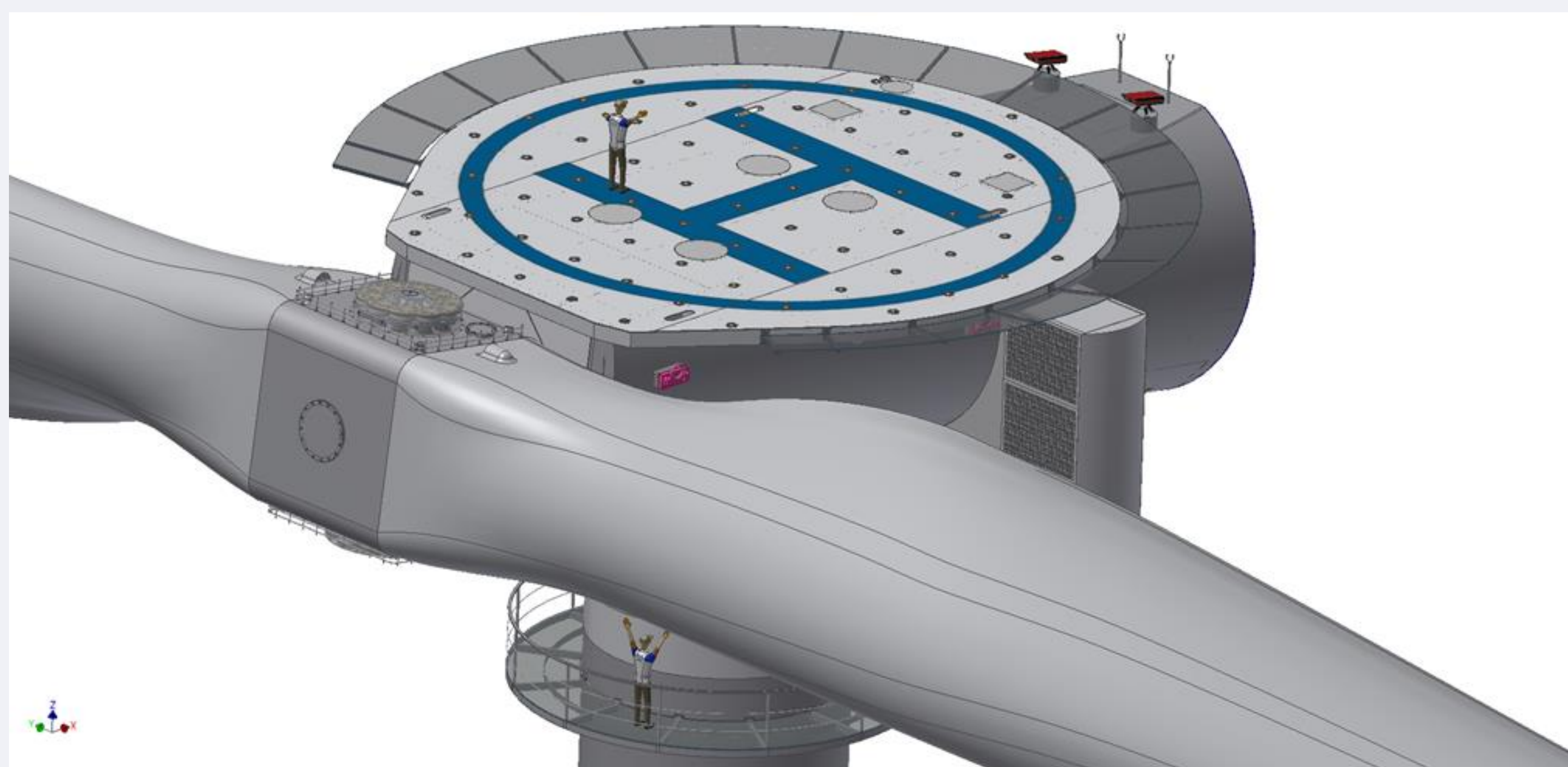


## The pathway to lower the offshore wind CoE (to € 0.05/kWh @ 9 m/s)

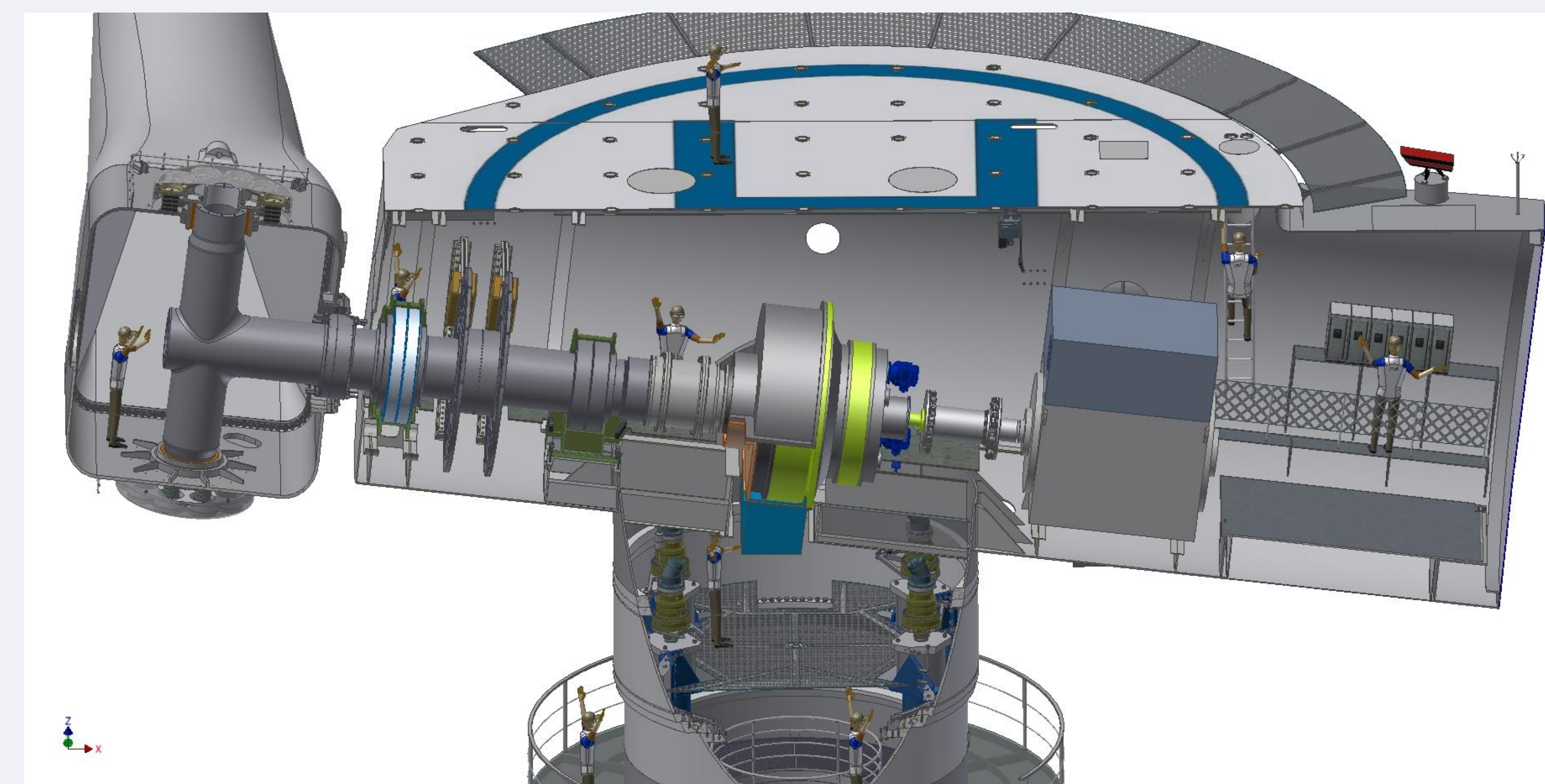
- Install a fully assembled turbine/support structure system with a simple and fast “one-shot” method rather than construction at sea;
- Use a two-bladed upwind turbine with teetering hinge technology and active yaw control, which is simpler, lighter, and easier to handle in offshore deployments than three-bladed wind turbines.

