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# Power Generation

**GREEN AHEAD: SOLAR**  
**SPOTLIGHT: BACKUP POWER**  
**SPECIAL FOCUS: SMART GRIDS**



**Sanjith S Shetty,**  
Vice Chairman and Managing Director,  
Soham Renewable Energy India (P) Ltd



**Francois Vazille,**  
Vice President  
Oracle Utilities



**M Rajagopalan,**  
Market Development Director (Middle  
East & Asia), Wartsila India Pvt Ltd



**Priyadarshini Sanjay,**  
Managing Director,  
Mercom Communications India



# “Microgrids enable a greater level of penetration for RE”

Says Sanjith S Shetty, Vice Chairman and Managing Director, Soham Renewable Energy India (P) Ltd, in conversation with R Srinivasan.



**K**indly comment on the current market potential of backup power - Diesel gensets (DGs) and inverters - in India in view of the government's thrust on renewable energy?

The fact that India is in dire shortage of power is the main reason that the back-up power system market is growing very fast with newer technologies and methodologies incorporated and implemented. The Indian UPS market is a steadily growing market with both Indian and multinational manufacturers contending for a major chunk of the market share. The Indian inverter market comprises several organised and unorganised players jostling for space. The major factor driving growth for inverters and UPS in industrial and private sector need uninterrupted power supply to run basic infrastructure. The widening gap between demand and supply of electricity in India is another key factor driving growth in this market.

Inverter is basically a backup power device whereas UPS is used for backup power as well as power conditioning. Certain manufacturing industries, have very critical nature of processes which cannot afford a millisecond of power disruption. This is one sector where UPS really fits in and which is also driving growth in the UPS sector. Insufficient capacity and inefficiency of the grid for distribution are factors that are driving the UPS and inverter industry today.

To maintain technology, inverters and UPS has become an integral part to address power fluctuations and prevent wear and tear of expensive electronic and industrial equipment. Also the increased purchasing power of Indian middle-class households is fuelling the growing popularity of inverters.

The market for inverters and UPS in India is characterised by a dominant presence of the unorganised sector, since the unorganised sector caters to price-sensitive consumers and the organised players mostly target brand-conscious consumers. However, low prices offered by unorganised players are now compelling organised

players to reduce their prices to effectively maintain their competitive edge in the market.

Suppliers operating in the inverter industry are also exploring contract manufacturing opportunities since it benefits both the service provider and the hiring firm as each can focus on their core competencies. Moreover, players operating in the UPS market are increasingly focusing on selling their products through large retail formats and on strengthening their channel sales.

Due to rising cost and storage challenges of diesel, people are starting to shift from gensets to power inverters. A lot of people today want to be independent of the grid.

Renewable energy trend: Solar hybrid inverters are in vogue these days. Especially in the inverter segment, people are exploring solar inverters and trying to install a solar system with batteries so that it not only serves their power needs during the day but also gives them a small relief in their power needs during night. The popularity of solar technologies in both rural and urban India is driving the trend for solar hybrid inverters that combine solar panels with an inverter, to address their power requirements.

Government schemes such as computerisation of schools have also boosted the inverter industry.

Finally, R&D has become one of the major focus areas of the power backup systems market. For overall development of this industry it has become imperative for companies to invest in R&D activities. Making power backup equipment available in smaller sizes ensures higher revenue, especially from the SME and SOHO segments. Players are also looking to foray into e-commerce business models along with doorstep delivery systems.

**Kindly comment on the market potential of the solar power conversion chain including off-grid solar and battery backup solutions in India since diesel gensets consume \$13 billion worth of diesel annually.**

Nearly 50 per cent of India's rural population - 80 million households have little or no access to grid-based electricity and instead depend solely on kerosene as their primary source of lighting. While government efforts are expected to increase grid connectivity, progress has been quite slow.

India currently has 77 million households (about 360 million people) who lack adequate access to grid-electricity and another 20 million households (approximately 95 million people) who receive less than four hours of electricity in a day. While grid connectivity is expected to improve over the next 10 years, at the current rate of grid expansion, urbanisation and population growth, 70-75 million

households will still lack access to grid electricity by 2024. Since 90% of these households live in rural areas, a significant reduction in the 83 million rural households are currently not served by the grid.

