

# Offshore wind farm electrical design using a hybrid of ordinal optimization and mixed-integer programming

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**Abstract—** Electrical layout design is, for offshore wind farms (OWF), a complex problem that has a far-reaching impact on both plant cost and reliability. A full optimization of the layout, as opposed to just selecting the most favorable pre-established configuration, is required in order to capture all the potential efficiencies. However, classical optimization methods such as mixed-integer programming (MIP) might not be applicable to large OWFs. This paper describes a novel combination of ordinal optimization (OO) and MIP that is able to deal with large problems in reduced computation times with a statistical optimality guarantee. The algorithm is applied to a real case study taken from Barrow Offshore Wind Farm in the East Irish Sea.

**Index Terms—** offshore wind farms; collector system; transmission system; electrical layout; circuit optimization

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