# Innovations-Sustainability of Telecom

**Tilak Raj Dua,** FIETE
Tower and Infrastructure Providers Association, 7, Bhai Vir Singh Marg, Gole Market, New Delhi 110001 India
tr.dua@taipa.in

*Abstract* **-- A 10% increase in broadband penetration results in 1.38% increase in GDP of the developing economies. The telecom sector is one of the key sectors driving socio-economic development of India. The growth in telecom services coupled with wireless data has been exponential which necessitated the expansion of existing telecom infrastructure. The telecom services have reached places where the winds of development have not yet touched.**

**The technology evolution to 5G would lead to data explosion as it would make possible many applications and services. Power and energy consumption for telecom network operations is by far the most important factor to ensure seamless telecom connectivity to the masses. Various applications in smart city** *e.g.* **security surveillance, climate indicators, traffic control, waste control etc. would need huge data usage, resulting in increased energy demands.**

**Tower and Infrastructure Providers Association's recommendations for measures required for incentivisation of renewable energy technology solutions are mentioned.**

*Keywords: Telecom services, Reducing diesel consumption in telecom towers, Renewable energy solutions, Lithium-ion battery, Integrated neutral host platform, Indoor to outdoor site conversion, RET*

## I. INTRODUCTION

INDIAN telecommunication industry continues to witness unprecedented growth. India is the world's second-largest telecommunications market in terms of subscriber numbers. As per TRAI's recent report, the subscriber base was 1189.28 million out of which 1176.00 million were wireless subscribers as on 31$^{st}$July 2019. The overall tele-density was 90.23% as on 31$^{st}$July 2019, the telecom sector contributes 6.5% to India's Gross Domestic Product (GDP). India has one of the lowest data tariffs globally at Rs 10.91 per GB, a drop of 96% over last 4-5 years, which led to manifold growth in data consumption in the country. Number of broadband subscribers reached 604.12 million as on 31$^{st}$July 2019. A study conducted by the World Bank estimates that a 10% increase in broadband penetrations results in 1.38% increase in GDP of the developing economies.

The growth has been made possible due to significant addition in telecom infrastructure: telecom towers and OFC network. During the last 2 years about 6.30 lakh new base Transreceiver Stations (BTSs) were installed and ~61,000 new mobile towers were added. Number of mobile BTS more than doubled – from 7.9 lakh in May 2014 to more than 20 lakh in December 2018. Country-wide OFC coverage doubled – from 7 lakh Km in May 2014 to 14 lakh Km in May 2018. The average per minute tariff has dropped to 11 paise per minute. The data consumption is growing at a huge pace.

*Telecom Infrastructure requirements to operate & provide 24x7 connectivity:* Energy forms a significant component of telecom tower site operations as the sites are required to be operational 24x7 all through the year.

As per license conditions, a telecom operator needs to maintain a network availability higher than 99.5 % of total time. Assured power 24x7 is, therefore, a pre-requisite for any telecom tower site. Although electricity situation is improving, it is still erratic in several pockets of the country.This forces the telecom sector to use diesel to generate backup power not as a choice but as a compulsion resulting in huge financial burden upon telecom players just to meet the deficit of power supply and maintain the QoS and network uptime.

Due to sustained efforts of telecom infrastructure providers/ telecom service providers, 37% of the total towers *i.e.* 208516 towers out of 5,68,836 towers have been turned diesel-free so far. About 6100 towers are being powered by Renewable Energy Technology solutions as well.

*Mission statement as per National Digital Communication Policy (2018):* National Digital Communication Policy- 2018 (NDCP 2018), notified in 2018 by the Government, envisages the following for enhancement of deployment of Renewable Energy Technology in telecom sector:

Incentivising the use of renewable energy technologies in the communications sector, including:

i. Encouraging the utilisation of small cell fuel batteries, lithium-ion batteries or other similar technologies to improve energy consumption efficiencies
ii. Promoting research and development of green telecom through active participation of stakeholders across government, industry and academia.

Thus, while keeping the objective of "Broadband for All" mission by 2023, the Government also wants to ensure sustainable development.

