The Potential of Hybrid Microgrids for Mitigating Power Outage in Lebanon

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Abstract : Lebanon electricity crisis continues to escalate. Rationing hours still apply across the country but with different rates. The capital Beirut is subjected to 3 hours cut while other cities, town and villages may endure 9 to 14 hours of power shortage. To mitigate this situation, private diesel generators distributed illegally all over the country are being used to bridge the gap in power supply. Almost each building in large cities has its own generator and individual villages may have more than one generator supplying their loads. These generators together with their private networks form incomplete and ill-designed and managed microgrids (MG) but can be further developed to become renewable energy-based MG operating in island- or grid-connected modes. This paper will analyze the potential of introducing MG to help resolve the energy crisis in Lebanon. It will investigate the usefulness of developing MG under the prevailing situation of existing private power supply service providers and in light of the developed national energy policy that supports renewable energy development. A case study on a distribution feeder in a rural area will be analyzed using HOMER software to demonstrate the usefulness of introducing photovoltaic (PV) arrays along the existing diesel generators for all the stakeholders; namely, the developers, the customers, the utility and the community at large. Policy recommendations regarding MG development in Lebanon will be presented on the basis of the accumulated experience in private generation and the privatization and public-private partnership laws.