A state-of-the-art review of the optimization of electrical cables in Offshore Wind Farms (OWFs) is presented in this paper. One of the main contributions of this work is to propose a general classification of this problem, framed in the general context of the Offshore Wind Farms Design and Optimization (OWiFDO). The classification encompasses two complementary aspects. First, the optimum sizing of electrical cables, with the three main approaches used nowadays: static rated sizing, dynamic load cycle profile, and dynamic full time series, being conceptually analyzed and compared. The latest techniques and advances are described, along with the presentation of potential research areas not thoroughly addressed today, such as Dynamic Cable Rating, and cable's lifetime estimation under time-varying conditions. Second, the network optimization of large OWFs is thoroughly presented, dividing the problem with a bottom-top approach: cable layout of collection system, Wind Turbines (WTs) allocation to Offshore Substations (OSSs), number and location of OSSs, and interconnection between OSSs and Onshore Connection Points (OCPs). A comparison among different methods is performed, taking into consideration the main engineering constraints. Global optimization, specifically, Binary Programming (BIP) or Mixed Integer Linear Programming (MILP), is envisaged as the best way to tackle this topic. The full combinatorial problem is found to be better addressed following a Top-Bottom approach, combining exact formulations with high level heuristics, or holistically with evolutionary algorithms.

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