Lighthouse initiatives

An action driven approach

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Special thanks to

- Mikel Iribas (CENER)
- Sandrine Aubrun (EC Nantes)
- Till Kristian Vrana (Sintef)

SET Wind

EERA European Energy Research Alliance JP WIND

- Workshop at the EERA JPWIND and SETWind annual event in Amsterdam, September 2019.
- Presentation for the SETWind Steering Committee in October 2019
- Session at WindEurope Offshore with presentation of the SETWind lighthouse initiative and panel debate with key stakeholders, in Copenhagen, November 2019
- Blog on offshore wind, December 2019
- Workshop at EERA DeepWind in Trondheim, January 2020
- Presentation for the SETWind Steering Committee in February 2020
- SETWind report on Lighthouse initiatives in May 2020
- Presentation for the SETWind Steering Committee in December 2020
- Presentation for EERA JP Wind Steering Committee in May 2021
- Workshop with EERA JP Wind participants in May 2021
- Document writing + discussions with MB during summer 2021
- Presentation for EERA JP Wind members in September 2021

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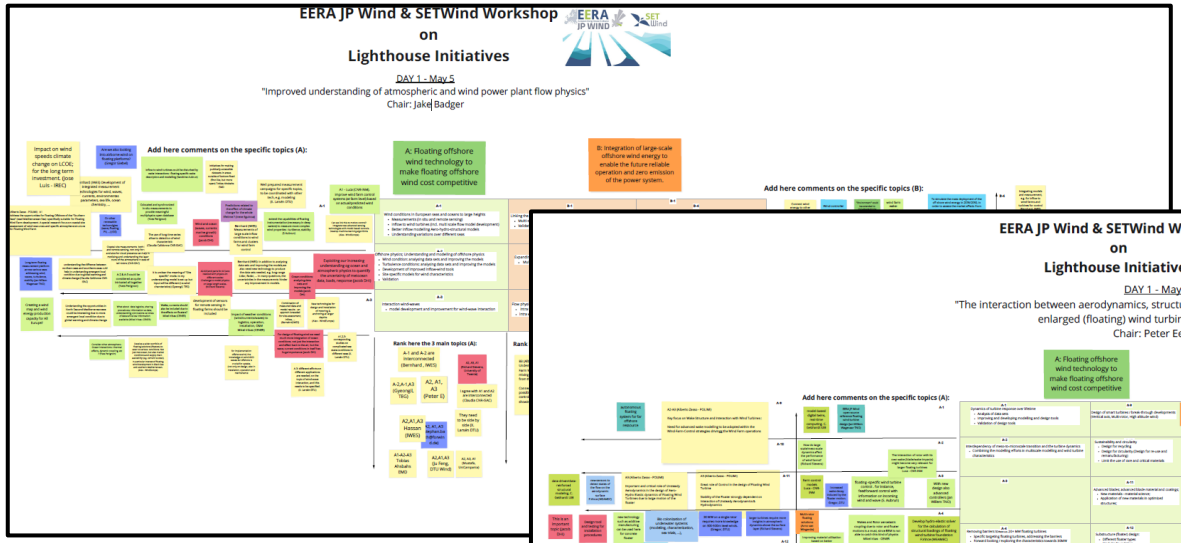
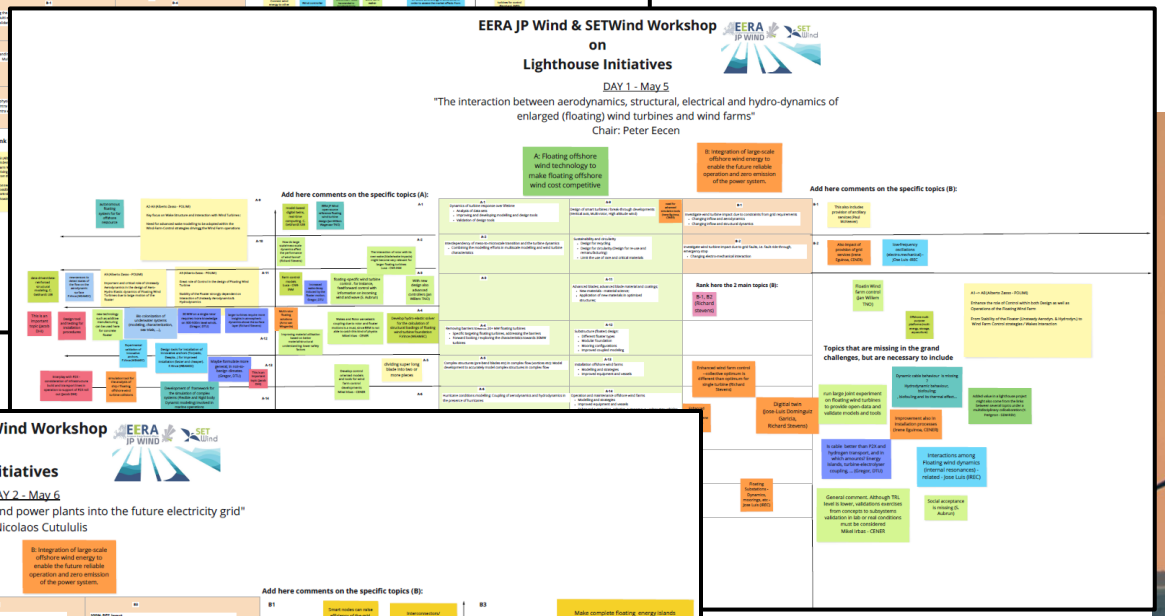
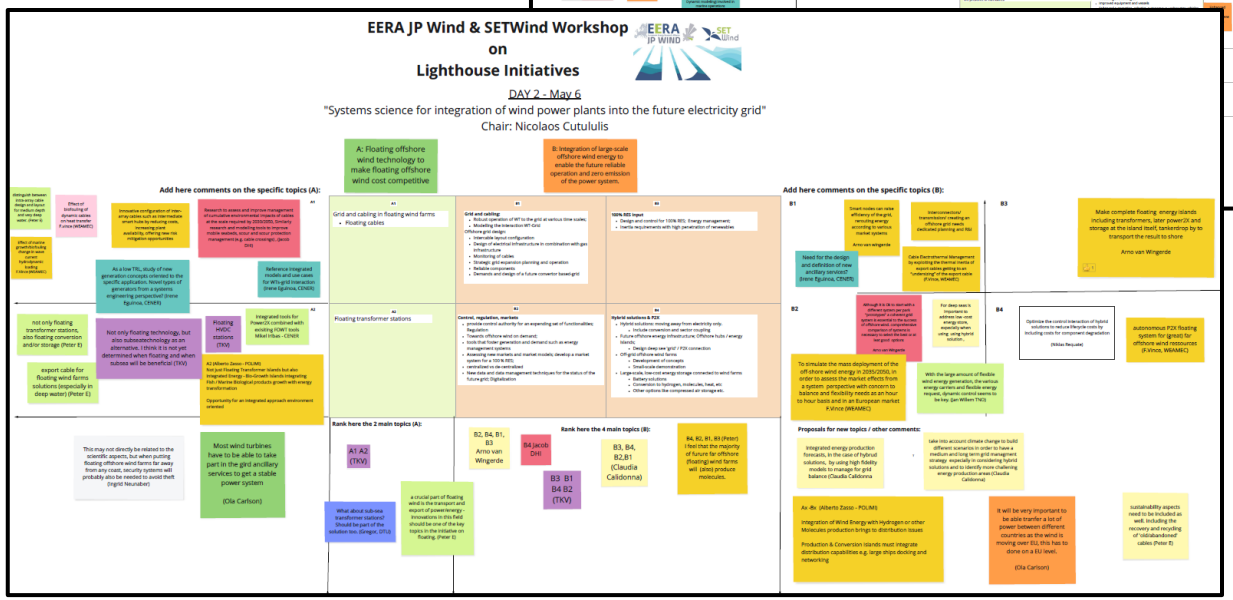
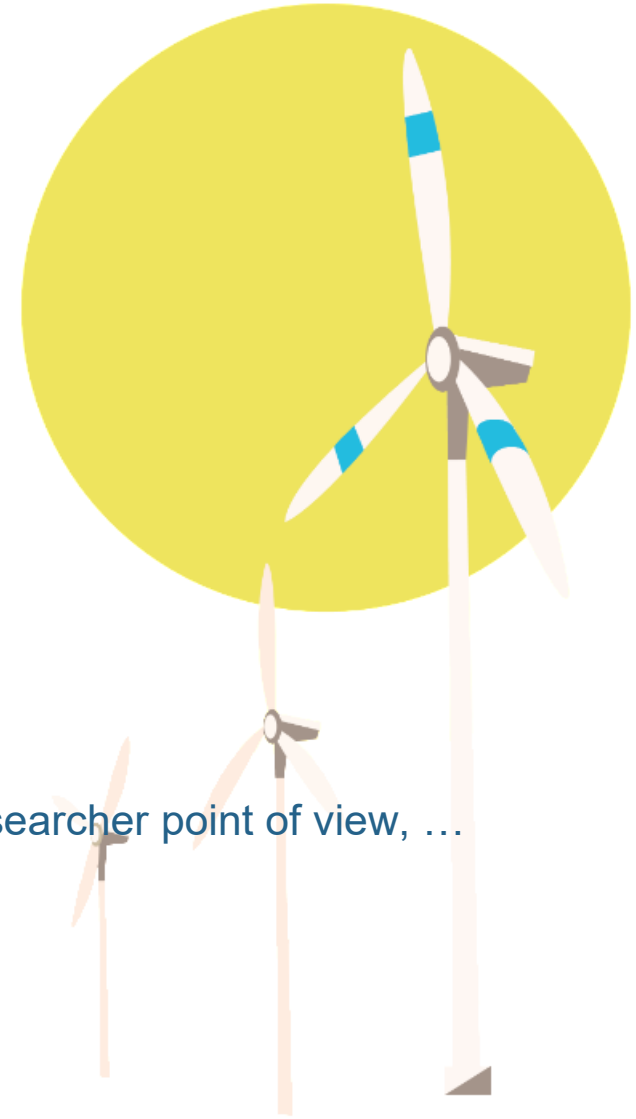






