

Stimulating the mini-grid market in India

Size of the market

The market size of mini-grids in India has been growing steadily in recent years. According to a report by the Council on Energy, Environment, and Water (CEEW), the market for decentralised renewable energy (DRE), which includes mini-grids, was valued at approximately \$1.75 billion in 2018 and was expected to grow to \$2.5 billion by 2023. The report also noted that the mini-grid market in India is still in its early stages, with significant growth potential. The government's target of installing 10,000 renewable energy-based mini-grids by 2021, as well as other initiatives aimed at promoting the development of off-grid renewable energy solutions, is expected to drive the growth of the mini-grid market in India. In addition, several private sector players operate in the mini-grid sector in India, including companies such as Mera Gao Power, OMC Power, and Husk Power Systems, among others. These companies are expanding their operations and investing in new technologies to improve the efficiency and reliability of their mini-grid systems. Although the market size for mini-grids in India is still relatively small compared with the overall energy market in the country, it is expected to grow significantly in the coming years, driven by both government and private sector investments.

According to a report by the International Energy Agency (IEA), the mini-grid market in India is expected to grow rapidly in the coming years, with an estimated investment potential of up to \$2.5 billion per year. The report notes that the growth of the mini-grid market is driven by a combination of factors, including increasing demand for electricity in rural areas, falling costs of renewable energy technologies, and supportive government policies and incentives.

The Council on Energy, Environment, and Water (CEEW) has also conducted market analyses of the mini-grid sector in India. Their report noted that the market for decentralised renewable energy (DRE), which includes mini-grids, is expected to grow at a compound annual growth rate (CAGR) of 22% between 2018 and 2023. The report identifies several key drivers of growth in the mini-grid market, including increasing demand for electricity in rural areas, declining costs of solar photovoltaic (PV) technology, and supportive government policies and incentives.

In addition, a report by the World Bank identified several key challenges facing the mini-grid sector in India, including regulatory barriers, limited access to financing, and inadequate capacity among local institutions and communities to effectively manage and operate mini-grids. The report also noted that there is significant potential for private sector investment in India's mini-grid sector, particularly in innovative business models and financing structures.

Mini-grids have been set up in India in the last three decades, but the earlier ones catered to meeting domestic electricity demand. With 100% electrification, the market conditions have changed, and the sector offers significant potential for growth in the coming years, driven by both increasing demand for electricity in rural areas and supportive government policies and incentives.

Policy and Regulatory Framework for mini-grids

The policy and regulatory framework for mini-grids in India is primarily governed by the Ministry of New and Renewable Energy (MNRE) and state electricity regulatory commissions (SERCs). MNRE has launched several policies and schemes to support the development of mini-grids in India, including:

- **Deen Dayal Upadhyaya Gram Jyoti Yojana (DDUGJY):** This scheme aims to provide access to electricity to all rural households and electrification of all rural villages through a combination of grid and off-grid solutions, including mini-grids.
- **National Solar Mission:** This scheme aims to promote the development of solar power in India, including the installation of solar mini-grids.

- **Off-Grid and Decentralized Solar PV Applications Program:** This program provides financial support for the installation of off-grid solar PV systems, including mini-grids.

In addition, the SERCs in each state are responsible for regulating the operation of mini-grids and setting tariffs for the electricity supplied by mini-grid operators. SERCs also play a role in approving the installation of mini-grids and ensuring that they meet technical and safety standards.

There are also various policies and regulations related to renewable energy and electricity distribution relevant to the mini-grid sector in India, including:

- **Electricity Act, 2003:** This act governs the regulation of the electricity sector in India and provides a framework for the development of renewable energy sources, including mini-grids.
- **National Tariff Policy, 2016:** This policy provides guidelines for setting tariffs for electricity supplied by mini-grids and other off-grid sources.
- **Renewable Purchase Obligation (RPO):** This policy requires power distribution companies to purchase a certain percentage of their electricity from renewable sources including mini-grids.

While supportive policies and regulations are in place for the development of mini-grids in India, there are also challenges related to regulatory barriers and inconsistent implementation of policies across different states.

Financing options for mini-grids

Several financing options are available for the development and operation of mini-grids in India:

- **Government subsidies and grants:** The Ministry of New and Renewable Energy (MNRE) offers subsidies and grants for the installation of mini-grids in India. For example, the Off-grid and Decentralised Solar PV Applications Program provides a subsidy of up to 30% of the project cost for mini-grid installations.
- **Debt financing:** Mini-grid developers can access debt financing from commercial banks and other financial institutions. The Indian Renewable Energy Development Agency (IREDA) is a specialized financial institution that provides debt financing for renewable energy projects, including mini-grids.
- **Equity financing:** Equity financing is another option for mini-grid developers, whereby investors provide funding in exchange for a share of ownership of the project. Several venture capital firms and impact investors in India focus on financing renewable energy and mini-grid projects.
- **Crowdfunding:** Crowdfunding is a relatively new financing option for mini-grids in India. Platforms, such as Milaap and Kiva, allow individuals to make small investments in mini-grid projects, which can help raise capital for project development.
- **Carbon financing:** Carbon financing is another option for mini-grid developers, whereby they can earn revenue by selling carbon credits generated from their renewable energy projects.

In addition to these financing options, mini-grid developers can explore innovative business models and financing structures to make their projects more financially sustainable. For example, some mini-grid developers in India have implemented pay-as-you-go models, where customers pay for electricity on a per-use basis, which can help reduce upfront costs and increase revenue.

Recommendations

There are several ways in which the mini-grid sector in India can be stimulated to grow and meet its potential.

- **Encouraging supportive policies and regulatory frameworks:** The government can continue to implement policies and regulatory frameworks that support the mini-grid sector. This includes providing financial incentives, simplifying regulatory procedures, and creating an enabling environment for private-sector participation.
- **Increasing access to finance:** Access to finance remains a critical challenge for India's mini-grid sector. To address this, the government can encourage financial institutions to invest in the sector and offer innovative financing options such as debt and equity financing, crowdfunding, and pay-as-you-go models.
- **Fostering innovation and collaboration:** The mini-grid sector can benefit from greater innovation and collaboration among different stakeholders, including the government, private sector, and civil society organisations. This could include initiatives to encourage research and development of new technologies, promote knowledge sharing, and support the creation of partnerships and networks.
- **Enhancing capacity building and skill development:** The successful operation of mini-grids requires a range of technical and managerial skills. To address this, there is a need to enhance capacity building and skill development among local institutions and communities, including training in operations and maintenance, financial management, and community engagement.
- **Strengthening monitoring and evaluation:** It is important to have a robust monitoring and evaluation framework to measure the impact and effectiveness of mini-grids in meeting their objectives. This can include the development of performance indicators, regular data collection and analysis, and sharing of lessons learned and best practices.

By implementing these measures, the mini-grid sector in India can be stimulated to grow and meet its potential, ultimately contributing to the country's sustainable development goals and improving energy access for rural communities.