Given the increasing affordability and consumer demand for solar energy, there is likely to be greater competition from new and existing solar players. Rising rural incomes mean that village households will demand and be able to afford products beyond basic lighting. One expects the number of households that can afford solar energy to increase by more than 30% per year over the next five years.

Thankfully, growing awareness, falling prices and greater access to finance are making off-grid energy solutions including solar lanterns, solar home systems (SHS) and decentralised renewable energy (DRE) are getting to be an increasingly attractive option.

India has set a target of installing 175 GW of renewable energy by 2022, of which 100 GW will be solar. Of this solar capacity, 40 GW will come from rooftop and 60 GW through large and medium scale grid-connected solar power projects. The Indian market is expected to reach close to 9 GW in 2017.

With a focus on the renewable energy sector and smart grids, there is scope for new innovative solar power installations throughout the country, providing solar power conversions including off-grid solar and battery backup solutions in India.

**To what extent do Chinese equipment affect the local market?**

Practically eight out of the top 10 module suppliers in the Indian market are now from China as against just four out of the top 10 in the previous year. The remaining two names include First Solar (USA) and Waaree (India). While early movers Trina Solar and Canadian Solar have managed to maintain their market share and retain top positions, the big change is a significant pick-up in market share by other Chinese suppliers including JA Solar, GCL Poly, Hanwha, BYD, Talesun and Risen. These companies had a very marginal presence in the market previously but now have a combined market share of 32%.

Shipments for major non-Chinese suppliers such as First Solar, Tata Power Solar and Vikram Solar grew in volumes but respective market shares have come down drastically.

Chinese module suppliers have increased their share of the Indian solar PV market, which added a total capacity of 3.6 GW in the past 12 months to 75%, up from around 50% in the previous 12 months. In contrast, the share of Chinese suppliers in the US market is believed to be less than 30%. Existing Chinese majors have maintained their market





share but the new Chinese companies have taken a significant share away from Indian and other international suppliers.

Module supply glut in China may lead to even more Chinese suppliers focusing on the Indian market with aggressive pricing. It is a buyer's market for Indian project developers despite a major increase in demand.

Going forward, we can expect the Chinese module companies to be shaken up somewhat as the Indian government's push for Make in India and the imminent announcement of a new manufacturing policy for the sector may turn the game in India's favour. A mix of factors including local supply glut and falling prices means that Chinese companies will compete hard for a growing share in the Indian market. The possibility of other mid-sized Chinese suppliers entering the market with aggressive pricing also cannot be ruled out.

Indian suppliers are expected to maintain a market share of 10-12%, broadly proportional to capacity set aside for Domestic Content Requirement (DCR). However, we expect a churn in the domestic supplier market shares once Adani's 1.2 GW manufacturing facility becomes operational.

The big beneficiary of falling prices and increasing competition between module suppliers is obviously the Indian solar market. Project developers are in an advantageous position as they are in a buyer's market despite increasing Indian demand. They will be relieved with falling prices, which will serve to grow the appetite of local investors.

**Microgrids can serve as backup power sources and allow homes or businesses to operate off the grid. A Navigant research report identified 1,437 microgrid projects worldwide representing 13 GW of capacity either operating, proposed or under development and the market for microgrids will soar to \$40 billion by 2020. Your views.**

