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The Indian telecom sector has grown rapidly over the past decade, which is evident from the fact that the telecom network covers about 90 per cent of the country's villages, whereas the electricity network has 83 per cent coverage. As the sector has matured, and is witnessing increased competition and declining ARPUs, operators have shifted their focus towards cost reduction to ensure profitability.

For a telecom company, almost one-third of the network opex comprises electricity and diesel generator (DG) fuel costs. Electricity costs are high because power supply has not been able to keep pace with the huge demand from telecom companies. At present, 10 per cent of telecom towers do not have grid supply and are dependent on alternative fuels. The grid power demand-supply gap is expected to increase further in the future. Moreover, some rural areas are facing issues related to poor grid infrastructure.

The cost of using alternative fuels is also heading north. Diesel prices have almost tripled from Rs 14 per litre in 2000 to Rs 41 per litre in 2011 and are expected to rise further with diesel deregulation. On the other hand, costs of solar photovoltaic (PV) panels almost halved from Rs 25 per kWh in 2008 to Rs 13 per kWh in 2010.

Therefore, shifting to alternative energy technologies (green fuels) is a critical cost reduction initiative for telecom companies. Besides being environment friendly, they can lead to sustainable growth because these depend on renewable natural resources like wind, solar and biomass.

A comparison of these alternative energy technologies shows an interesting trend. The initial cost of a solar plant is very high and the efficiency is lower than the other three sources. But, the positives include the abundant availability of sunlight, possibilities of scaling up, reliability and predictability of solar power, and the absence of fuel logistics problems. Also, low repair and maintenance costs help reduce expenses. Moreover, the technology is tested and proven, and can be used in hybrid models (for example, solar-battery, solar-generator and solar-wind hybrids).

One of the successfully tested and implemented solar power models is the solar-DG hybrid system. A typical solar-DG hybrid system consists of:

- Solar panels of 3 kWp for one equipment site and up to 8 kWp for three to four equipment sites

- Valve-regulated lead acid batteries used as energy backup

- Solar controllers used to control the maximum per point tracking.

These installations are managed remotely by connecting them with the data management centre. Thus, each site's data can be centralised and viewed at a remote place to monitor critical data such as DG, solar and battery run hours and fuel consumption.

Research and development is being undertaken to increase the efficiency of solar panels and develop batteries with a longer cyclic life. These developments will make solar technology more acceptable for use on a large-scale basis. The operation of a solar-DG hybrid system involves the following: The generator runs during midnight to 7 a.m. Solar energy is used between 7 a.m. and 7 p.m., when sunlight is available. In the evening, the battery starts discharging the energy stored during generator run hours and solar run hours.

This hybrid solution reduces DG run hours from 22 hours per day (in the case of only generator) to six to eight hours per day, thereby decreasing reliance on DGs, especially in non-electrified areas. The decrease in DG run hours reduces its maintenance costs by 60 to 70 per cent and leads to a significant decline in carbon emissions. The decrease will also help in reducing DG breakdowns, thereby increasing site uptime. The hybrid solution is scalable and three to four operators can be accommodated at a single site. It is a perfect solution for sites that have available land to install solar panels, but have no or poor grid availability.

Several operators are opting for an opex model, whereby the telecom company pays a monthly

opex to vendors for 10-12 years. The vendor is required to install, operate and maintain the solar system for this period. This model does not involve any upfront cost for the operator. For vendors, it is in effect a capex model because they have to bear the initial cost of installation. This ensures performance guarantees from vendors. For instance, Bharti Infratel has opex-based tie-ups with technology providers like Applied Solar Technologies Private Limited, Pace Power Systems and Bhaskar Solar System.

Solar technology is being continuously developed in order to make it more suitable for commercial use. Some key challenges have been witnessed in this process. The initial capex for installation of solar panels is substantial, which impacts the commercial viability of the technology. Solar energy is expensive in comparison to other renewable sources. Site configurations are not standard and this requires modifications in the design of equipment. Availability of shadow-free sites is also an issue. Space availability to accommodate 10 square metres per kW of solar panels is another challenge. A major concern for setting up a solar system is that panels cannot be installed on the top of towers due to high wind loading. Also, in some remote villages, theft and pilferage have become major problems. Telecom, being a 24x7 business, will require that solar equipment vendors provide site operation and maintenance experts in order to ensure break-free performance from the solar solution installed at the site.

Going ahead, there is a strong case for the use of solar technology in the Indian telecom sector. There is a significant tower base with off-grid sites, for which solar technology presents a realistic solution. The estimated solar potential for telecom is 1,200 MW by 2017, which is likely to increase to 2,300 MW by 2022. Also, the cost of solar systems is projected to drop by 5 to 6 per cent annually during the next decade. Another positive is the fact that new-generation equipment is lightweight, which will lead to load reduction on the base transceiver station.

Therefore, the cost advantage and scope to scale solar technology present a big opportunity in the telecom sector.

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