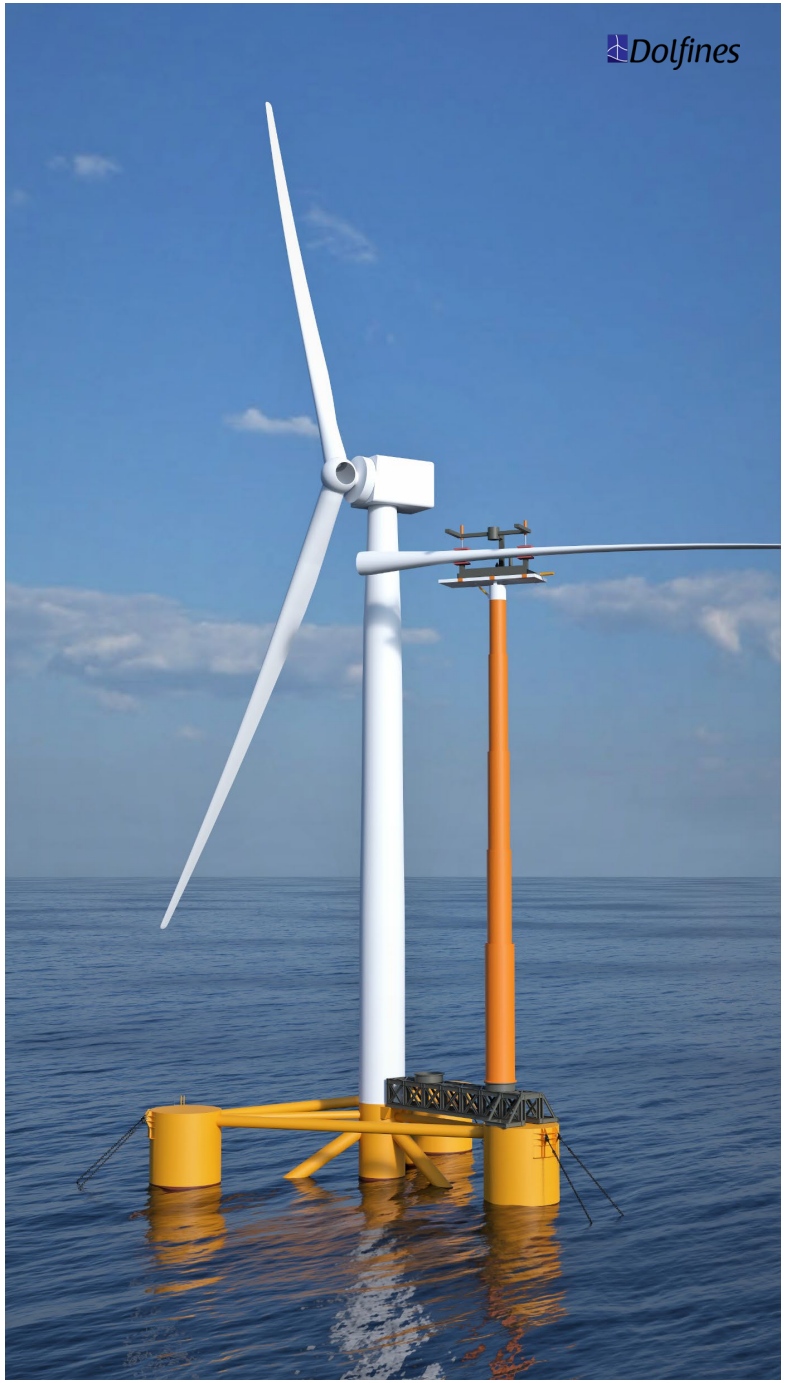
Dolfines

Innovation to execute heavy maintenance of commercial scale floating wind farms & lower project risks