## The offshore wind turbine: Seawind 6

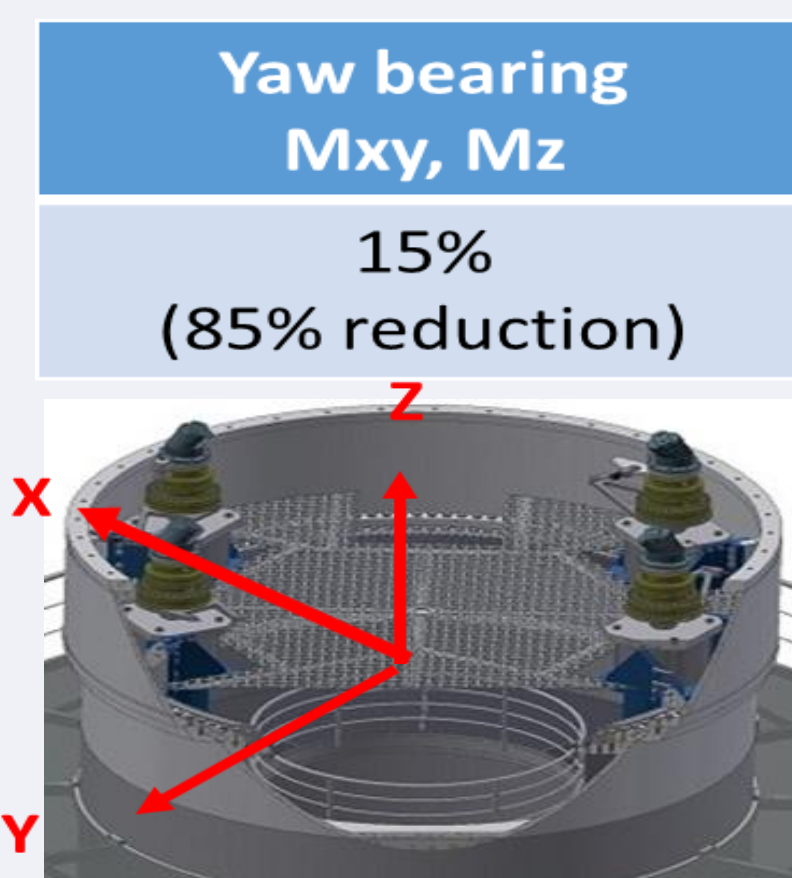
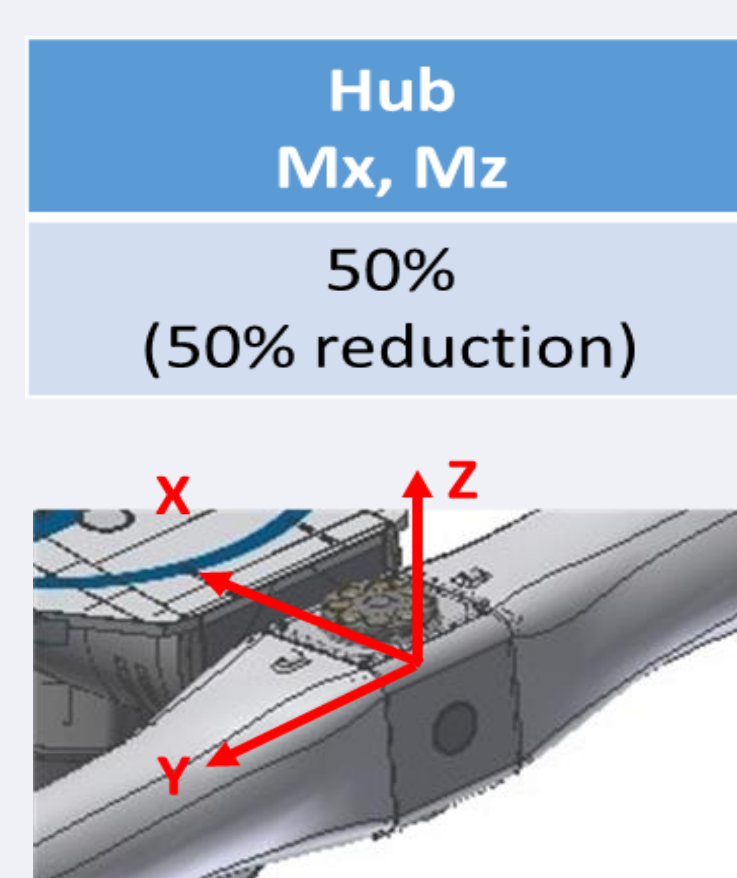
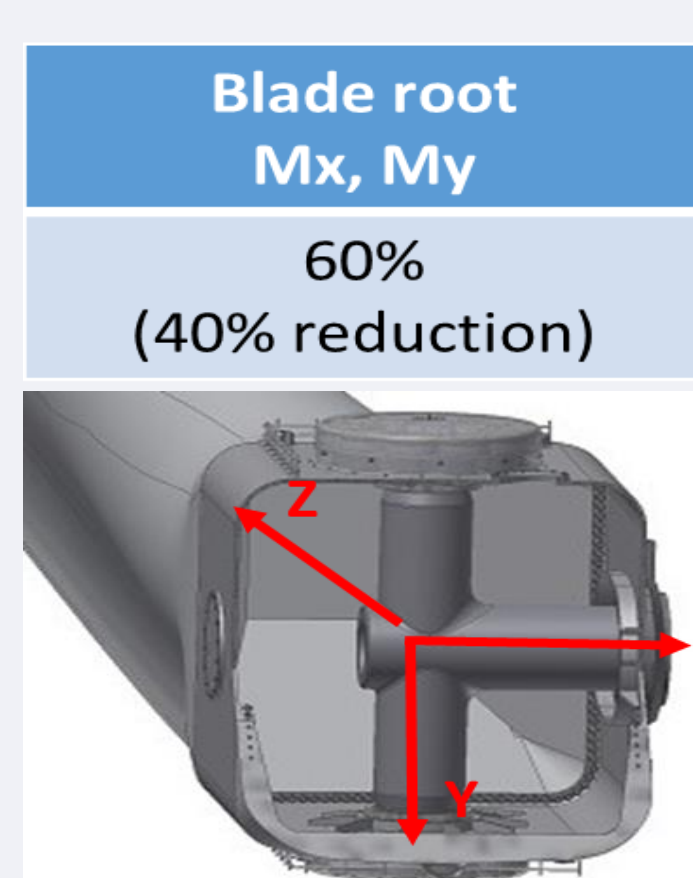
- The robust but lightweight Seawind 6.2 MW offshore wind turbine is characterized by:
  - A turbine head weight of 290 t (including a strong helideck for twin engine helicopters on top of the nacelle);
  - Low fatigue and ultimate loads on drive train and rotor with expected life of 30+ years, when using a simple lifetime extension approach;
  - The ability to perform maintenance and repair onboard without using crane vessels or jack-ups;
  - Redundant critical components and subsystems; no complex blade pitch mechanism;
  - Drivetrain mounted on a stiff self-supporting body, which is the integrated bed plate-cover structure (steel nacelle).