- Combine everything in 2 documents
- Make a concise story out of it

Challenges of the writing process …



- Why Lighthouse Initiatives …?
- Why should EU bother …?
- What does it yield …?
- How to avoid: collection of everything, preference of personal ‘hobbies’, story from researcher point of view, …
- What challenges to address …?
- How to execute …?
- How to formulate a story that:
  - provides a convincing and understandable story to EU policy makers
  - contains a solid technical body to tackle challenges

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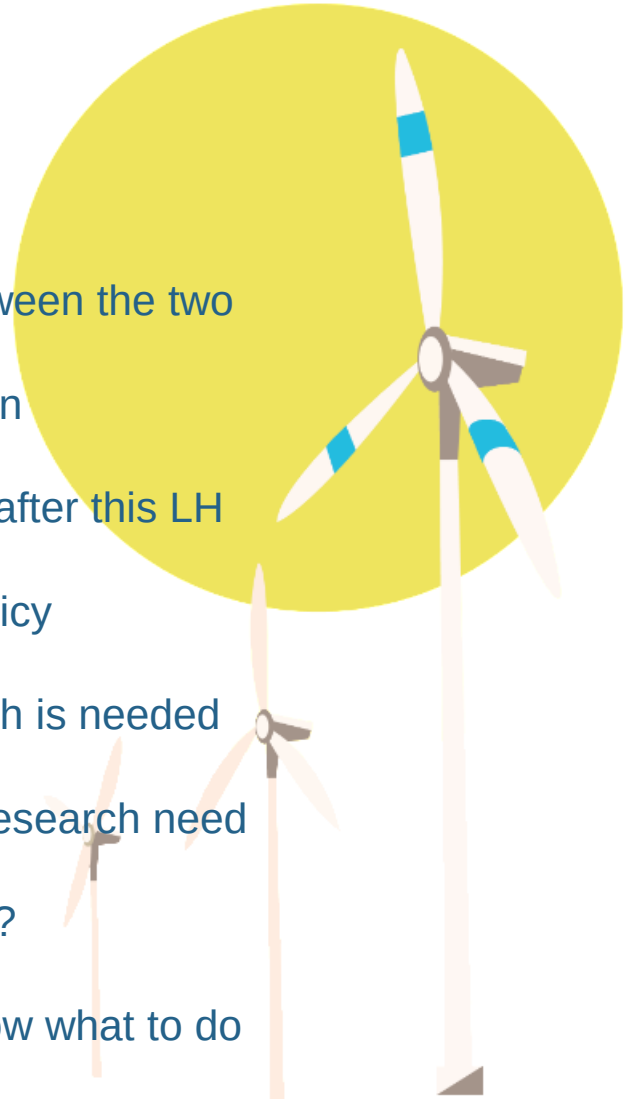
Approach