ADEME / NEDO Conference – 7 July 2022



Dolfines

20+ years of services in the energy sector

Inspection, Audit & Performance

Drilling Rigs through Dolfines Factoring

Renewables through

8.2 | France

8.2 | Madrid

Technical assistance & Expertise

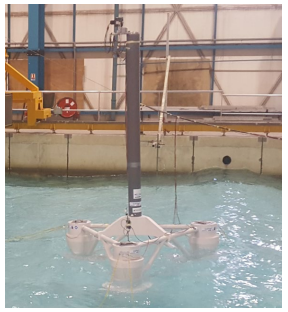
Engineering, Technology & Projects

Projet EolFloat (2018)

TrussFloat 6MW

ADEME

INVESTISSEMENTS D'AVENIR



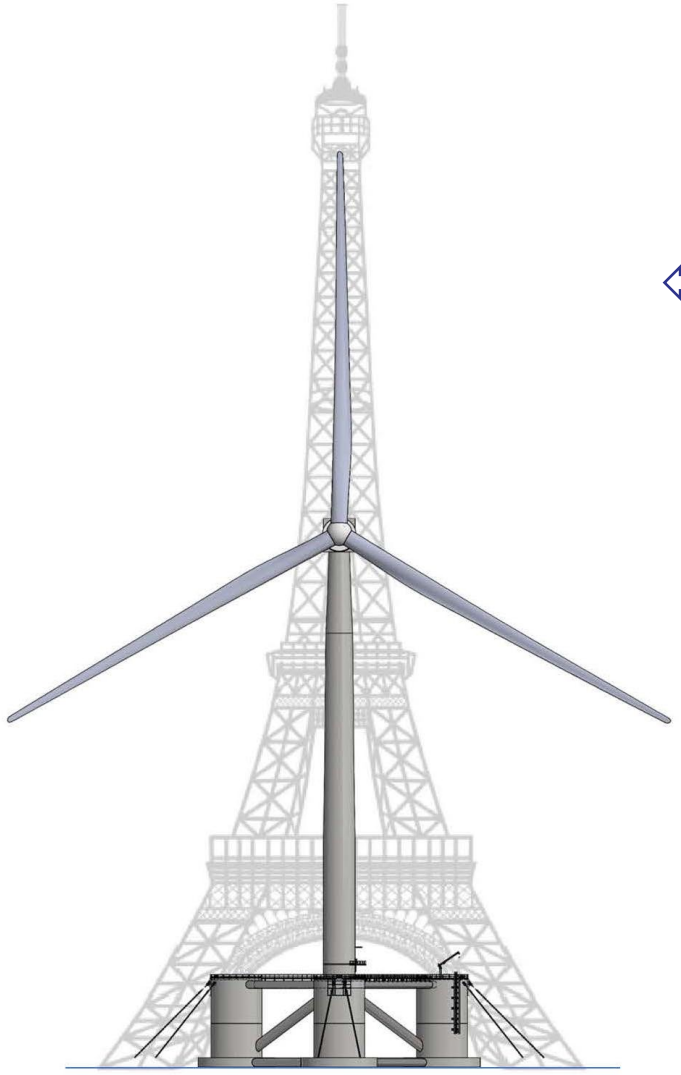
Returning to port to repair a floating wind turbine means:

1. Disconnect the electric cables and place them on the seabed
2. Unmoor the floater and place the anchor lines on the seabed
3. Tow the floater to the nearest maintenance port
4. Bring the floater back to the site after its repair
5. Recover the anchor lines and moor the floater
6. Recover the electric cables and reconnect them to the floater

= six risky offshore operations that require summer sea conditions

If we add to this the interfaces with the port which constitute an additional risk, you understand why **it will be necessary to do the heavy maintenance on site**.

How to perform the heavy maintenance on site ?



