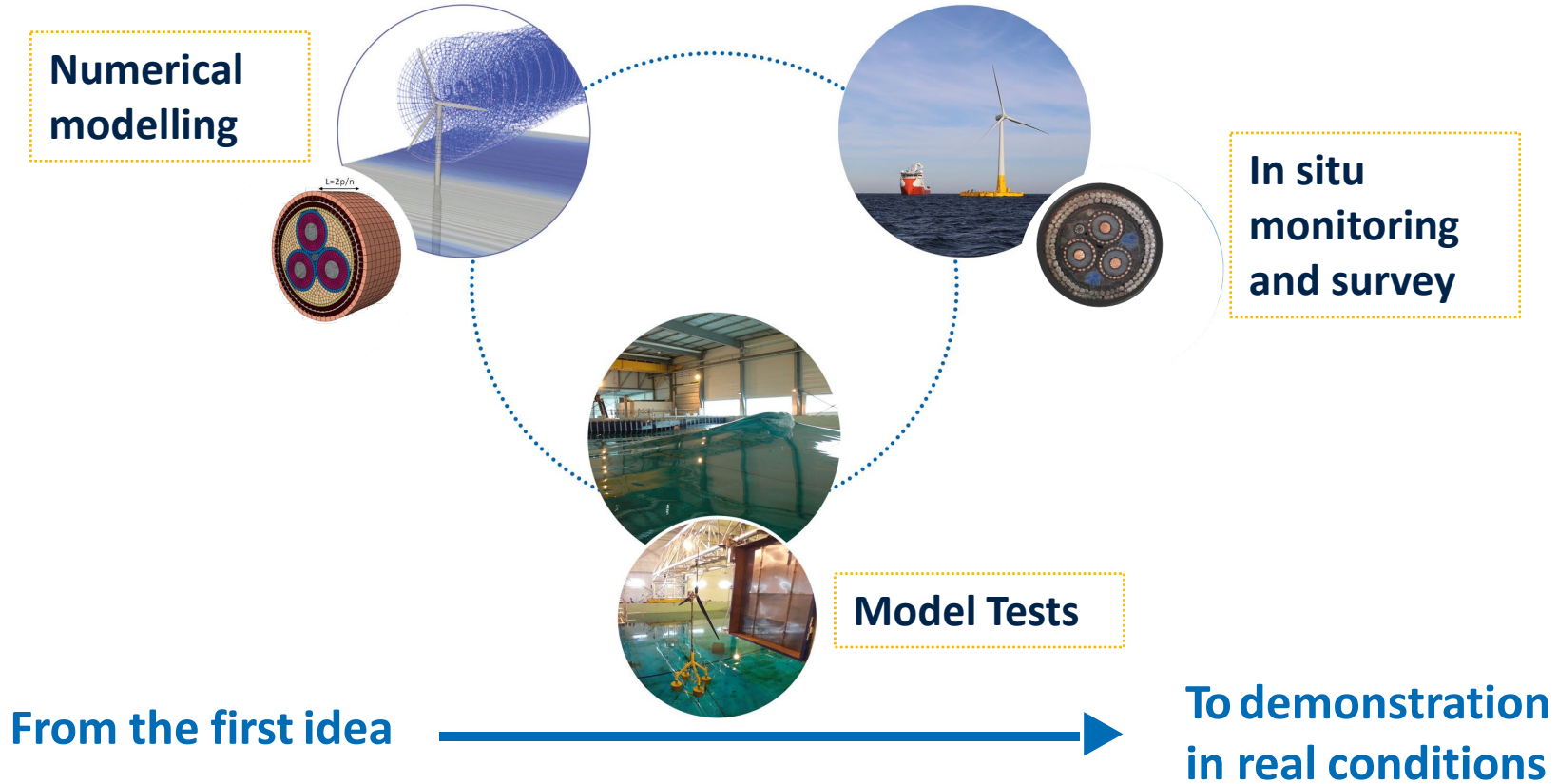
From prototype to commercial deployment:
Strong arguments in favor of non-technology specific Testing Capabilities