*Technology evolution and increasing energy requirements of telecom sector:* The increasing need for computation, data storage, and communication is driving the rapid growth in telecommunication and enhancing the emissions associated with such technologies. By 2020, ICT is expected to account for about 3% of global Green House Gas (GHG) emissions worldwide. With 3G becoming pervasive, energy demand is likely to increase by two three folds at least because data transfer would consume more energy and the introduction of 4G, with a speed transfer rate 10 times higher than the 3G, will further substantially increase the energy consumption patterns of the telecom sector.

As per TRAI's white paper on 5G, Mobile data usage has grown to 46404 million GB per month by December 2018. This translates to average wireless data usage of 7.69 GB/ data customer. By 2025, smart phone connections would be 75% of total connections. India will add 208 million new connections by 2025. 5G will add to growing data demand for broadband/ high speed internet. It is expected that 5G enabled digitalization revenue potential will be above USD 27 billion by 2026. 5G connections will grow to 70 million by 2025, around 5% of total connections (TRAI white paper on 5G).

The technology evolution to 5G would lead to data explosion as it would make possible many applications and services. This would in turn lead to substantial energy requirements. There is an urgent need to address the sustainability of telecommunications with this technology evolution and data explosion. Power and energy consumption for telecom network operations is by far the most important factor to ensure seamless telecom connectivity to the masses. The energy requirements have been projected in Figure 1.

It is pertinent to highlight as India has recently become the sixth biggest economy in the world. It is needless to mention that a robust telecom infrastructure will be a critical element in realization of ambitious Government's program of Digital India which aims to create a knowledge-based society.

As next generation technologies such as 5G, M2M, IoT and Artificial Intelligence take shape, the telecom infrastructure will expand, and additional sites will be installed. This also translates into increased energy consumption at sites. Going forward, the number of sites will tremendously increase during 5G rolled out. The energy requirements will shift towards powering of small cells, smart poles and street furniture etc. The following reasons would lead to higher energy requirements in 5G:

*a.* Densification of sites in 5G due to higher frequency waves
*b.* Small cells deployment at street furniture level
*c.* Lower latency and customised radio.

*Smart Cities:* Apart from creation of digital infrastructure to usher the country into digital India, the Government of India has chalked out smart city program wherein 100 cities have been identified in the first phase. 5G and smart city – both are Government of India's flagship programs.

The cities would be designed on self-sustainable model with extensive use of technologies which lead to zero waste and healthy environment. Under the Smart Cities Mission, these cities will be transformed to Smart Cities. Part of being "smart" is utilizing information and communications technology (ICT) and the Internet to address urban challenges. During the next 20 years, 30 Indians will leave rural India for urban areas every minute, necessitating smart and sustainable cities to accommodate them. Significant investment in technology and connectivity are required. The most important technological pieces required for the functioning of a smart city are:

- Communication networks
- Intelligent telecom infrastructure
- Compute, data storage, and data centres
- Data analytics.

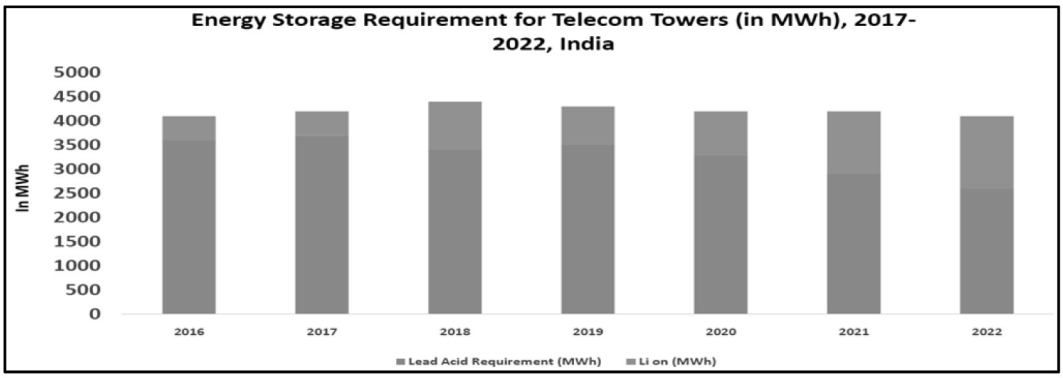


Figure 1. Energy storage requirements for telecom towers.

