

Design and Optimal Operation of Micro Electricity Grids: The Case of Lebanon

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Abstract:

This research proposal aims at assessing the effect of adopting the microgrid (MG) concept in Lebanon as a futuristic direction to enhance power supply reliability, increase the share of renewable energy in power generation, reduce emissions and find sustainable solutions to the illegal operation of diesel generators operating during power outages. It will be conducted under the prevailing situation of massive private power supply service providers operating expensive diesel generators and in light of the developed national energy policy that supports renewable energy development through public private partnership schemes. A methodology to optimally design a MG suitable for a Lebanese village will be developed. The supply of power from existing private generators in that village will be revisited by redesigning the system which will incorporate, in addition to the diesel generators, PV arrays and may be battery storage. To ensure optimal operation, an energy management system will also be developed. The outcomes of the proposed research will demonstrate the benefits of adding PV arrays to supply green electric energy; the implications of legal, economic and technical problems of the private generation business; and the policy framework to enable developing and managing private sector investment in power generation and distribution through the concept of MG.