- Full scale testing as a key capability for **cost reduction**
- Test Sites : pre-consented, pre-existing infrastructure, monitoring and systems
- Public & Industrial interest : Non profit organisations as source of knowledge enhancement



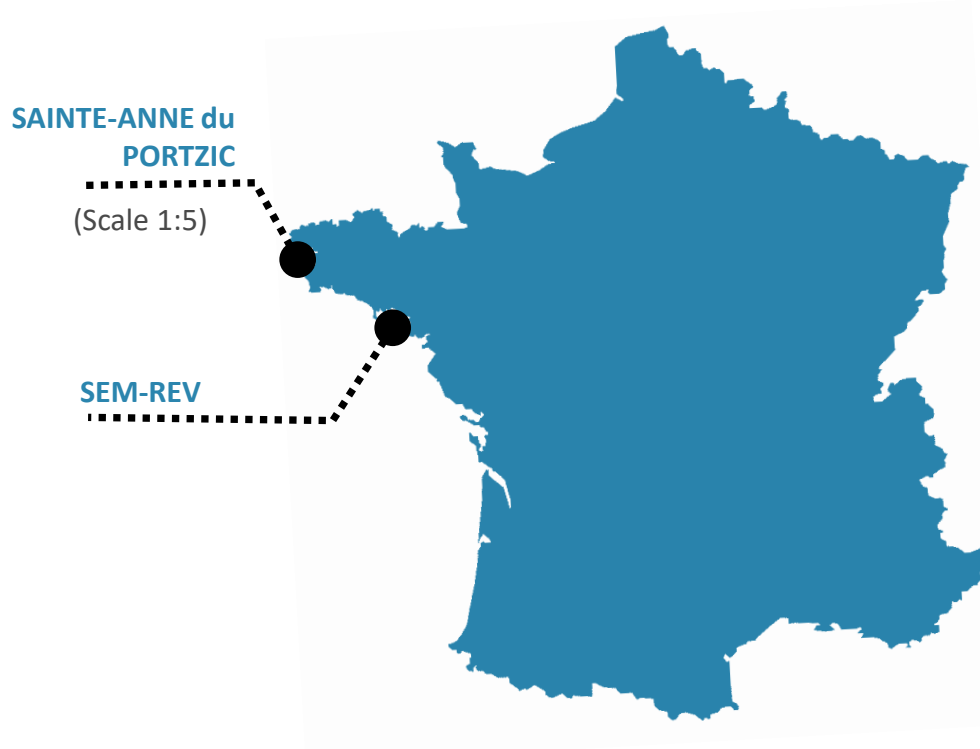
Open Sea Test sites – Test beds for prototypes

R&D path for efficiency, reliability and acceptability



Operational open sea facilities in France

Floating Wind Energy oriented capabilities



SEM REV



FLOATGEN (2 MW), Ideol



EOLINK (5MW)

SAINTE ANNE du PORTZIC



EOLINK (1/10th)

Structuring Sea Test Site activities

➤ National recognition :

- *Centrale Nantes & Ifremer, founding entities of Carnot Institute MERs (Marine Engineering Research for Sustainable, Safe and Smart Seas)*

- *Centrale Nantes & Ifremer's test sites, part of THEOREM, the French national research infrastructure for MRE*



TheoREM listed on the 2018 national research infrastructure roadmap

EU networks of testing infrastructures

European support to demonstration of technologies through :

OCEANDEMO and MARINE ENERGY ALLIANCE

Supporting Low Carbon Technology developers in NW Europe's test facilities



MARINET2, under H2020 Program

Supporting MRE developers to access Europe's test facilities



MARINERG-I, under H2020 Program

Planning an integrated European Research Infrastructure



Integrated technological and scientific strategies

Demonstration of Technology ...