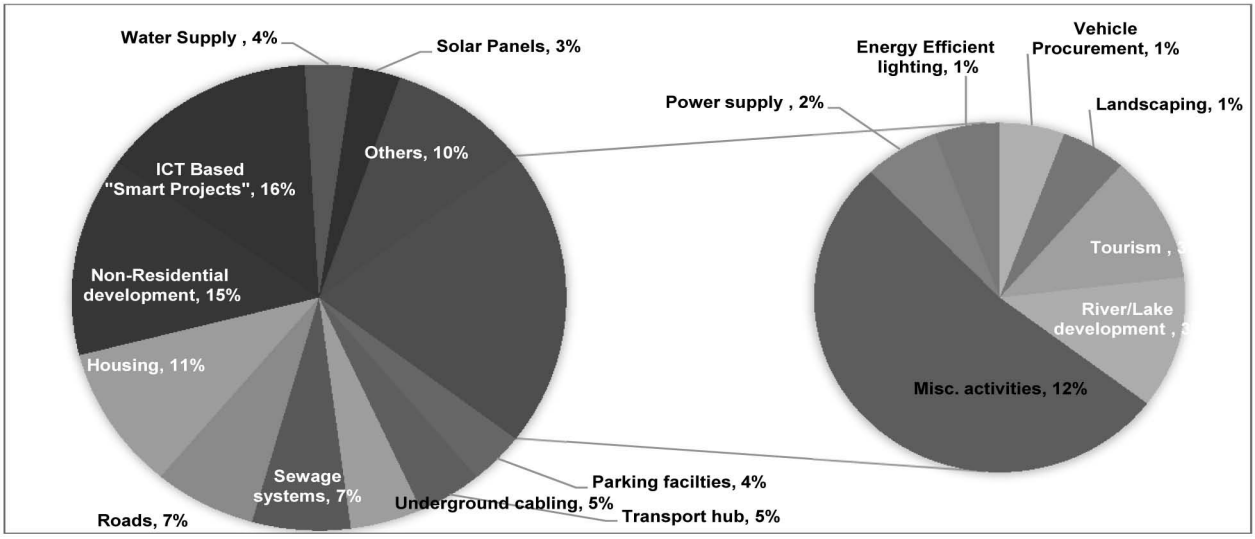


Figure 2. Rs 2.01 trillion investment planned in smart cities.
(Based on Smart City proposals of announced for 99 cities Source: MoUD).

Various applications in smart city *e.g.* security surveillance, climate indicators, traffic control, waste control etc. would need huge data usage, resulting in increased energy demands.

*Anticipated All India Power Supply Position for the year 2018-19:* All India power supply situation indicated that the country was likely to have a peak surplus of 2.5% and energy surplus of 4.6%. Surplus energy is anticipated of the order of 1.9%, 14.8% and 22.9% in the Western, Northern and North-Eastern regions respectively. Eastern and southern regions are likely to face energy shortage of 4.2% and 0.7% respectively which can be met from surplus power in other regions. Northern and southern regions are likely to face peak deficit of 1.2% and 4.5%. The All India situation is shown in Table 1.

Table reflects that CEA anticipated some regional demand-supply gap during 2018-19. This gap, coupled with lack of transmission lines/ capacity all across India, poses a challenge, to telecom operations, which are spread across each nook and corner of the country.

## II. STEPS TAKEN BY TELECOM INDUSTRY TO REDUCE DIESEL CONSUMPTION

Infrastructure providers are the key players in the telecom ecosystem who deploy telecom infrastructure such as towers, OFC, cables, duct, micro sites, IBS. Telecom Infrastructures are established and maintained by the IP's and is shared with the licensees under section 4 of the Indian Telegraph Act, 1885 on a non-discriminatory basis. They also provide plug-and-play service to Telecom service providers, by enabling power solutions at the tower site.

TABLE 1 -- ALL INDIA POWER SUPPLY SITUATION

| State / Region | Energy | | | | Peak | | | |
|---|---|---|---|---|---|---|---|---|
| | Requirement | Availability | Surplus (+)/ Deficit (-) | | Demand | Availability | Surplus (+)/ Deficit (-) | |
| | (MU) | (MU) | (MU) | (%) | (MW) | (MW) | (MW) | (%) |
| Northern | 398,020 | 456,855 | 58,835 | 14.8 | 63,300 | 62,525 | -775 | -1.2 |
| Western | 418,323 | 426,401 | 8,078 | 1.9 | 53,837 | 58,817 | 4,980 | 9.3 |
| Southern | 348,077 | 345,708 | -2,369 | -0.7 | 49,600 | 47,384 | -2,216 | -4.5 |
| Eastern | 156,703 | 150,192 | -6,511 | -4.2 | 22,884 | 24,014 | 1,130 | 4.9 |
| North-Eastern | 15,914 | 19,550 | 3,636 | 22.9 | 2,708 | 3,049 | 342 | 12.6 |
| All India | 1,337,036 | 1,398,706 | 61,670 | 4.6 | 180,682 | 185,122 | 4,440 | 2.5 |