- Both Lighthouse have the same structure; top to bottom
- Vision
- Main objective
- EU policy; outlook towards 2050
- EU WE hub: industry and R&D
- Lighthouse initiatives intro
- Challenges and Ambitions
- Programmatic and Action-driven approach

Purpose

- Showing relation between the two
- Our dot on the horizon
- What will the EU get after this LH
- Connecting to EU policy
- Fundamental research is needed
- Our proposal to the research need
- What specific targets?
- Action driven: we know what to do
- Programmatic: more than a project (LH)



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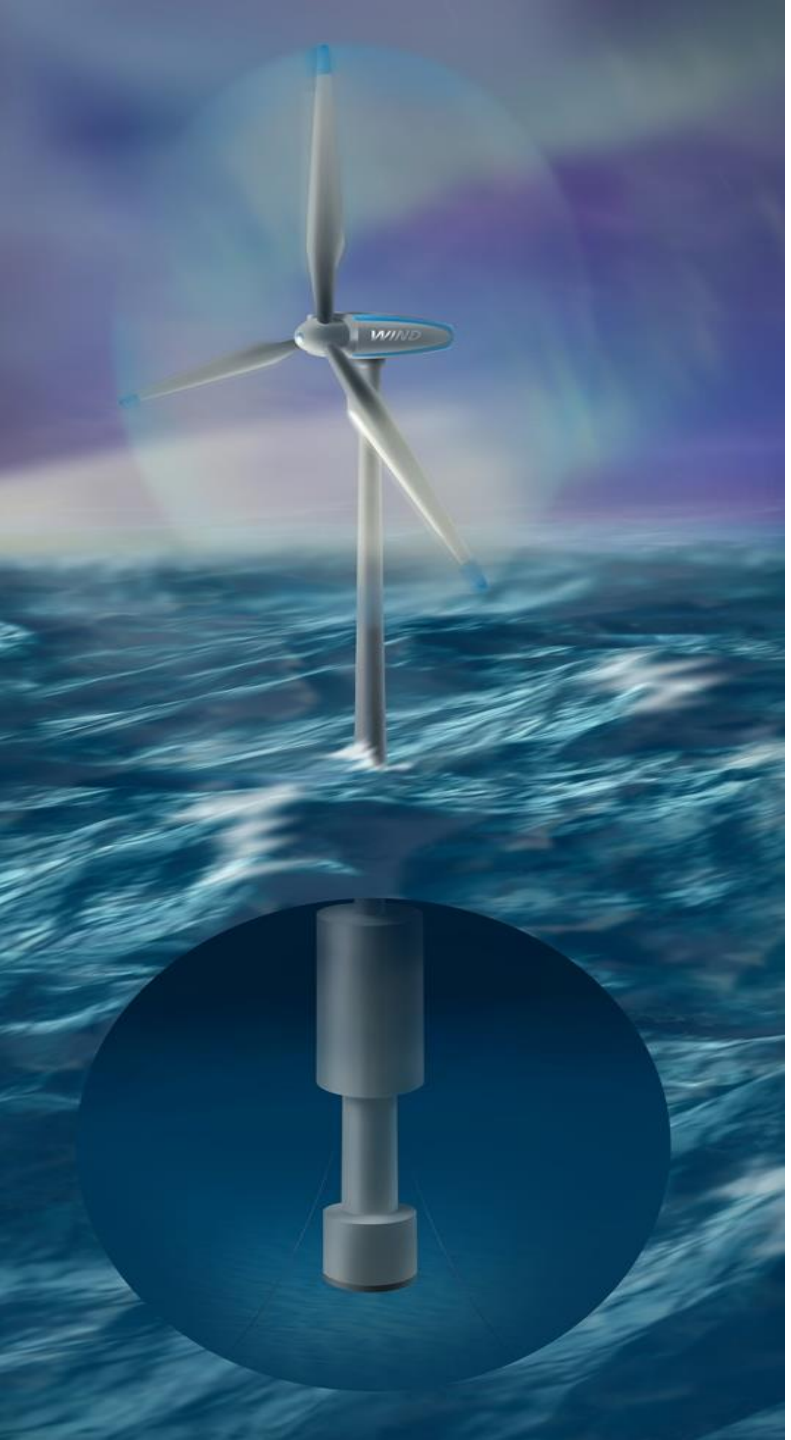

Floating Wind Energy

Vision
Offshore wind power will be the cornerstone of the future energy system

Main objective
Development of **reference multi-GW-scale** floating wind clusters for various European sea conditions with innovations to overcome the barriers for **large-scale deployment** of floating wind energy. The **open-source** reference wind farm is designed in collaboration with industry applying **20 to 30 MW wind turbines**. The challenges related to the barriers are in the fields of **reliability and robustness, societal costs, circularity and ecology**.