FLOATGEN ID1 prototype (FP7) :

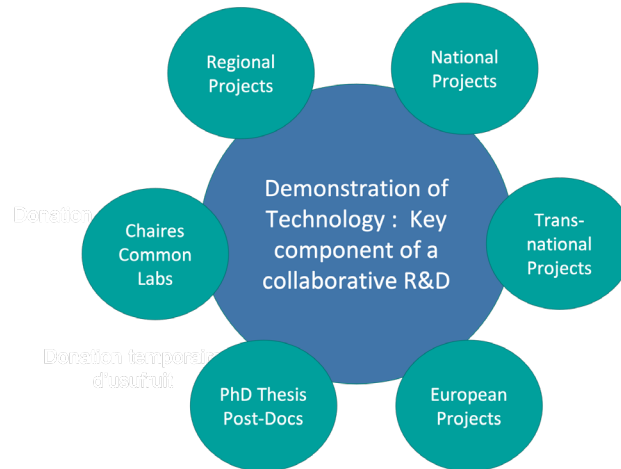
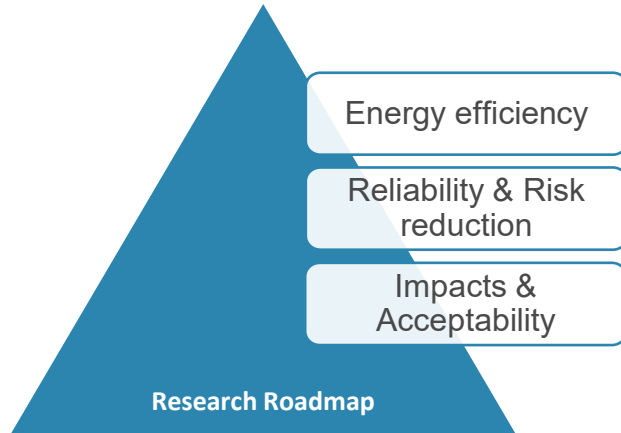
“Year 2019 – 6 GWh, availability 94.6%

February 2020 – 66.3% capacity factor”

IDEOL



... Complemented by several collaborative research projects



Complementary collaborative research projects

Floatgen « Joint Lidar Experiment » on SEM-REV :

- Nacelle Lidar : Project **Vamos** , Coord U. Stuttgart
Access on SEM-REV completed through H2020 MARINET2 program
 - Deployment up to 3 year, total budget ~1.5 M€
- Scanning Lidar : Coord Centrale Nantes
 - Deployment : target 6-12 months, starting mid-2021
 - Regional funding, composite project including **Floateole** & **Wakeful** projects (regional funding by WEAMEC)

Energy Efficiency

Reliability & Risk
reduction

Impacts &
Acceptability

Research Roadmap



Complementary collaborative research projects

H2020 MSCA ITN FLOWER:

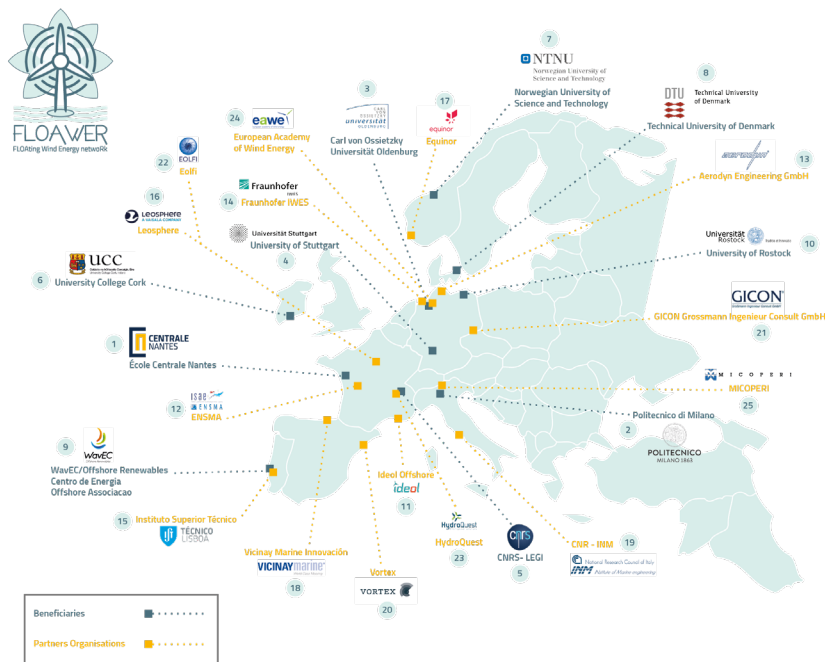
- 2019-2023
- Training of 13 PhD dedicated to Floating Wind Energy topics