Source : CEA website

Telecom sector is moving away rapidly from diesel as it not only increases operational expenditure, but also involves additional cost of diesel along with its pilferage. Cost of DG powering is 80-120% more than electricity besides placing fuel import burden on nation. Diesel pilferage losses are around 20%, with absolute loss being Rs 2200 Cr per annum. To optimize the electricity usage through non-conventional sources of energy, the sector is moving towards energy-efficient sources of energy. Solutions such as energy storage can provide 20-25% of annual savings in current fuel cost to the operators.

Strategies such as conversion from indoor to outdoor, replacement of diesel with renewable energy sources and storage of excess energy are being deployed by tower companies and helped deliver the desired results. Telecom tower companies have been converting energy consuming indoor tower sites to outdoor sites by implementing several energy efficient initiatives. Indoor sites require air conditioning, which accounts for around a third of the site's opex and consumes about 50% power at the tower. Thus, air conditioners are being increasingly replaced with free cooling units (FCUs) and natural cooling units (NCUs).

In addition, the tower companies are deploying energy storage solutions, which are crucial for ensuring uninterrupted connectivity for places where grid power is unreliable. Battery banks are emerging as a key energy storage solution. The cost of power from batteries is almost half the cost of power from diesel. The Valve Regulated Lead Acid (VRLA) batteries are being replaced with Lithium ion batteries as the VRLA batteries suffered from quick discharge, slow charging, shorter life span and the need for air conditioning. The lithium ion batteries provide depth of discharge and efficiency.

*Lithium ion battery:* Lithium-ion (Li-Ion) batteries deliver high power density, deep cycling capability and a service life much longer than that of Lead Acid batteries. Li-Ion batteries also accept high charge currents and recharge very quickly**.** Li-Ion batteries are maintenance-free and ultimately deliver the lowest total cost of ownership. They can be used for outdoor applications because they discharge reliably at temperatures up to +60°C and can be recharged at temperatures up to +50°C. These properties make Li Ion batteries ideal for Telecom applications.

Also, with continuous innovation and rising scale of production, battery cost is expected to fall. Chile, which has the largest global reserve of lithium, is expected to double production to 0.5 million ton per annum to ease constraints on raw material availability.

Apart from adding financial burden on the sector, diesel also adds to the carbon emissions by the sector which is prime concern for the industry. The increasing need for computation, data storage, and communication is driving the rapid growth in telecommunication and enhancing the emissions associated with such technologies. By 2020, ICT is expected to account for about 3% of global GHG emissions worldwide.

The sector is taking bold steps to mitigate diesel usage at telecom tower sites by using alternative energy efficient sources as power backup solutions. These are described below:

*Sharing model:* Sharing Model allows passive infrastructure like telecom towers to host active network components of multiple telecom service providers. Under this model, the telecom infrastructure is shared with the operators on a non-discriminatory, transparent and in a cost-effective manner. Tower infrastructure companies provide an 'Integrated Neutral Host Platform' used by diverse and often competing operators helping build a unique, scalable and successful business model. The concept is being emulated globally and is a Harvard Business School Case Study too.

