

OPINION: Energy access - Why it is a good time for grid-tied microgrids in India?

Microgrids are our best bet for reliable and affordable power supply in the current scenario

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[Energy access](#) is a critical challenge in the Indian [power](#) sector. The last-mile connectivity to a household or any other consumer is the responsibility of distribution companies (DISCOMs). The remoteness of some locations and the ailing finances of most DISCOMs make achieving 100% electrification in India, challenging. [Grid connectivity](#), [power supply](#) reliability, and affordability are the three pillars of energy access. Over the past five years, Government of India's ambitious policies and schemes have supported grid connectivity. Therefore, it's time to shift focus to reliability and affordability of power supply.

There is a need to improve power supply for remote rural areas. That said, power supply reliability issues can be resolved through distributed energy generation

technologies. Government policies on the development of distributed solar capacity (such as 40 GW rooftop solar installations by 2022) are a major driving force for power generation at the consumer-end. Lenient grid-integration policies (net metering or gross metering) and various subsidy schemes are also motivating consumers to install solar rooftop photovoltaic (RTPV) systems to generate clean energy domestically.

Microgrids for uncertain scenarios

Energy access inclines more towards supply to domestic households, compared with other consumer categories. Residential consumers remain the highest priority while discussing energy access. However, the energy demand of residential consumers is highly sensitive to externalities such as climate/weather changes and unexpected problems such as the current COVID-19 pandemic.

The demand curve of residential consumers is changing drastically because of the pandemic. A recent field study recorded the consumer loads of 81 households spread across Uttar Pradesh and Maharashtra. The analysis showed a 26% higher energy consumption during the pandemic.

This variation makes the overall residential demand more complex than pre-pandemic scenarios. But the complexities can be tackled easily through grid-tied microgrids, which ensure backup for the grid in times of crisis. Meanwhile, distribution side energy generation (mostly residential solar RTPV) and storage support can significantly reduce the load on a grid, apart from enhancing energy reliability. These measures can ensure a reliable and steady supply of power during uncertain scenarios, wherein the power demand varies randomly and the available grid supply is unreliable.

How microgrids support energy access

Microgrids have the potential to play a major role in the electrification of villages even in adverse conditions. It has to be assessed if microgrids can adhere to the two fundamental parameters of energy access: affordability and reliability.

Affordability: Solar, wind, and small hydro energy sources are considered to have the best potential to support microgrid requirements. Solar energy generation is the most flexible option in terms of installation (ground-mounted or rooftop solar) and affordability. The benchmark price of the rooftop solar PV system reduced considerably from ₹70,000/kWp in 2015 to ₹37,000/kWp in

2020. Additionally, government subsidies from central and state ministries have brought down the cost to ₹22,000/kWp. This has energised the distributed solar generation market.

Reliability: When a power grid operates in highly sensitive environments with sudden changes in weather and demand patterns, system reliability becomes crucial. Power outages in such situations can be avoided if backup is available from distributed microgrids. This can help in supplying power to critical loads such as hospitals, educational institutions, and sensitive pharmaceutical industries. Thus, microgrids not only provide reliable power to their connected loads but also increase the reliability of power in nearby grid-connected areas.

Public participation key to energy access developments

While good governance and new policies are required for reliable energy access, public participation is vital in understanding power reliability issues at the ground level. Direct public feedback could be recorded in identified locations for electrical fault observations such as time and duration of faults and frequency of interruptions. This strategy can help in speeding up resolutions. It could also serve as a base for the development of distributed microgrids based on consumer requirements.

The way forward for reliable energy access

Considering the target of 24/7 power for all by 2022, energy access reliability and affordability need to be addressed urgently. The microgrid supply has reached only a small fraction of consumers because of the lack of successful business models. Performance evaluation of microgrid-electrified villages along with a few pilot studies (with sustainable business models) is the need of the hour. After all, microgrids are our best bet for reliable and affordable power supply in the current scenario.

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