

## Dynamic performance of a novel offshore power system integrated with a wind farm - DTU Orbit (09/11/2017)

### Dynamic performance of a novel offshore power system integrated with a wind farm

Offshore wind technology is rapidly developing and a wind farm can be integrated with offshore power stations. This paper considers as case study a futuristic platform powered by a wind farm and three combined cycle units consisting of a gas turbine and an ORC (organic Rankine cycle) module. The first aim of this paper is to identify the maximum amount of wind power that can be integrated into the system, without compromising the electric grid balance. The stability of the grid is tested using a dynamic model of the power system based on first principles. Additionally, the dynamics of the system is compared with a simplified plant consisting of three gas turbines and a wind farm, in order to identify benefits of the installation of the ORC system. The maximum allowable wind power is 10 MW for a nominal platform load of 30 MW. The results show that the presence of the ORC system allows decreasing frequency oscillations and fuel consumptions of the platform, with respect to the simplified configuration. On the other hand, the dynamic response of the combined cycle units is slower due to the thermal inertia of the heat transfer equipment.

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