

Paris Session 2022



Islanded power systems with a high share of renewable generation

Study Committee C6

Active Distribution Systems and Distributed Energy Resources
Preferential Subject 3

Question 3.4 “What are the main challenges and opportunities in operating rural or islanded power systems with a high share of renewable generation? To what extent are energy storage systems helpful? What is an optimal share of renewables and storage in islanded or remotely operated power systems?”

Group Discussion Meeting

Subir Karmakar, India

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What are the main challenges and opportunities in operating rural or islanded power systems with a high share of renewable generation?

- *The cost of electricity generated with renewable energy is continuously reducing due to technical enhancement, efficiency, and mass production. Powering the island grid with the renewable energy will reduce the overall electricity cost and be an energy ecosystem that relies on local resources to eliminate the dependence on imported fuels*

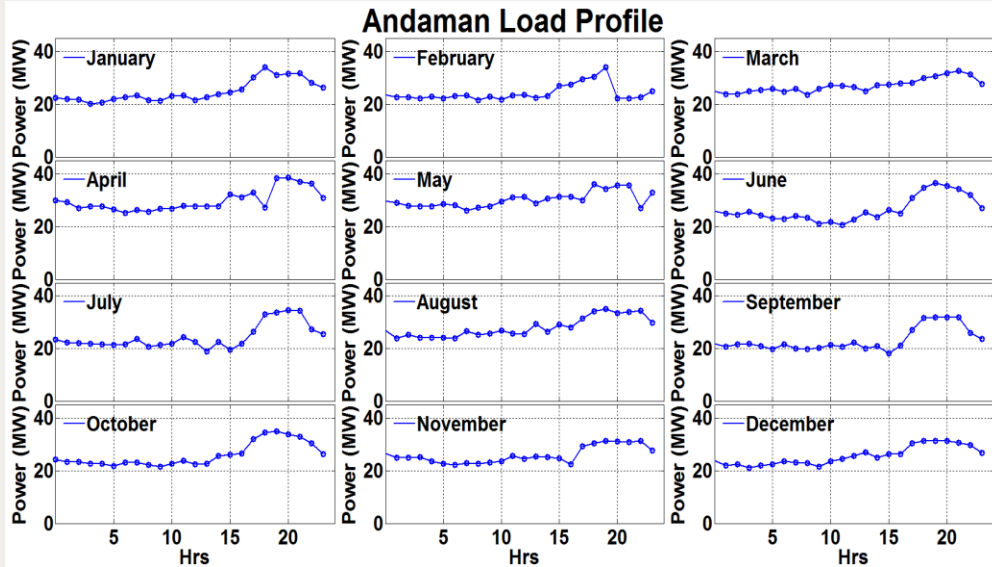
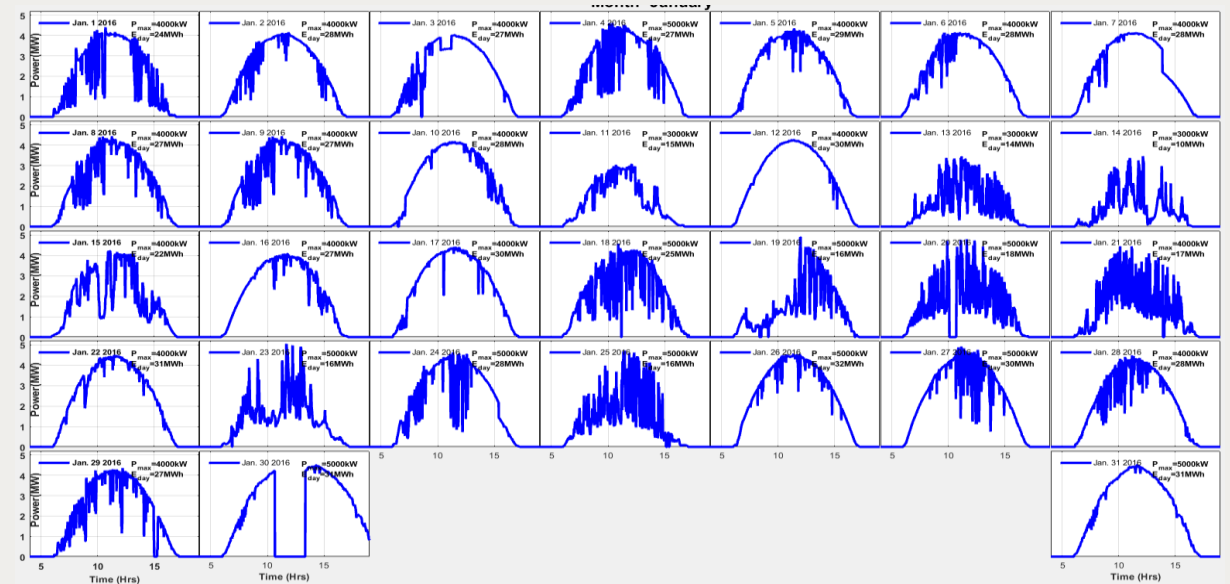


