



Floating wind analysis gives seal of approval needed for offshore project

Location:

Offshore Japan

Product:

Floating offshore wind analysis



INTELLIGENTLY ENGINEERED

Background

A client requested our support in determining the viability of a power take-off cable planned for use with a floating offshore wind turbine, along with selection and optimisation of a variety of buoyancy topologies. Our extensive offshore experience provided comprehensive analysis, guiding the client on key design choices.

For all buoyancy topologies, three platform excursions were considered: near, far and mid (nominal). For each topology and platform excursion, appropriate structural assessments were required, with fatigue analysis needed on the final chosen configuration. The buoyancy topologies were:

Lazy Wave: Consisting of buoyancy modules to create a neutrally buoyant section that helps prevent motions of the top catenary being passed to seabed touchdown.

Restrained Lazy Wave: As per lazy wave, but the ends of the neutrally buoyant section is tethered to the seabed.

Mid-Water Arch: Instead of using buoyant modules, uses a mid-water arch and the cable then forms a “Lazy S” shape.

Solution

For all combinations of topology and platform position, Aquaterra Energy were able to determine the key loads passing through the upper and lower catenary sections as well as the curvatures in the region of the buoyant (or arch) sections. This allowed comparison of the three topology configurations.

The restrained lazy wave was shown to have higher curvature and effective tensions than the lazy wave, while the absence of buoyant sections of the cable in the mid-water arch configuration results in high curvature as the cable passes over the arch.

Results:

The lazy wave configuration was taken forward for further optimisation which accounted for the accumulation of marine growth, altered buoyancy lengths and cable weights. Once optimised, the fatigue experienced by the cable was determined.

Our analysis gave the client confidence in the viability of their planned power take-off cable and allowed them to proceed to the next stage of their operational planning.