Energy
Efficiency

Reliability & Risk
reduction

Impacts &
Acceptability

Research Roadmap



WP1: COORDINATION

FLOATING OFFSHORE WIND
Emerging market driven by
European pioneers

BUSINESS
Global leadership of European companies in
offshore wind energy development



INNOVATION
Innovative, efficient,
cost-effective floating
wind turbine designs



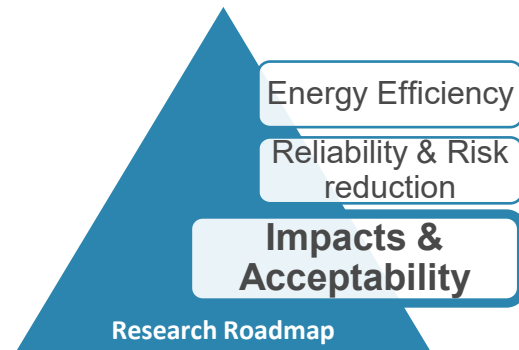
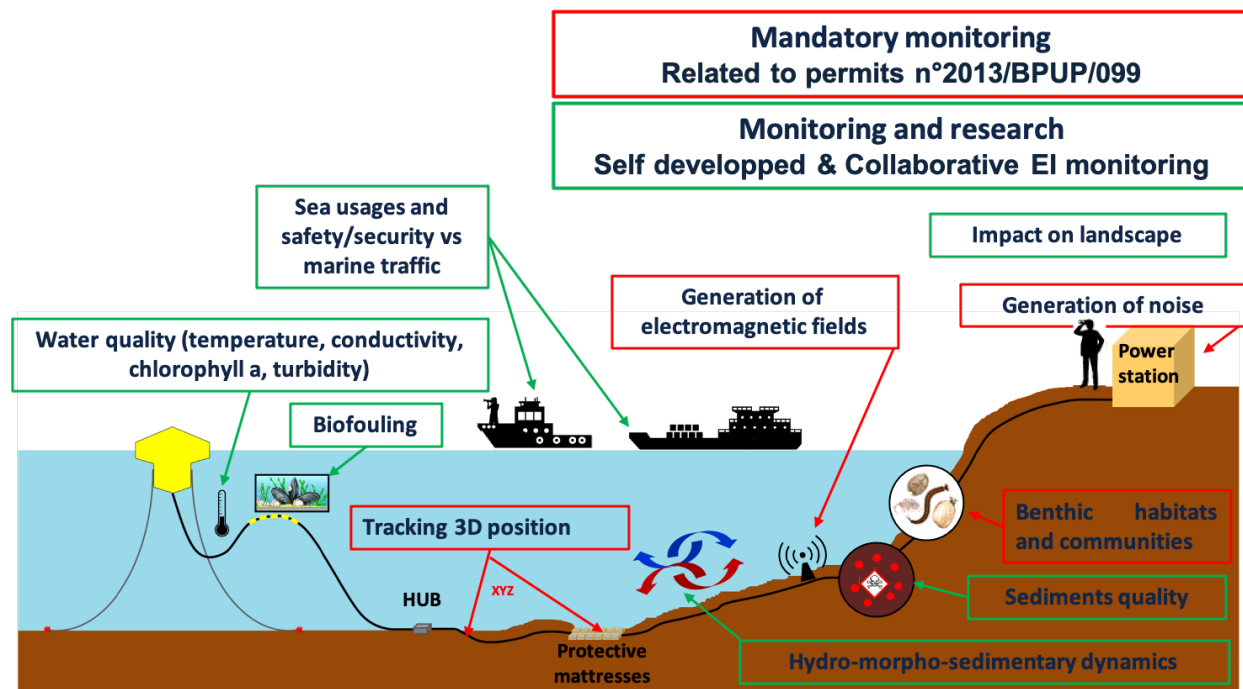
WP2: Training