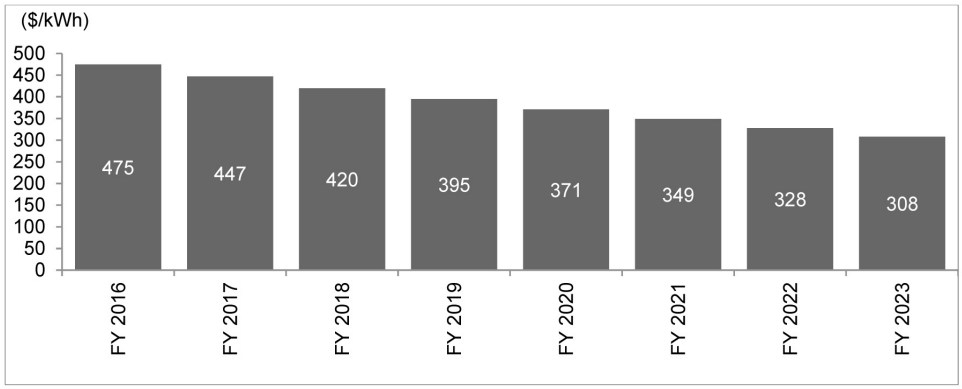


Figure 3. Trend in battery prices.

Note: It includes the landed cost of product (plug-and-play battery storage); Imports considered; includes GST and importer margins

The sharing model results in capex as well as opex reduction, ensuring faster rollout. The energy consumption is estimated to be around 25-30 % total opex. Sharing reduces opex and energy requirements as well.

TABLE 2-- SHARING MODEL

*Impact of passive infrastructure sharing on Indian telecom energy consumption*

| Tenancy ** | Total Energy Intensity | Per Operator Energy Intensity | Reduction in energy intensity (%) |
|---|---|---|---|
| 1 | 100 | 100 | - |
| 2 | 150 | 75 | 25% |
| 3 | 180 | 60 | 40% |
| 4 | 220 | 55 | 45% |

There are several other advantages of passive infrastructure sharing:

- Reduced Capital Expenditure
- Reduced Operational expenditure
- Faster time to rollout services
- Cost and energy efficiencies
- Safety and improved aesthetics
- Reduced Entry barriers
- Avoids duplicity of infrastructure.

*Renewable Energy Solutions:* Telecom tower industry is aggressively aiming to use alternate energy resources to reduce its dependence on diesel. Since the RET ecosystem has matured, it makes business sense to deploy RET at feasible locations. Tower companies continue to make efforts to adopt energy efficient solutions and reduce cost. Solutions such as solar, wind and biomass are gaining traction for the Telecom Industry. The average cost per unit comes to Rs.7-8 per unit as compared to Rs.13-14 per unit from Diesel genset.

Some companies have been exploring hybrid solutions, which is a combination of solar photovoltaic (PV) batteries, DGs and the grid. Further, fuel cell systems are being explored. These cells have a higher capacity than renewable energy solutions and can be used for reducing the energy requirement of a telecom site owing to better efficiency and load characteristics as compared to DG sets.

*Solar plus battery storage becoming a more cost-competitive alternative:* Led by economies of scale and huge investments in the solar space, the standardized cost of energy for solar-based applications has plummeted over the past few years. Major reason for drop in bid tariffs is the drop in module prices. Module prices declined to $0.32/W in fiscal 2018 from $1.14/W in fiscal 2012, a compounded decline of 19%. In fact, the drop continued YTD fiscal 2019, falling to $0.25/W - prices were in range $0.23-0.25/W peak in March 2019. Prices are expected to continue to decline over the medium term.

Further, ease in availability of finance along with increasing installations (portability + ease of installation) have improved its favourability as a power generation source across sectors. Figure 3 depicts the fall in bid tariffs, mainly led by decline in solar module prices.