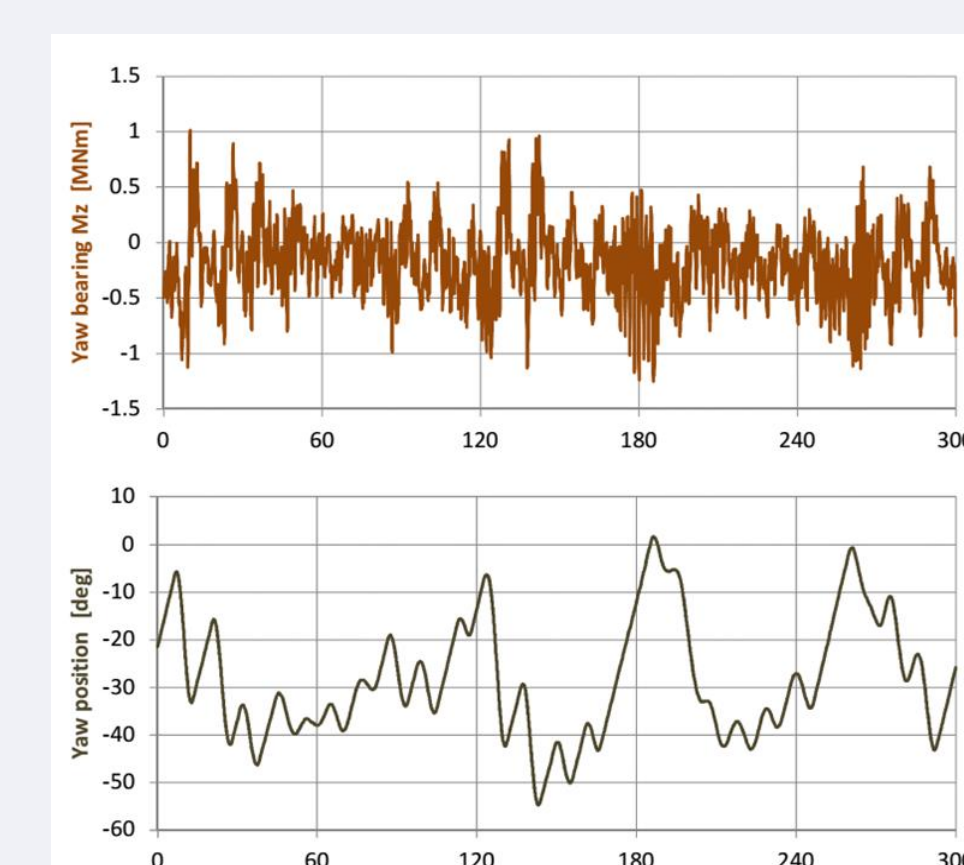
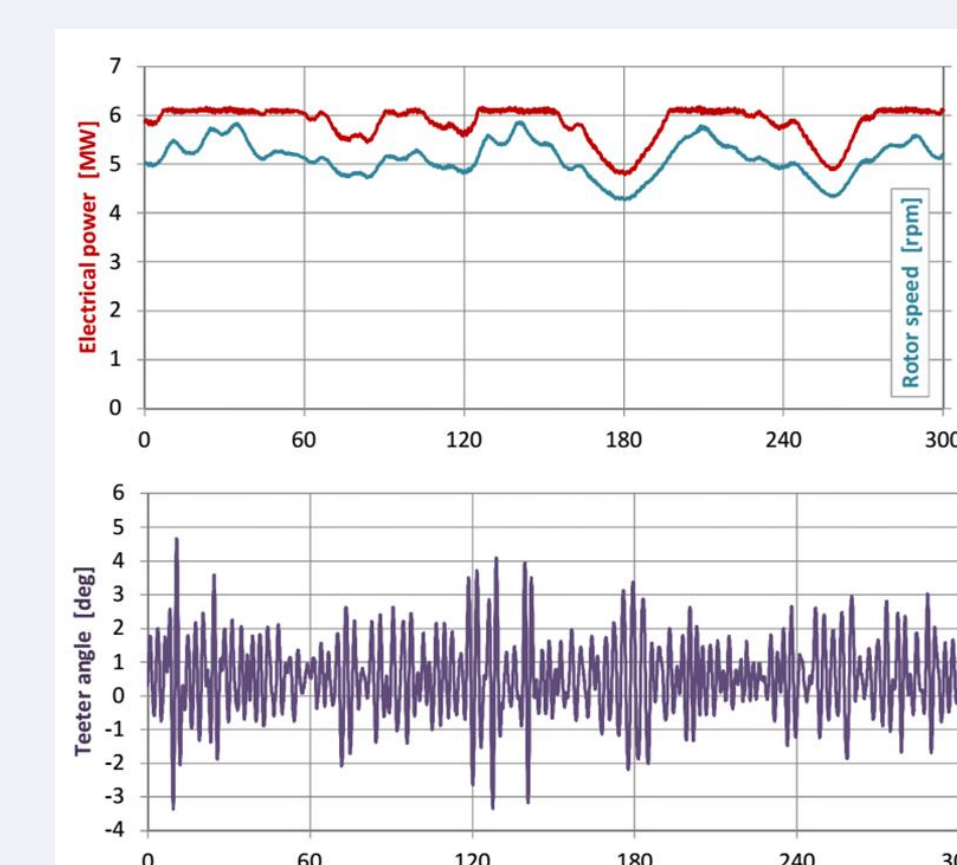