EDUCATION
Transdisciplinary highly
skilled wind energy experts

WP3: Knowledge dissemination,
Exploitation, Industrial liaison and public outreach

Complementary collaborative research projects

Monitoring of Environmental Impact : Knowledge enhancement and dissemination



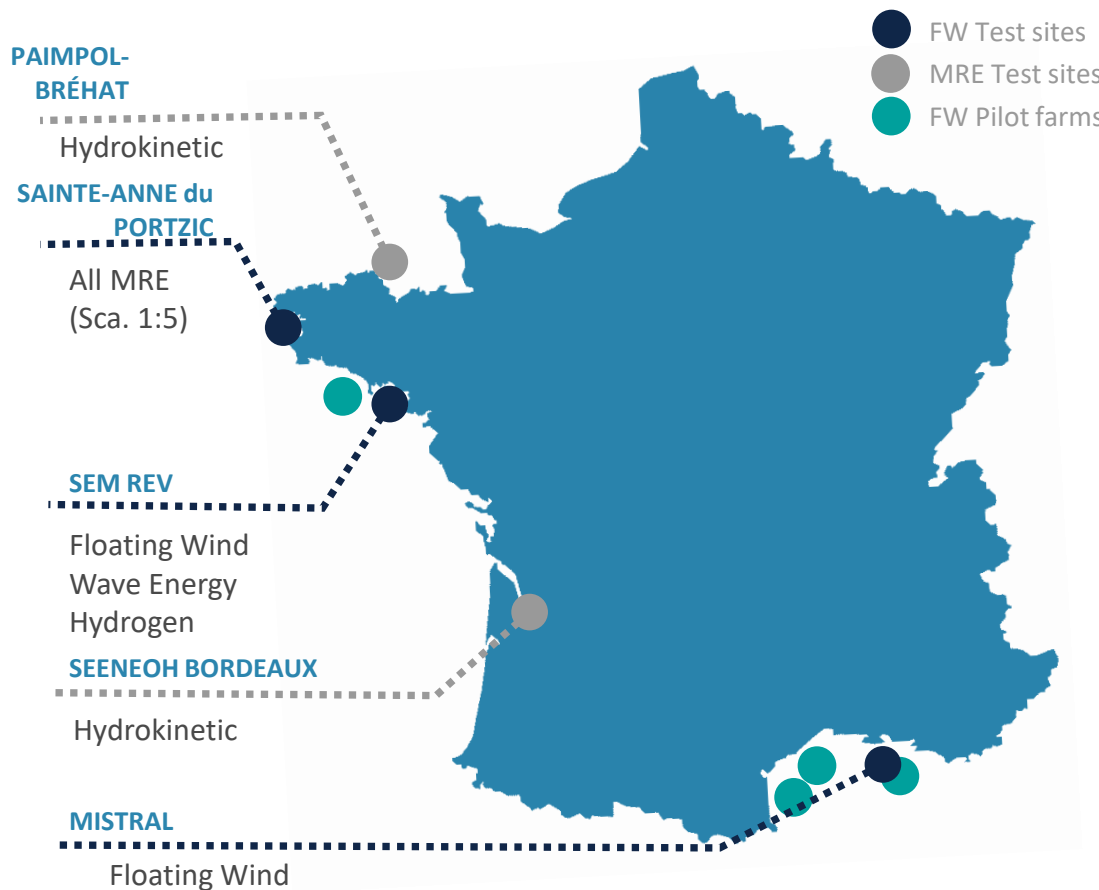
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New Foundation for Scientific Cooperation