Problem n°1 : reach the hub

At least 140m above sea level
=> Crane boom height > 170 m

Problem n°2 : manage relative motions

between floating turbine and maintenance vessel

Problem n°3 : manage swinging motions

due to floater displacements

A solution : the OHMe (*)

PATENT PENDING

- ✓ **Reach the hub**
- ✓ **No relative motion**
- ✓ **No swinging motion**

(*) OHMe : Offshore Heavy Maintenance enabler

https://youtu.be/HGXGdrtVljc

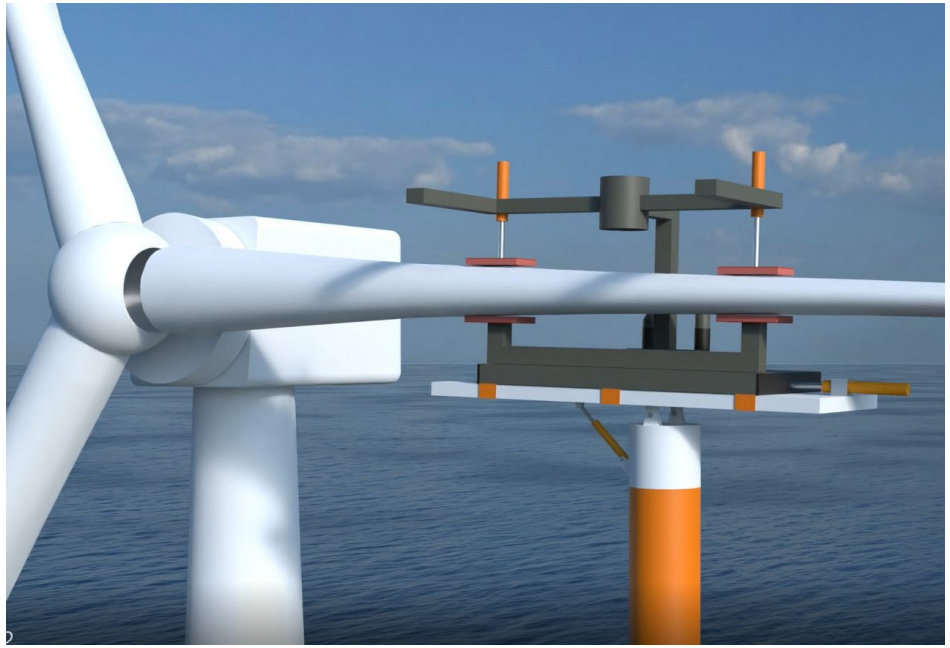
Compatible with most semi-subs and barges

PATENT PENDING

OHMe : a modular solution

Blade handling tool

equipped with a 5-axis table



Temporary Support Structure

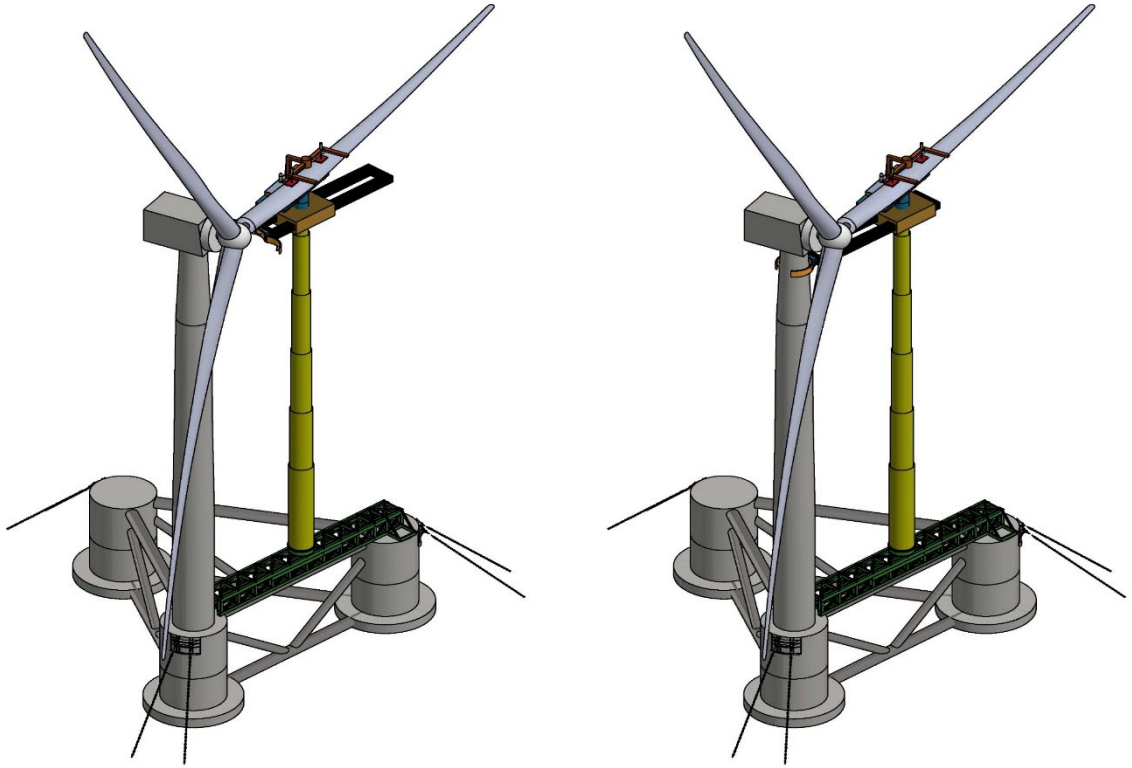
designed to limit floater structural reinforcement