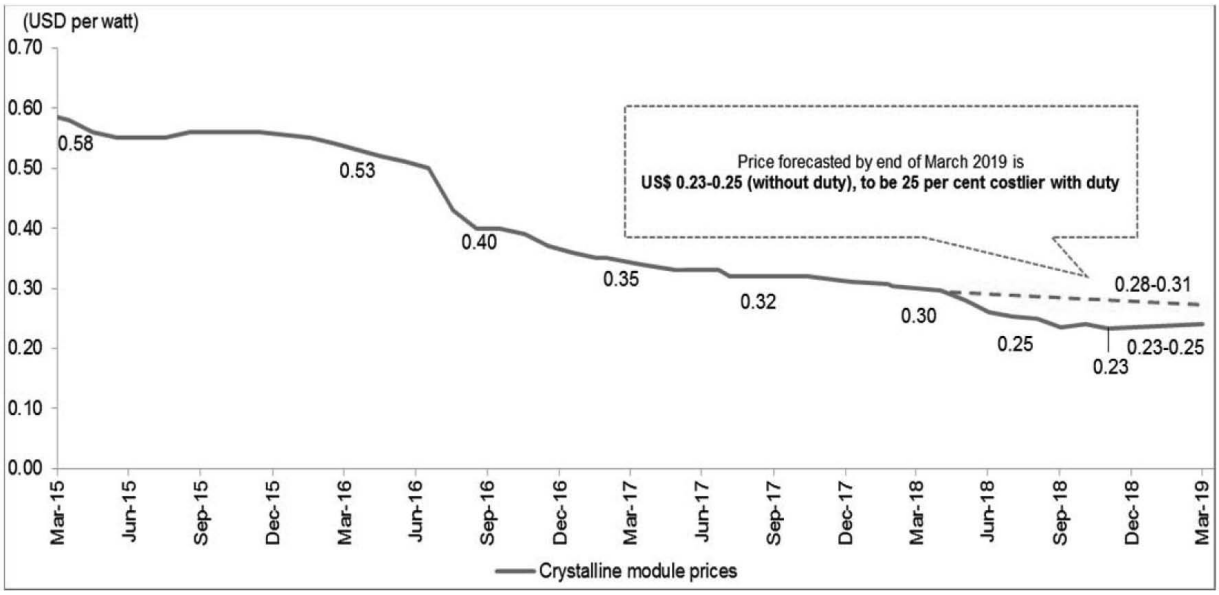


Figure 4. Module prices declined by 86% from fiscal 2010 to 2018.
Source: PV Insights; CRISIL Research

*Renewable Energy Supply Company (RESCO)Model:* TAIPA had come up with a novel initiative in 2012 when it had invited Request For Proposals (RFP) from renewable energy companies. The innovative idea was based on supply of renewable power to a cluster of locations and supply the balance power to the adjoining village.

The Renewable Energy Service Companies generate power through alternate energy sources and telecom towers serve as their anchor clients giving Minimum Guaranteed Offtake to bring scale and viability to their business model. The power generated by the RESCO is off-grid and can also be sold to the communities in the areas near the power plants.

Under this model, RESCO sets-up renewable energy-based power plants near telecom towers and sells power to the telecom companies at a predetermined cost on a pay-per-use model and with committed long-term power purchase agreements (PPAs)

However, till now, the model has had limited uptake, with only two RESCOs engaged for deployment of renewable energy technologies at 1,100 sites as of September 2016. Challenges with regards to scalability and financial viability have deterred the adoption of the RESCO framework which otherwise holds immense potential in addressing energy management needs at tower sites.

*Diesel free sites:* While focussing towards green telecom, IPs continuously strive to reduce diesel consumption at sites. Telecom Tower Companies have made more than 1.05 lakh sites diesel free (sites that consume only a litre a diesel a day) impacting the diesel usage at telecom tower sites. IP-Is are keen on deploying existing and emerging technologies to make the sites diesel free .Overall, 20% of the sites are diesel free sites. The reduction in diesel consumption is achieved via higher capacity storage batteries and grid power and DG set is kept as backup power for emergency only. Number of diesel free sites has gone up to 1,20,000 as on March 2019, as compared to 90,911 sites as on December 2016.

*Improved Grid Power Supply:* In the past, the Government has made progressive reforms on electrification of non-electrified areas which helped the industry to further reduce its reliance on diesel. Overall power availability has increased and the load shedding reduced. In March 2013, all India peak power deficit was 7.4% which reduced to 1.1% in March 2018. The peak power deficit further reduced to 0.9% for the period April 2018 to July 2018 *i.e.* 4 months' period, as per Central Electric Authority (CEA).

Tower companies try to maximise the uptake of reliable grid supply – through conversion of EB connection on higher loading, change from rural to urban connection etc. Further, the CERC has issued circular to distribution companies not to indulge in rostering and ensure EB supply to rural areas as well. The circular has come into effect from 1st April 2019.

*Indoor to outdoor site conversion:* Indoor to Outdoor Sites – Air Conditioners consume about 25-30% of the total energy used at an indoor site. Accordingly, technologies such as Free Cooling Units (FCUs), etc. were developed, essentially converting an indoor site into outdoor. This brings in significant energy demand reduction at the site. The industry has converted a significant number of indoor sites to outdoor sites saving sufficient amount of energy. Conversion to outdoor BTS from indoor BTS has led to savings of more than 4 tons of $CO_2$ emissions/site. The number of outdoor sites has gone up to 87,509 as on December 2018 from 62,099 in Dec 2016, thus, additional 25000 sites in last 2 years have been converted to outdoor.

