

## NAFEMS UK Regional Conference 2018 - Abstract Submission

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<b>Please identify the event for which your submitting?</b>	NAFEMS UK Conference 2018
<b>Will you be the presenting author?</b>	Yes
<b>Presentation Title</b>	Minesto Deep Green – optimisation of the power take-off system for a novel tidal energy device
<b>Relevant Themes / Keywords</b>	Systems simulation, optimisation, renewable energy, tidal flow

## Abstract (plain text)

The EU-project “Powerkite” is developing a next generation power take-off system (PTO) for a novel tidal energy collector concept, the Minesto Deep Green subsea tidal kite. The overall objective of the Powerkite project is to enhance the structural and power performance of the PTO for a next generation tidal energy converter to ensure high survivability, reliability and performance, low environmental impact and competitive cost of energy in the (future) commercial phases.

The Minesto Deep Green concept is to extract tidal energy by ‘flying’ a turbine through water. This increases the flow velocity through the turbine by an order of magnitude compared to a fixed turbine and enables the device to operate at relatively low velocity tidal flows, extending the ocean energy potential substantially. The turbine is mounted on a nacelle hung from a rigid wing and it drives a generator to convert the kinetic energy in a tidal or ocean energy flow into electricity. The electricity is transmitted along tether cables connecting the ‘kite’ to the seabed and then brought to land via an electrical array sub-system to be connected to the grid.

The PTO consists of the turbine sub-system, power conversion sub-system, tether sub-system and array sub-system. The emphasis in this paper will be on the turbine, power conversion and tether sub-systems and will describe the overall Deep Green concept and the requirements of the various sub-system designs including, for example, why the design objectives of a moving turbine differ from those of a fixed installation turbine, what is the impact of voltage level on energy conversion efficiency and how the hydrodynamics of the tether influences the flying of the kite.

Details will be provided of the analysis conducted to predict and optimise the performance of the sub-systems and also the multi-disciplinary lower order model to optimise the overall PTO system design.

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