PATENT PENDING

OHMe : a modular solution

Locking arm

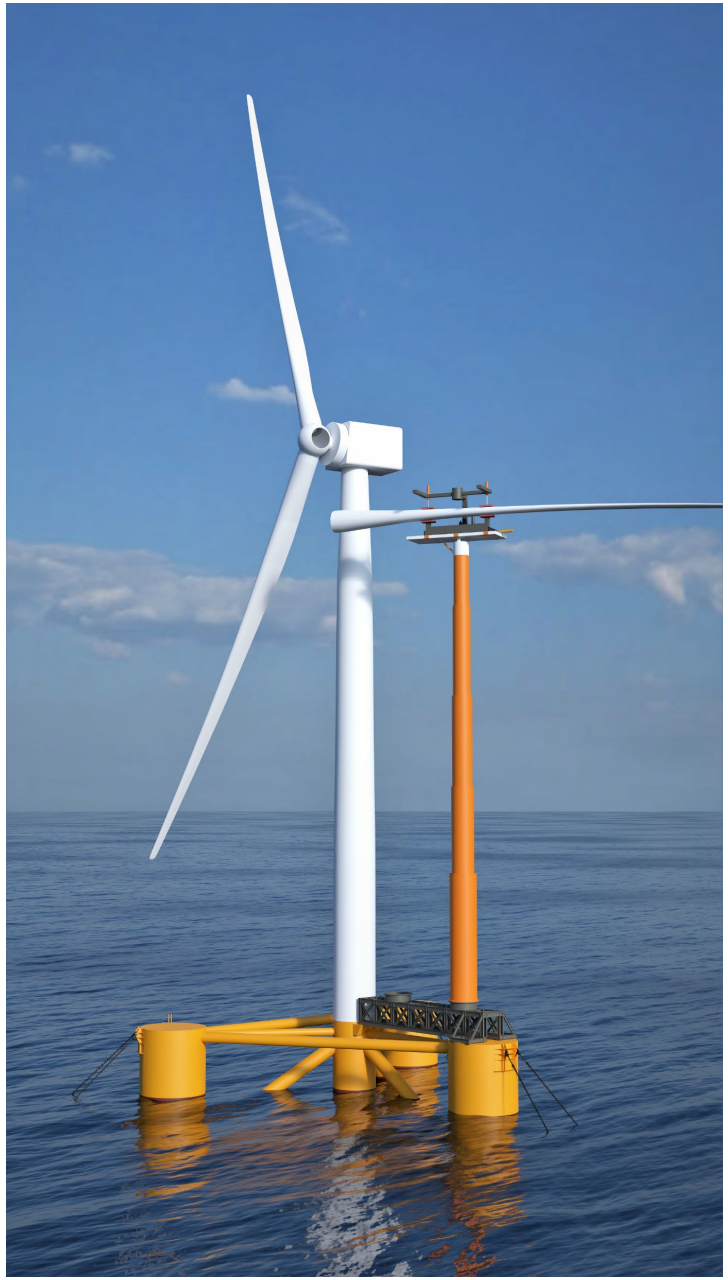
to improve operability during blade connection / disconnection