Emerging body for the operation of the 5 French MRE test sites



Unified capability to host any MRE technology :

- Generic consenting
- Grid Connected
- Short duration testing
- Specific Business Model

Balanced capabilities on different seafront

- 4 operational test sites
- 1 to be developed : MISTRAL, the only test site on the occidental mediterranean side

Strong complementarities :

- One single non-profit public interest organization as operator
- Wide range of site conditions and infrastructure properties
- Mutualized resources and complementary teams

Aimed at carrying an ambitious investment program

BASED ON THE STRENGTHENING OF CAPABILITIES FOR GRID CONNECTIONS

| | Budget (k€) |
|--|---------------|
| SEM - REV | 16 000 |
| 10MW upgrade | 8 500 |
| Floating Substation incl. power to H2 | 6 500 |
| Support Center | 1 000 |
| MISTRAL | 14 500 |
| Grid Connection 16,9 MW | 13 000 |
| Instrumentation | 1 500 |
| SEENEOH | 500 |
| Export cable exchange + Scada | 300 |
| New mooring system & SCADA | 200 |
| PAIMPOL BRÉHAT | 1 500 |
| AC connection capabilities | 1 500 |
| SAINT-ANNE du PORTZIC | 3 800 |
| Grid Connection / Instrumentation | 3 800 |
| TOTAL | 36 300 |

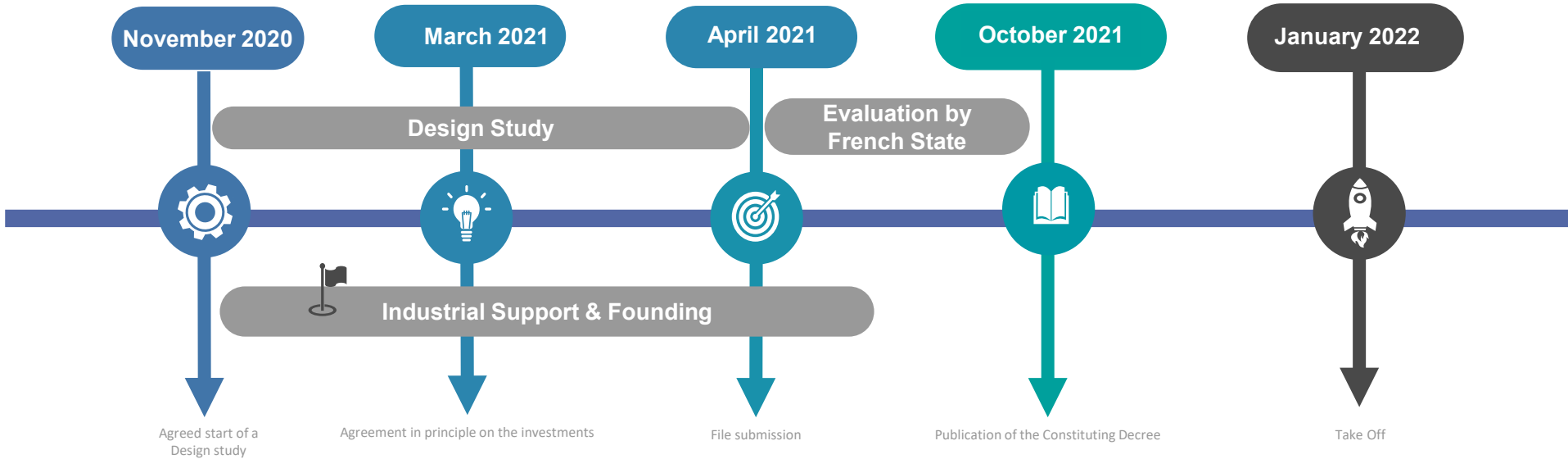
Targetted sources of fundings :

- French Regions and State
- National and EU Recovery Plan
- FEDER including REACT-EU