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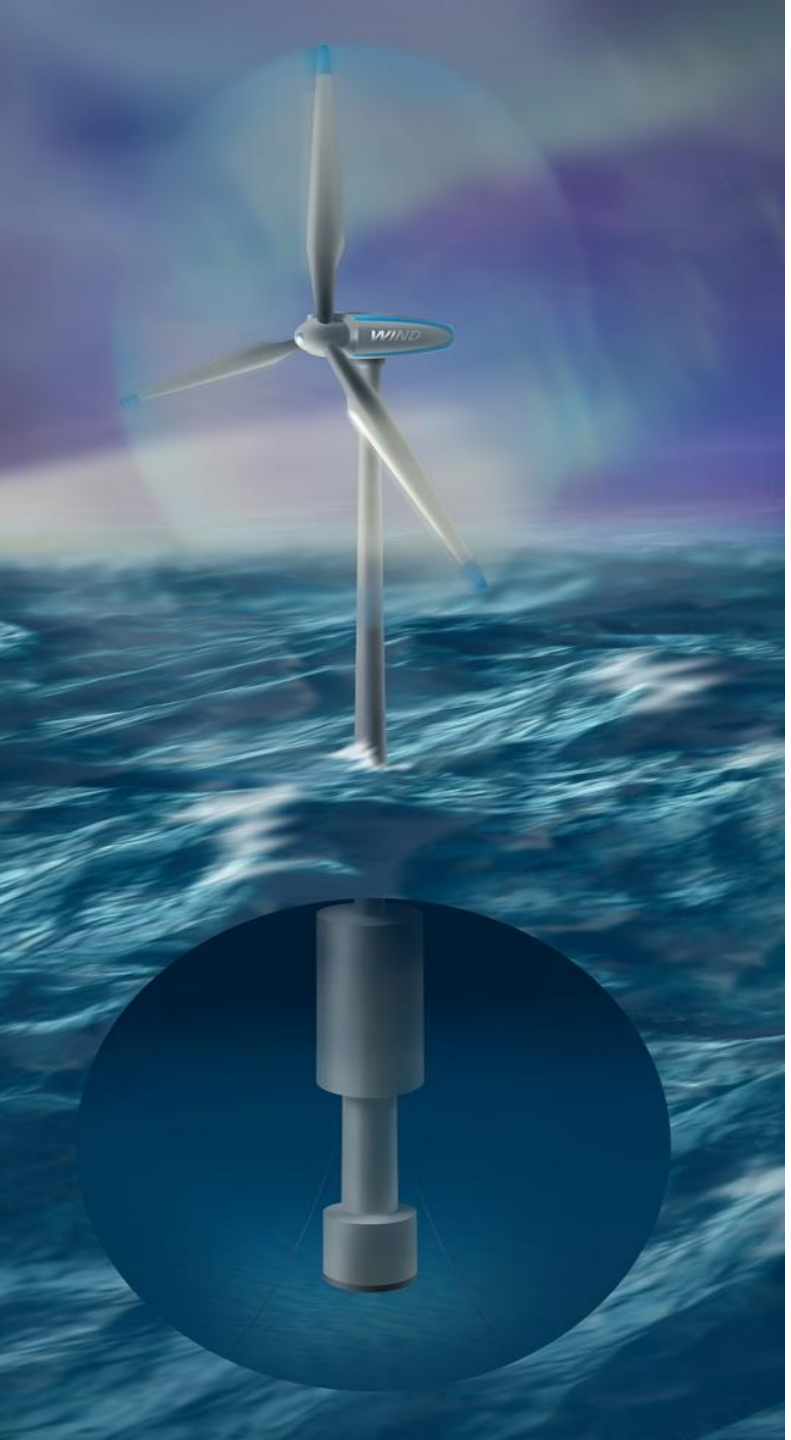