PATENT PENDING

Top crane

to perform heavy lift at the nacelle



OHMe : advantages

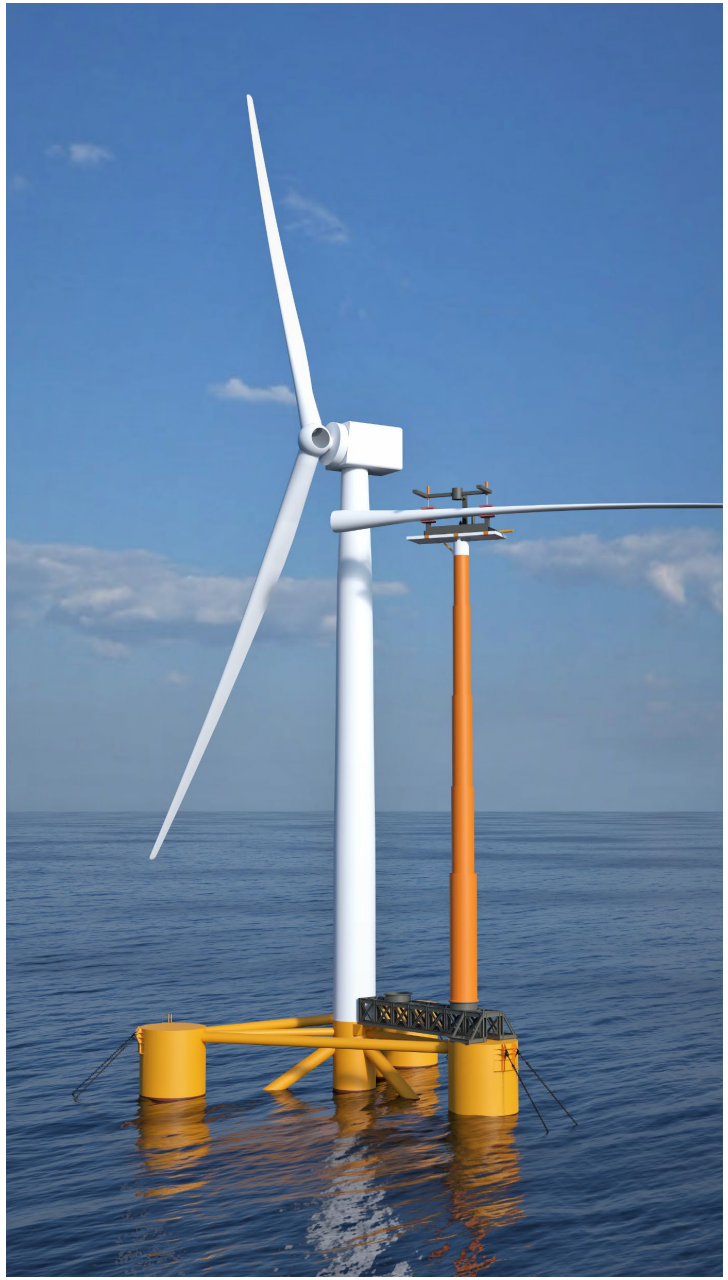
Compared to other methods of maintenance on site :

1. Compatible with all turbines – No modification required on the mast or on the nacelle
2. Require a « standard » heavy lift vessel
3. Use safe & field proven offshore operations

Compared to a tow back to port solution :

1. Cheaper on CAPEX – no need to manage temporary absence of one floater
2. Reduce project risks
3. Cheaper repair
4. Quicker repair - Save production

Expected saving per event > 50%



OHMe : Roadmap

- Engineering completion : Q1 2024
- Prototype Scale1 FID : Q2 2024
- Offshore tests : Q2 2026

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