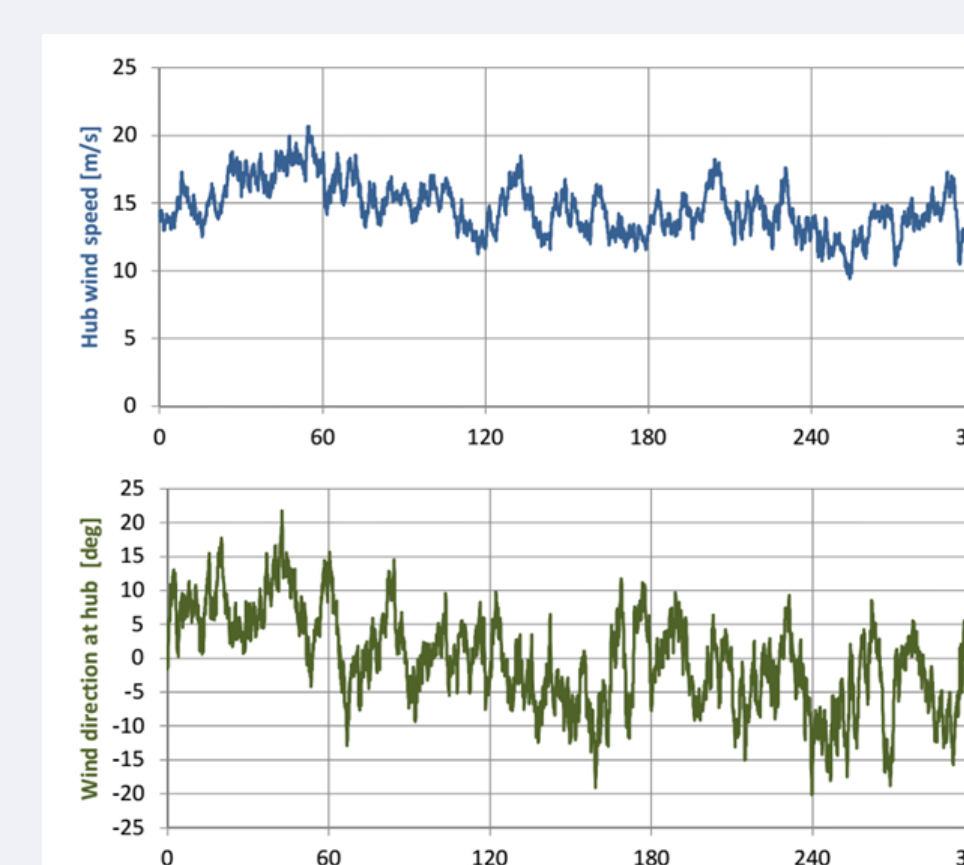
Strong helideck above the rotor for twin engine helicopter landing