Floating Wind Energy

EU perspective

- ‘Fit for 55, set for 2050’
- 2050: 450GW offshore wind
- IEA: Potential FOWT >80% of offshore wind globally
- EU leading, but USA and China rising
- FOWT not mature, yet

Lighthouse initiative

- is a visionary, science-driven and large-scale initiative
- tackles EU challenges in an integrated and holistic way
- strives for impact by bringing excellent EU expertise together, complementing existing EU calls

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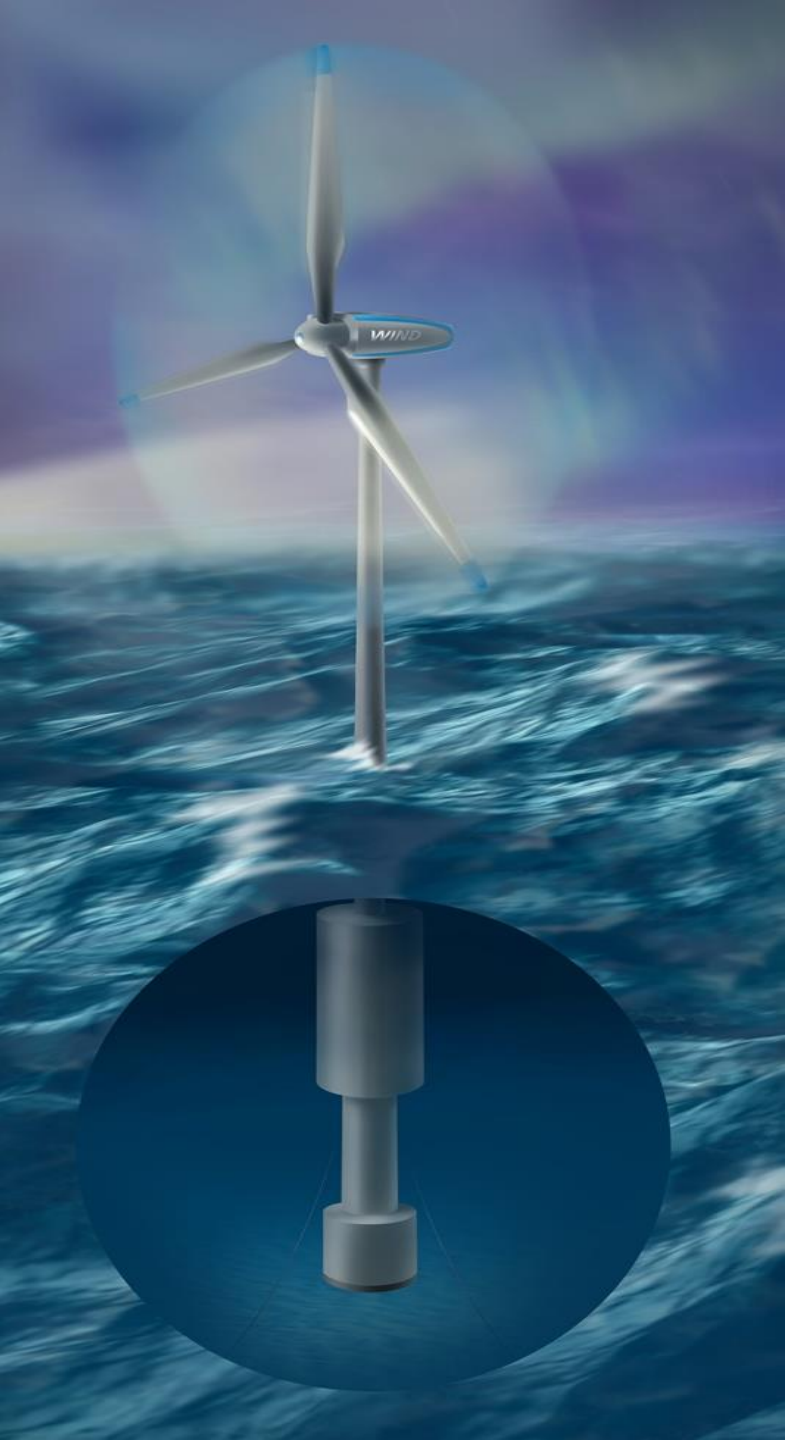

Floating Wind Energy

Challenges and Ambitions

- develop circular and ecology friendly solutions
- assure and maintain European leadership
- develop an open access, reference, multi GW-scale floating wind farm

Programmatic and action-driven approach

- 3 overarching, conceptual themes (IRPWind-like)
- 5 technical themes

Sharing and Disseminating Knowledge				
Open Access to data				
Towards Ecology-friendly and Circularity				
Understanding external conditions	Creating reference floating wind farm	Controlling FOWT	Logistics, installation and O&M	Subsea and floating transmission

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Integration of large scale offshore wind energy

Vision

Offshore wind power will be the cornerstone of the future energy system

Main objective

Develop solutions to **ensure reliable and affordable** power system operation with offshore wind energy **to supply one third** of the European electricity demand in 2050.