Figure-Typical month-wise load demand



Group Discussion Meeting

To what extent are energy storage systems helpful? What is an optimal share of renewables and storage in islanded or remotely operated power systems?”

- ❑ Without BESS the grid operation will be challenging as the gas plant requires a frequent start/stop and ramping up & down which leads to lowering of operating efficiency and higher maintenance. Gas plant spinning reserve capacity requirement is also reduced
- ❑ 100% RE supply to the load requires a very large solar and wind capacity and battery storage combination. The solution may not be techno-economical. Considering a minimum 40% annual PLF (commercial consideration) for an LNG/gas plant, the RE contribution of about 50% to 60% can be the best energy mix scenario.
- ❑ Gas plant energy tariff less than 40% PLF will increase exponentially for operating gas plant PLF less than 40%.
- ❑ 100% RE supply to load required huge storage capacity. Energy Tariff will be very high as cost of energy storage is very high.

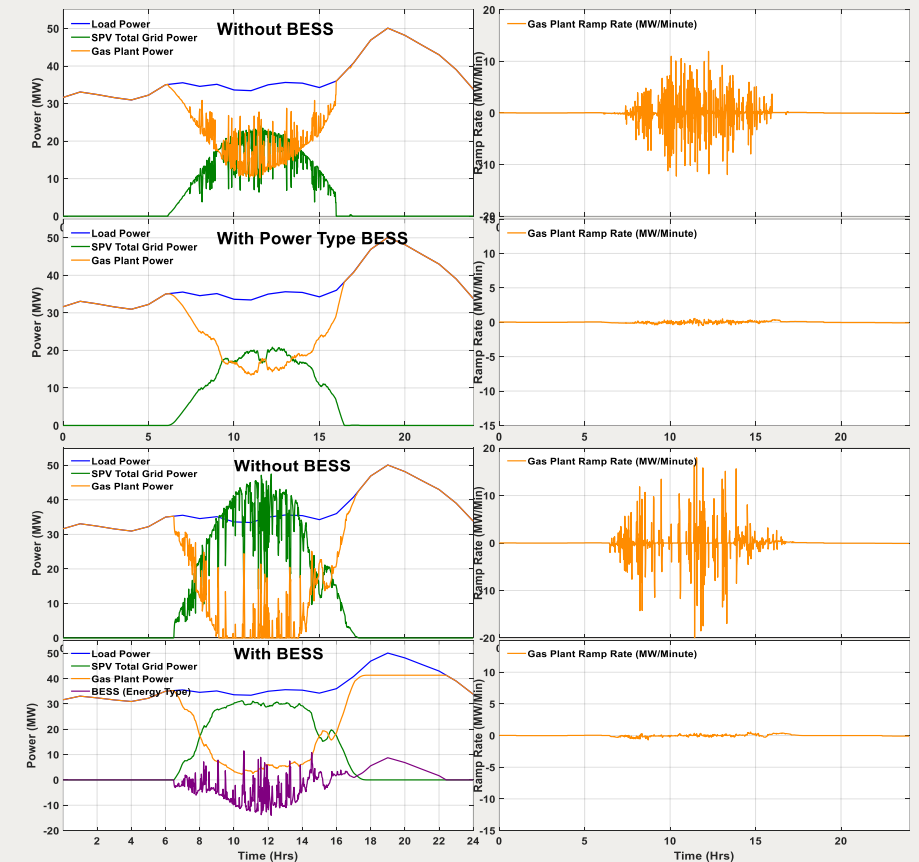


Figure:- Gas plant ramping requirement with and without BESS system during high solar intermittence