Spacious nacelle for on-board repair, electrical system in support structure



Low fatigue for long-lived components (compared w. 3-bladed turbines)



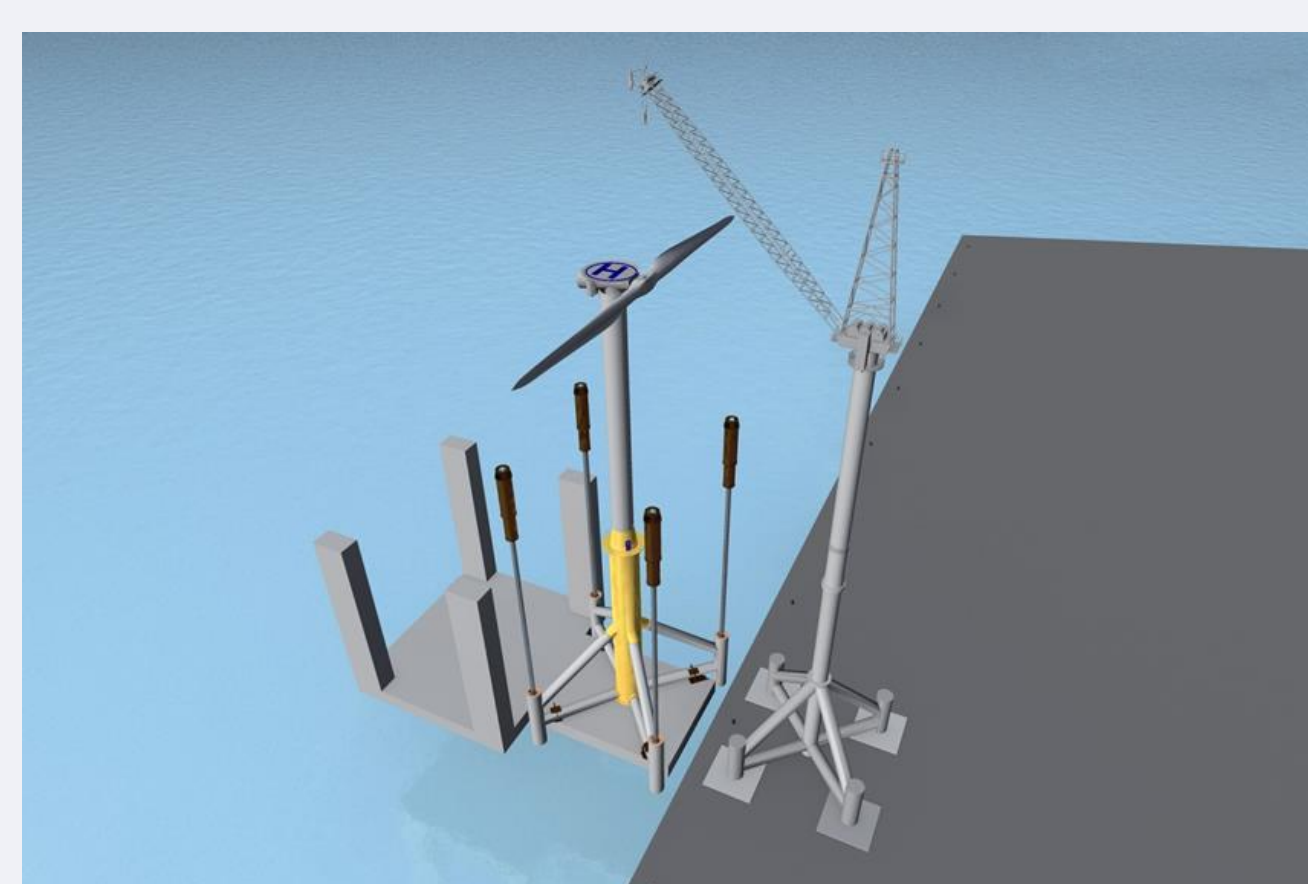
Example of Seawind 6 operation in turbulent wind

