Questions & Answers

1. **What is 'DeepWind'?**

DeepWind is a floating wind turbine concept consisting of a long floating tube submerged in water, with a rotor and a generator at the end – close to the sea bed.

2. **How does it look like and how does it work?**

The rotor is a Darrieus type (from the French inventor Charles Darrieus; in shape aka 'eggbeater'), and its shaft rotates along the whole spar. The rotor converts wind energy into mechanical energy, which the generator converts into electrical energy.

3. **How can it reduce energy costs?**

The conceptual design is simple, made of few components, and avoids known problems such as a nacelle at hub height, yawing devices aligning the turbine up in wind, or pitching mechanisms for the blades. The concept features upscaling potential:

a. As long as needed constant chord blades can be built with the most efficient production method on the market
b. The vertical concept allows for light rotor design
c. Excellent stability with low centre of mass
d. Minimalistic floater design
e. Long operation schedule with the potential of less operation and maintenance cost over existing wind turbines

4. **Is a vertical-axis wind turbine better than a horizontal-axis wind turbine?**

The floating offshore DeepWind vertical-axis wind turbine concept has several advantages:

a. Operation is insensitive of wind direction changes
b. Rotor dynamics only dependent on mainly aerodynamic loads
c. High floating stability
d. Easy assembly/installation and maintenance operations
e. Vertical-axis rotating rotor is less sensitive to wind gusts and turbulence during operation
f. A 20 MW design has been looked into

5. **How can the wind turbine be prevented from over-speeding?**

There are several known solutions:

a. In normal operation we rely on stall control and that the wind turbine is not capable to start by itself
b. An over-speeding control prevents over-speeding
c. An electrical brake in the generator prevents from accelerating
d. A water brake slows down the rotor in case of emergency or shut-down situations

6. **How did the smaller sized model works in the experiments?**

We did not realize a downsized-scale model in order not to include complexities from similitude laws.

a. We built a 1 kW demonstrator for experiments for 4-5 m water depths
b. Experiments in near to real conditions in Roskilde firth (at campus) and in controlled environment at an ocean laboratory of MARIN (NL)

7. **When will the 5 MW wind turbine be put in the water?**

This condition depends on many factors determined by societal, economic and cultural rules:

a. The energy demand is real
b. Investor possibilities and manufacturing environment
c. Demonstration (pilot) is needed for cost reductions assessment in installation, operation & maintenance and dismantling
d. The 5 MW design is ready for industrial optimisation and mass production
e. If exploited, the design could be operational within 2020 at a COE od 20 €/kWh