

The Impact of Large-Scale Wind Energy Development on Islands' Interconnection to the Mainland System

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Abstract : Greek islands' interconnection (IC) with larger power systems, such as the mainland grid, is a crucial issue that has attracted a lot of interest; however, the recent economic recession that the country undergoes together with the highly capital intensive nature of this kind of projects have stalled or sifted the development of many of those on a more long-term basis. On the other hand, most of Greek islands are still heavily dependent on the lengthy and costly supply chain of oil imports whilst the majority of them exhibit excellent potential for wind energy (WE) applications. In this respect, the main purpose of the present work is to investigate through a parametric study which varies both in wind farm (WF) and submarine IC capacities; the impact of large-scale WE development on the IC of the third in size island of Greece (Lesbos) with the mainland system. The energy and economic performance of the system is simulated over a 25-year evaluation period assuming two possible scenarios, i.e. S(a): without the contribution of the local Thermal Power Plant (TPP) and S(b): the TPP is maintained to ensure electrification of the island. The economic feasibility of the two options is investigated in terms of determining their Levelized Cost of Energy (LCOE) including also a sensitivity analysis on the worst/reference/best Cases. According to the results, Lesbos island IC presents considerable economic interest for covering part of island's future electrification needs with WE having a vital role in this challenging venture.

Keywords : electricity generation cost, levelized cost of energy, mainland grid, wind energy rejection

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