## The innovative installation method for shallow water (up to 50 m)

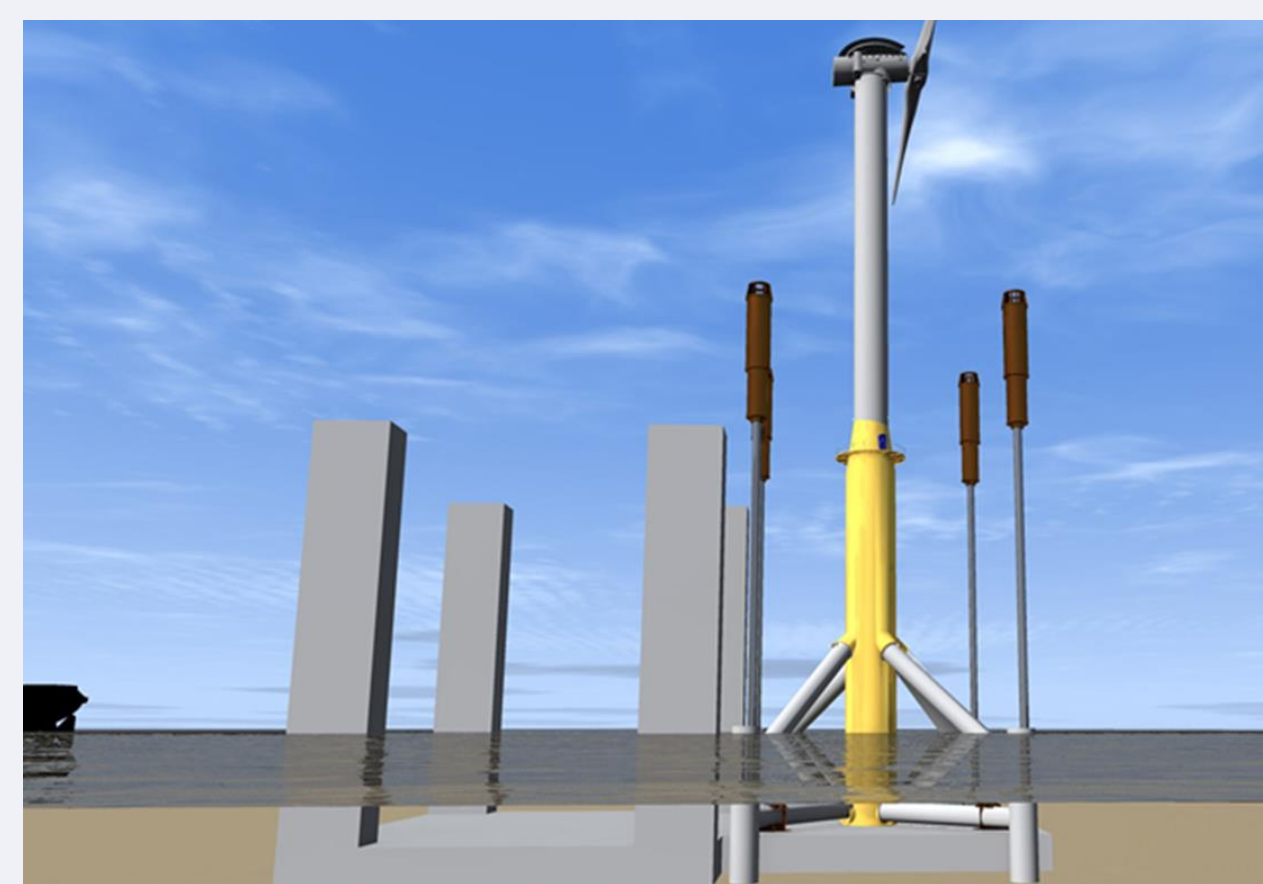
- Assembly of the wind turbine/support structure system at a pier; launching of the complete system, instead of assembling it at the sea site;
- A cost effective and simple self-installing process with an economic launching barge and pile driving requiring no crane vessels or jack-ups;