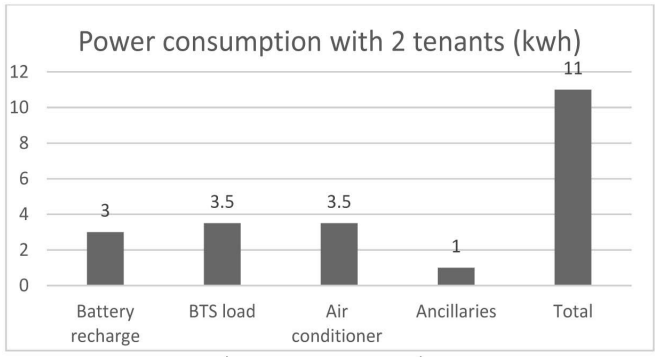


Figure 5. Power consumption.

*Energy storage solution Adoption:* To reduce diesel usage at sites with intermittent and low power availability, efficient storage solutions are required as compared to traditional storage. In order to optimize energy usage and reduce diesel consumption, the industry has installed high efficiency energy storage systems such as Li-ion batteries, advanced VRLA batteries, flow batteries, thermal energy storage solutions at a number of sites. Government of India reduced the import duties on Li-ion batteries from 5% to NIL in 2017. Recently the GST rate on Li-ion has been reduced to 18% from 28% earlier. Li-ion batteries have found the most application at tower sites owing to their compact size, quick charging and slow discharge features.

Li-ion batteries are increasingly being deployed for backup purposes with DG sets being phased out eventually. Telecom infrastructure service providers have been assisting the sustainable telecommunication goals as nearly 36% of sites have been made diesel free. The future is bright for the industry as cluster of Li-ion batteries may be deployed at telecom tower sites with additional capacity used as charging stations for EV Charging, the concept which is now nearing reality for Indian automobile market. Li-ion batteries have found the most application at tower sites owing to their compact size, quick charging and slow discharge features. Year on year increase

