

# Optimisation of offshore wind farm inter-array collection system

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**Abstract—** This study presents an automatic tool developed for the optimisation of the layout of offshore inter-array cable systems. Employing stochastic approaches, this tool can quickly find a near-optimum cable connectivity solution based on one of the criteria including capital expenditure (CAPEX), operational expenditure (OPEX), or their combination considering the net present value over the project lifespan. The seabed geo-tech constraints are considered to minimise cable routes across seabed areas where challenging installation conditions may exist, and to avoid cable routes across the seabed areas where the installation is impossible. The tool employs advanced identification of suitable locations of multiple offshore substations for large wind farms. This optimisation tool is coded in Python 2.7 and scripted IPSA+ is used as the load flow calculation engine for power loss calculation. This tool has been applied to 4 GW offshore wind projects developed in European and Asian waters and it is demonstrated that the tool automates the design for the inter-array cable system layout and delivers measurable overall project efficiency gains. Comparisons were made between radial design and branched design; it is shown that the branched design can achieve better cost savings than the radial design.

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