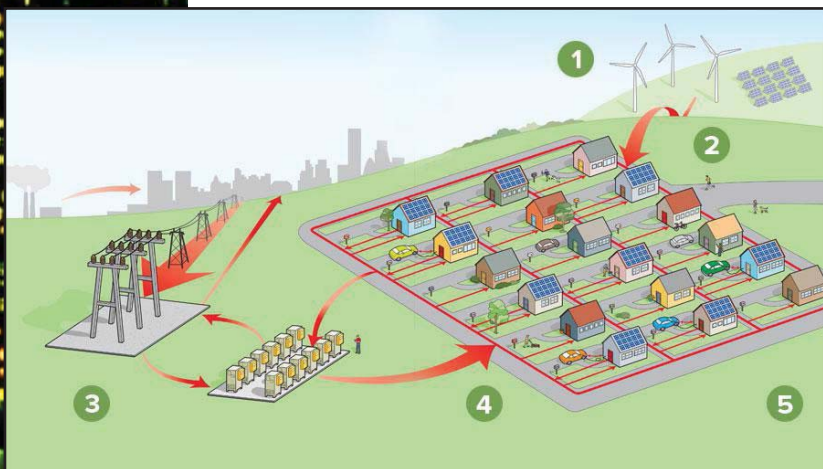
As an RE player I am totally fascinated by the potential of microgrid as this form of energy generation can function independently from the traditional regional power grid. Furthermore it can with ease fully enable towns, small cities or corporations to develop their own energy sources and power storage systems and distribute or even sell excess power back to local utilities. They also offer a very prompt response during high energy demand times and power outages. Microgrids therefore enable a greater level of penetration for renewable energy with higher efficiency, providing energy savings and carbon footprint reduction. They are here to stay.

While still immature in many countries, there are numerous pilot projects that are paving the way for microgrids. New technology is blossoming in this category. New ground is being broken as utilities and communities work together to protect one of their most precious resources: electricity. In order for the technology to receive its due share, utilities will need to embrace the concept of the microgrid, and how it can both enable and inhibit the business of energy. With knowledge and resources, microgrids can be a vital part of the new and upcoming Smart Grid biosphere.

Microgrids are not actually a new or a novel concept. Many sites have traditionally used embedded backup generators for reliability purposes. However the latest technology backed advanced microgrid ensures a permanent, clean, local generation, the ability to seamlessly connect and disconnect from the main grid, and the use of analytics to run the system at an optimal efficiency level. Microgrids can also be off-grid systems. They can even go beyond electricity and incorporate gas, heat, and district cooling. They generate and distribute electricity on a localised basis. Microgrids are comprised of a series of subsystems including their own rooftop photovoltaic generation, wind turbines, generator sets, CHP, energy storage systems and power distribution systems.

Individual buildings and residential consumers can be considered 'nanogrids' if they consume and supply power, self-consume their own generated electricity and isolate themselves from the grid. These smaller microgrid designs can serve residential or commercial loads. They may be configured to provide power to a larger commercial property such as a shopping mall, college campus, or military installation, or even an entire neighbourhood. These small grids can be linked together or embedded into larger microgrid.

Microgrids can be categorised into four categories: **Grid-connected facility:** With a single owner and connected to the main grid, these microgrids are created for improved reliability in places where





the main grid's reliability is poor, or when the utility is providing attractive pricing incentives for sheddable loads. Some examples are high-availability single buildings, or research or headquarter campuses of a corporation, hospital, data centre, etc.

**Grid-connected community:** Serving multiple consumers and producers, connected to the main grid, or managed as a unit and with an optimisation of exchanges with the utility's main grid, these microgrids range from business campuses of cities and green villages to eco-districts or even small municipalities.

**Off-grid facility-led:** This is the most common type of microgrid today. With a single owner, these are found in remote areas not reached by the traditional grid. Examples are military bases, remote mines, isolated mountain homes.

**Off-grid community-led:** Serving multiple consumers and producers, these microgrids

are also found where the main grid is out of reach, for example islands, remote villages, and communities. However, unlike facility-led microgrids that serve one corporation/institution, these initiatives encompass various community assets and aim to guarantee resilient power for vital community services.

I am sold on microgrids because it delivers power at close proximity to its generation point, thereby avoids much of the overhead costs associated with transmitting and distributing energy, including losses inherent in long-distance energy transport. Secondly, because of its key attribute of seamlessly disconnecting and reconnecting to the main grid without supply interruption of loads. Finally, microgrids that are powered by wind, solar, or biomass contribute to the overall renewable goal of the green utility and our society, helping reduce energy-related greenhouse gas emissions.

