

Techno-Economic Prospects of High Wind Energy Share in Remote vs. Interconnected Island Grids

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Abstract : On the basis of comparative analysis of alternative "development scenarios" for electricity generation, the main objective of the present study is to investigate the techno-economic viability of high wind energy (WE) use at the local (island) level. An integrated theoretical model is developed based on first principles assuming two main possible scenarios for covering future electrification needs of a medium-sized Greek island, i.e. Lesbos. The first scenario (S1), assumes that the island will keep using oil products as the main source for electricity generation. The second scenario (S2) involves the interconnection of the island with the mainland grid to satisfy part of the electricity demand, while remarkable WE penetration is also achieved. The economic feasibility of the above solutions is investigated in terms of determining their Levelized Cost of Energy (LCOE) for the time-period 2020-2045, including also a sensitivity analysis on the worst/reference/best Cases. According to the results obtained, interconnection of Lesbos Island with the mainland grid (S2) presents considerable economic interest in comparison to autonomous development (S1) with WE having a prominent role to this effect.

Keywords : electricity generation cost, levelized cost of energy, mainland, wind energy surplus

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