The research and innovation will develop solutions for offshore wind **power plants, grid infrastructure and flexibility technologies** to ensure the future zero-emission European power system to be reliable and affordable.

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Integration of large scale offshore wind energy

EU perspective

- ‘Fit for 55, set for 2050’
- 2050: 450GW offshore wind
- Need: Transport massive amounts of energy to shore
- Need: Stable operation
- Need: Flexibility technologies

Lighthouse initiative

- is a visionary, science-driven and large-scale initiative
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Integration of large scale offshore wind energy

Challenges and Ambitions

- develop circular and ecology friendly solutions
- assure and maintain European leadership
- develop technologies for a wind-dominated, EU energy system
- develop technologies for wind energy conversion and storage
- control wind energy input optimally for a stable power system

Programmatic and action-driven approach

- 3 overarching, conceptual themes (IRPWind-like)
- 4 technical themes

Sharing and Dissemination Knowledge			
Open Access to data			
Towards Ecology-friendly and Circularity			
Understanding flow physics of wind power plants	Designing the grid	Towards new controls and markets	Power2X

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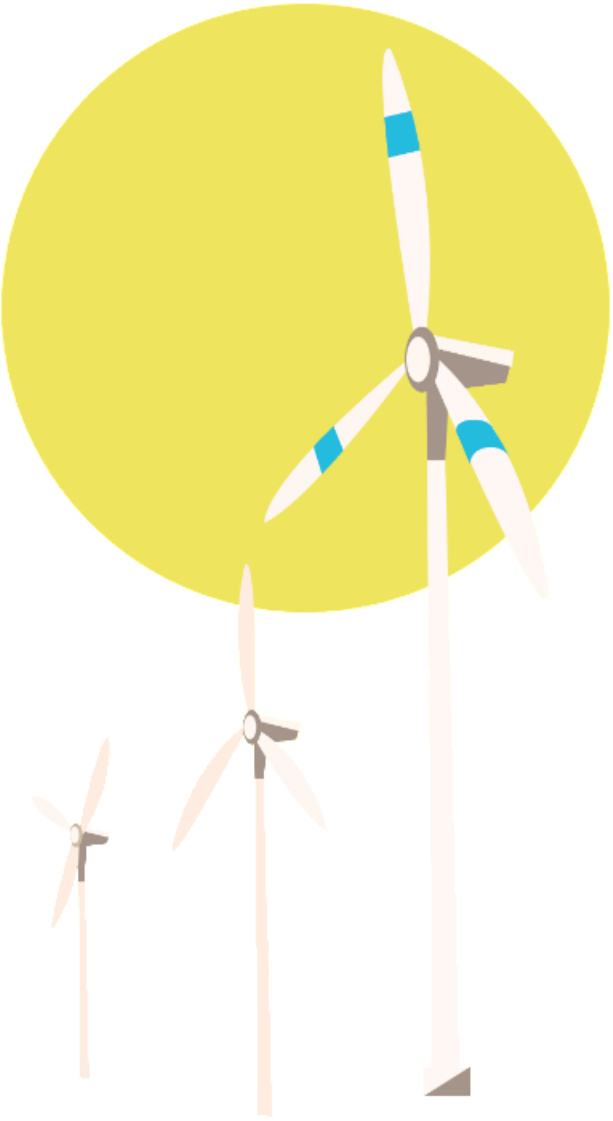
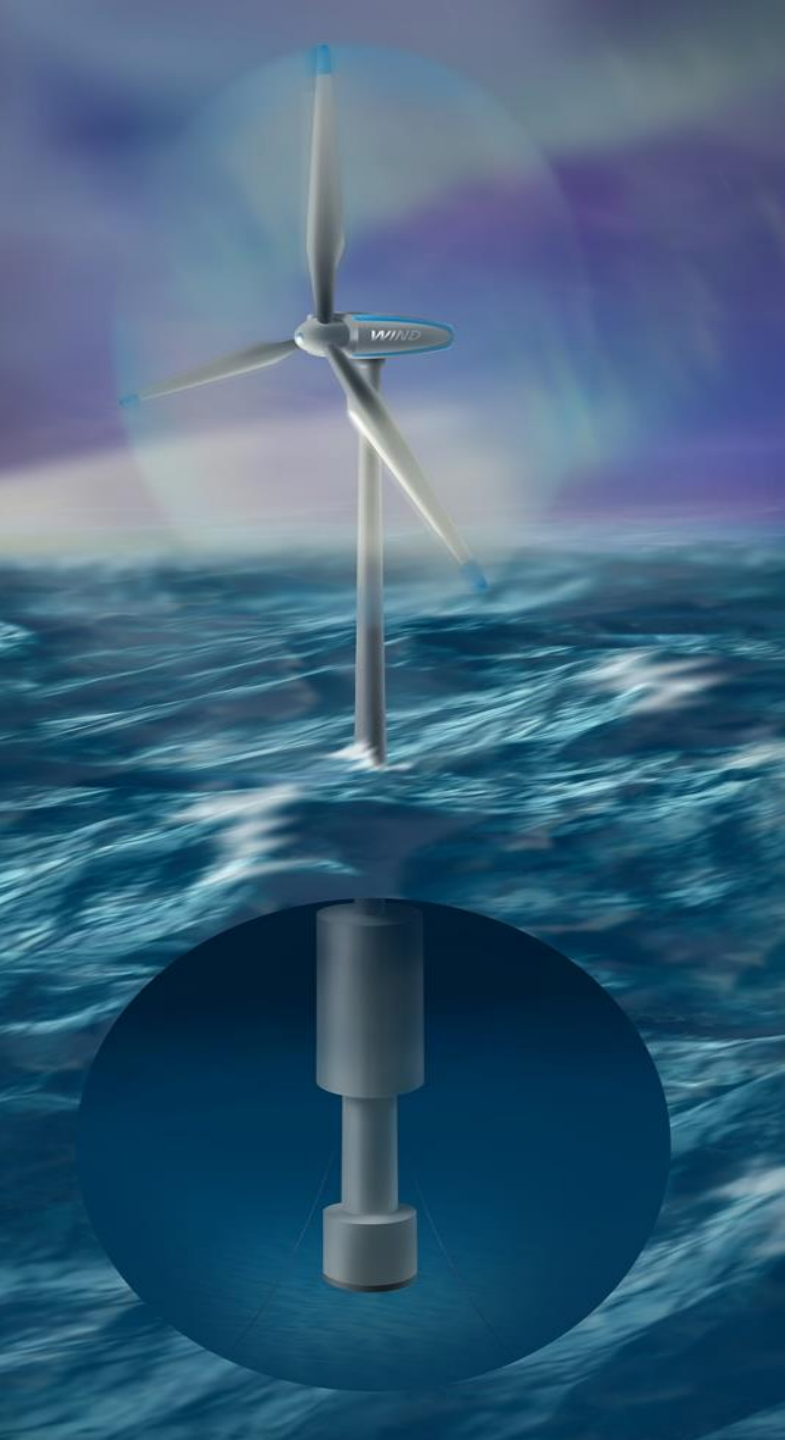
Thank you for your contribution

Questions and Discussion





Floating Wind Energy

Understanding external conditions:
- Met-ocean conditions
- Impact on FOWT and wind farm deployment

Creating ref, multi-GW wf cluster
- 20MW-30MW FOWT; design tools
- Ref wind cluster

Controlling FOWT
- WT control
- WF control

Logistics, Installation, O&M
- Anchoring and mooring
- Assembly, towing and O&M strategies
- Ships, harbors and supply chain

Subsea and floating electrical transmission
- Electrical cables in deep water
- Subsea technology

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Integration of large scale offshore wind energy

Understanding flow physics:

- Micro and macro scale linking
- Aerodynamics of large power plants
- Power stability

Designing the grid

- WT components
- WF connections
- Long distances to shore

Towards new controls and markets

- Balancing and flexibility
- Controls for stability
- Expand sets of functionalities

Power to X

- Conversion to H2
- Storage
- Offgrid
- Infrastructure

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