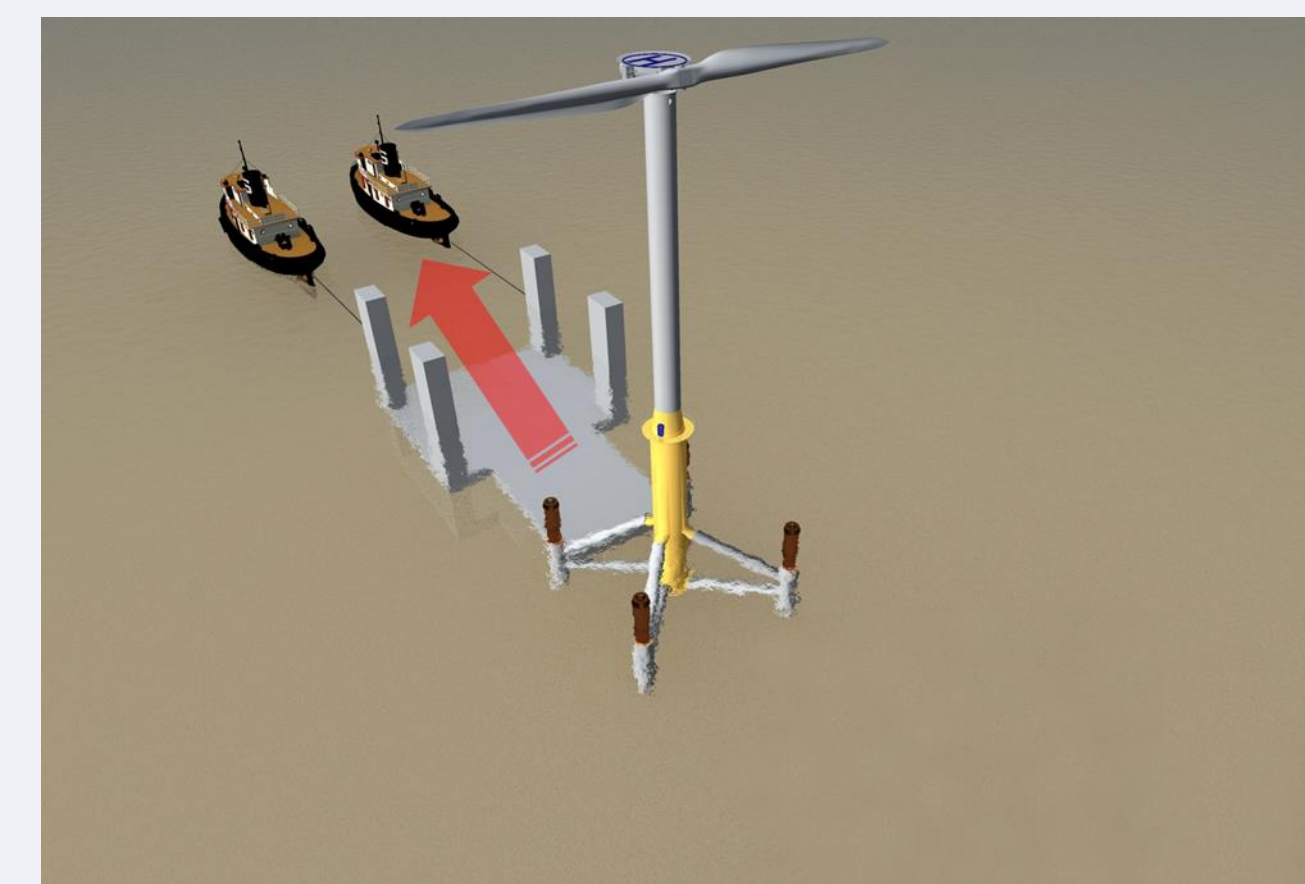
Assembly at pier



Ready for towing



During transport



Pile driving completed



System installed

## Conclusions

Merely adapting the fundamental elements of three-bladed wind turbines and their piece-by-piece installation methods, which has been drawn from the onshore wind industry, has driven the offshore wind energy CoE to today's unacceptable levels.

Only a radical change of approach in the offshore wind industry will allow it to survive and reach its full potential.

## References

The two-bladed revolution, Recharge, June 2014 ; A new generation of wind of wind turbines to bring down the cost of offshore wind power P.O.W.E.R.E.D., Ancona, May 2013.

