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Energy management systems for remote smart microgrids: Opportunities and challenges

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Electrical distribution networks across the world are witnessing a progressive infusion of smart grid technologies into many aspects of their infrastructure and operations. Technologies such as Distribution Management Systems (DMS), Energy Management Systems (EMS) and Advanced Metering Infrastructure (AMI) have been used to address present and future needs of the distribution grids for automation, control, monitoring and optimization. Moreover, they boost distribution network efficiency and reliability by utilizing dispersed generation resources such as Distributed Energy Resources (DER), Community Energy Storages (CES) and renewable energy resources. Growth or uncertainties in fossil fuel prices such as diesel, inaccessibility to such fossil fuels in some remote communities in some seasons, increasing the need of grid reliability level as well as reducing GHG emissions and increasing the reliance on DERs based on new governmental regulations and/or incentives are some of the main reasons of remote community tendencies to implement remote microgrid. The growth and the expansion of remote microgrids with DERs and other smart microgrid technologies prove the necessity of having a specifically designed advanced EMS for remote microgrids that should be affordable and accessible to most remote communities. Although the technology exists, market has not yet served remote microgrids with a reliable, flexible and cost-effective EMS. This presentation discusses the main reasons such as unawareness of electric power utilities on remote microgrid future market potential and low priority level of remote microgrids compared with other power system applications and/or networks for electric power utilities. As such, this presentation primarily investigates the necessity of designing an EMS specifically for remote microgrids based on remote community factors such as technical, economic, cultural and environmental factors. Then, it elucidates the main issues of EMS in the market and numerated the main features of a cost-effective user-friendly EMS for remote microgrids in near future.

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