A microgrid is a stand-alone small transmission and distribution network, connected to the grid or operating in isolation, that leverages on decentralized distributed power generation systems and exploits locally available resources. In a way, it is a self-sustained power system which serves various electrical loads in a radial distribution network and can operate in a centralized grid-tied or completely isolated mode.

Above figure depicts a simple sketch of a microgrid network. As shown, the network rely on distributed renewable energy (DRE) technologies such as solar PV, biomass or wind coupled with energy storage systems and feed power to local loads through a distribution system. The microgrid operations can be monitored and handled by remote automated system such as a controller. On consumer side the system allows the usage of advanced metering system through which users’ bills can be generated and typical O&M can be scheduled.

Microgrids thrive in areas that are remote and lack access to centralized electric grid and for meeting the energy access agenda for communities living there. In such areas, expanding the central grid proves a comparatively expensive proposition and can be done away with the exploitation of local DRE resources through micro-grid network. Having said that, from modern power system perspective, there are potential for microgrids in campus areas that can serve other goals such as:

- To expand distributed generation to meet rising demand without expansion of the transmission networks
- To provide resiliency in case of a man-made and natural disaster, especially in urban critical infrastructures
- To provide more reliable and/or affordable power for commercial & industrial and residential consumers

Initially the cost of energy service through microgrids may prove higher but from an opportunity cost perspective such network remains more attractive than the conventional grid or no power.
Related Links

POLICY
➢ Alliance of Rural Electrification & EU Energy Initiative - Mini-Grid Policy Toolkit- Case Study
➢ Uttar Pradesh Electricity Regulatory Commission - Promotion of Mini-Grid Renewable Energy (Generation and Supply) Regulations, 2016

STATUS REPORT
➢ Institute of Transformative Technologies - Achieving universal electrification in India - A roadmap for rural solar mini-grids
➢ The Climate Group – The Business Case of Off-grid Energy in India
➢ Energy + Environmental Economics - Assessing the business case for rural solar microgrids in India
➢ Institute for Local Resilience - Mighty Microgrids (Case for Campus Micrgrid)

TECHNICAL MATTERS
➢ Lawrence Berkeley National Laboratory & Schatz Energy Research Center - A Guidebook on Grid Interconnection and Islanded Operation of Mini-Grid Power Systems Up to 200 kW
➢ The Central Electricity Authority, Government of India - Technical Standards for Connectivity of the Distributed Generation Resources

CASE STUDIES
➢ Greenpeace - Dharnai microgrid, Bihar
➢ GramOorja – Microgrid Projects
➢ Powerhive – Microgrid Case Study, Kenya
➢ Greentech Media – University of California San Diego Campus Microgrid of Future: A Case Study