ROADMAP & SCHEDULE

FOUNDATION FOR SCIENTIFIC COOPERATION

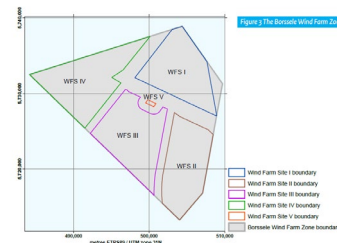
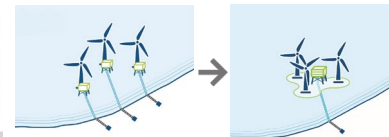
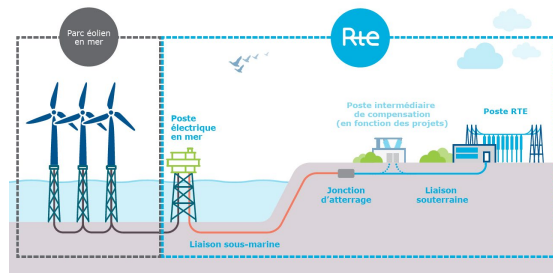


: Agreement in Principle - January 2021

AND BEYOND : Parallel actions for 10MW+ testing facilities

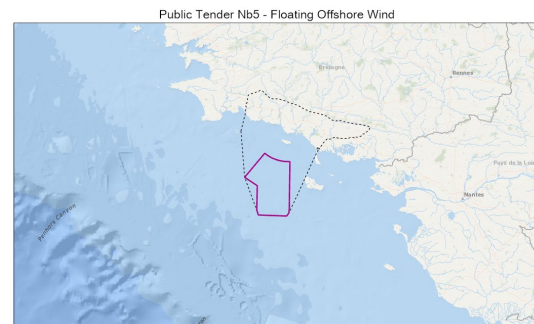
✓ Objectives of the French TSO (RTE) :

- Mutualized connections
- Other usages including test facilities already envisioned
- Inspired by EU fixed offshore initiatives (i.e. Borssele Wind Farm)



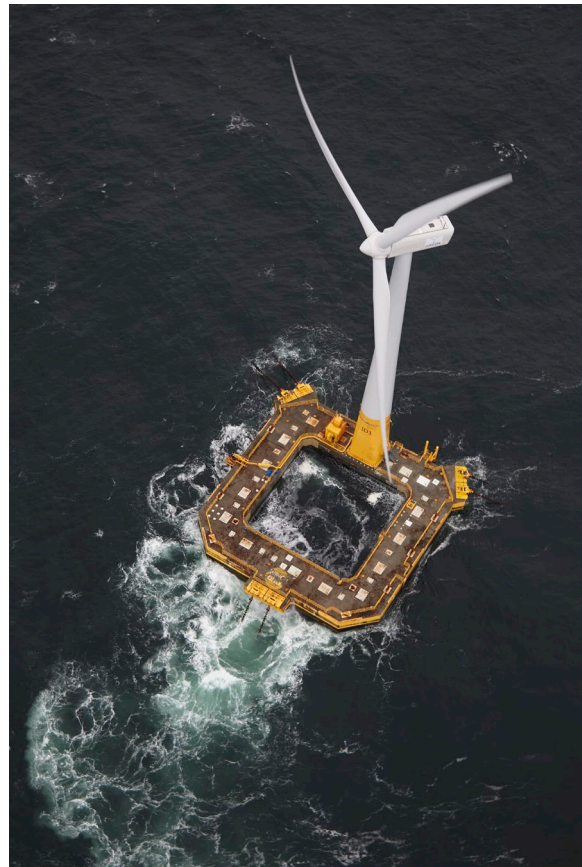
✓ Commercial tenders for floating wind in France :

- First is pending in 2021 (250 MW)
- Other will follow



Key Conclusions

- Successful coupling strategy between demonstration of technology and collaborative R&D programs
- Emerging French foundation for Scientific Cooperation - Ongoing structural evolution toward :
 - Increased efficiency and capability
 - Reduced demonstration costs
- Preparatory actions for development of future 10MW+ testing capabilities



Thank you for your attention

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