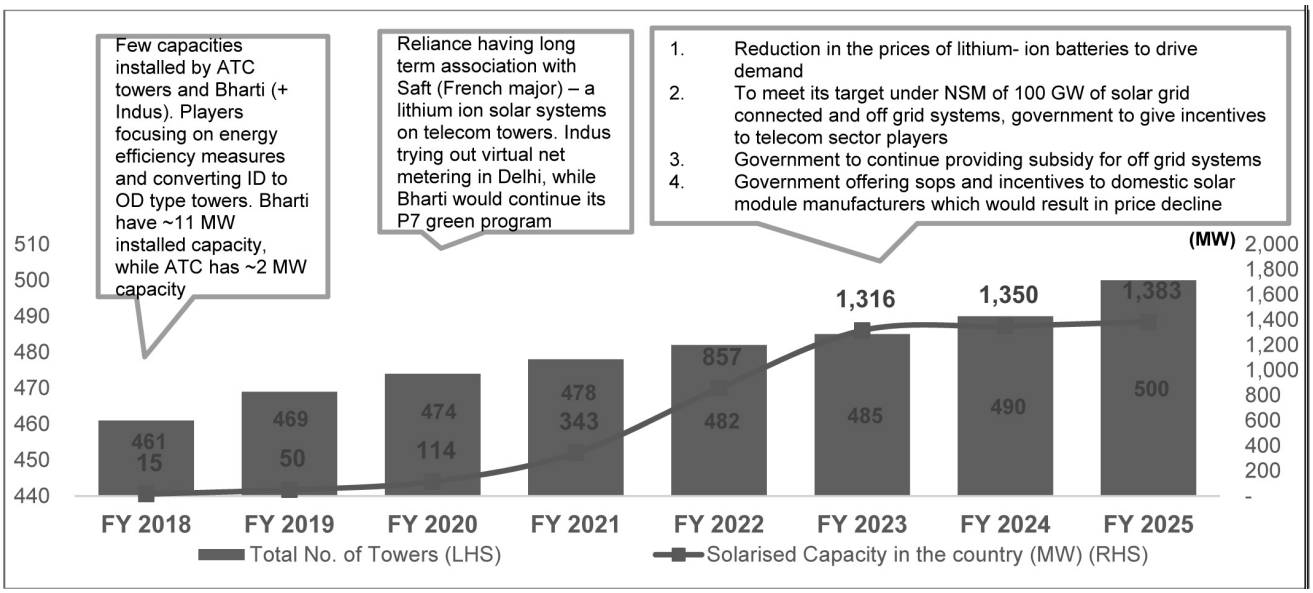


Figure 6. PAN India installed capacity from off-grid solar PV system in telecom towers will reach ~1.3 GW by fiscal 2025
Source: CRISIL Research

in no of sites for the last year was 12%; from 66353 in March 2018 to 73917 in March 2018-19.

The commissioning of large capacities by Tesla, Daimler (~60 GWh), Terra E (~34 GWh), Northvolt (~30 GWh), SK Innovations (7.5 GWh) will add to the supply. Moreover large tenders of grid scale battery storage (MW scale) by the Indian government along with introduction of penalty on deviation from forecast grid power would drive market for battery systems, making it readily available and at a cheaper rates compared with current rates.

*Green Sites deployed by telecom infrastructure providers:* Cumulative result of the above measures has resulted in minimal diesel consumption in at least 33% of sites as diesel free sites as on 31st March 2019

III. POLICY INTERVENTION BY THE GOVERNMENT

DoT issued circular in January 2012, which had following key provisions to promote Renewable Energy Technology usage.

- At least 50% of all rural towers and 20% of the urban towers are to be powered by hybrid tower (Renewable energy technologies) by 2015, while 75% of rural towers and 33% of urban towers are to be powered by 2020.
- Based on the details of footprints declared by all service providers, service providers should aim at carbon emission reduction targets for the mobile network at 5% by the year 2012-13, 8% by the year 2014-15, 12% by the year 2016-17 and 17% by the year 2018-19.

The service providers successfully met the targets of reduction in carbon footprint. However due to technical constraints in installation RET solutions at telecom towers, the Industry had represented this matter with DoT. An Interministerial committee comprising of MNRE representatives suggested recaliberation of the targets. Based on TRAI recommendations, the DoT issued a revised circular in May 2019 and mandated the following with regard to sustainability of telecommunications:

- Service providers should evolve a carbon credit policy in line with carbon credit norms with the objective of achieving the reduction in carbon footprint target. The ultimate objective of achieving a maximum 50% over the carbon foot levels of the base year in rural areas and achieving a maximum of 66% over the carbon footprint levels of the base year in urban area by the year 2020.
- The target for reduction in Average carbon emission (tons of $CO_2$e per unit Petabyte ) shall be 30% by the year 2019-20 and 40% by the year 2022-23, taking base year as 2011-12.

| | Total No. of sites powered by RET (a+b+c+d+e) | Solar Sites (a) | Wind Solutions (b) | Bio based (c) | Fuel Cells (d) | any other RET (e) | Sites with High efficiency battery banks | site with any other energy solutions* | sites converted from indoor to out door | No.of of Diesel free sites . |
|---|---|---|---|---|---|---|---|---|---|---|
| Total | 6121 | 6017 | 6 | 0 | 1 | 97 | 73917 | 117804 | 86457 | 118816 |

- Further, service providers have also been directed to voluntarily adopt the RET solutions, energy efficient equipments and high capacity fast charging storage solutions. The service providers have also to adopt a voluntary code of practice encompassing energy efficient network planning, Infra- sharing, deployment of energy efficient technologies and adoption of RET.

*Contribution of telecom sector towards Carbon footprint in the country:*It is estimated that the ICT sector worldwide is responsible for around 2% of global GHG emissions and for around 0.7% of global $CO_2$ emissions. By 2020, ICT is expected to account for about 3% of global GHG emissions worldwide. It is estimated that mobile networks will contribute about 0.5% of the global GHG emissions by 2020. In 2014 - 2015, $CO_2$ accounted for around 58.3 million tons.

As per an All India Study conducted by M/s Nielsen (India) Pvt Ltd for Petroleum Planning and Analysis Cell (PPAC), diesel consumption by mobile towers is only 1.54% out of 12 identified sectors in India like:

- Transport sector accounts for 70% (both direct and retail sales) consumption of diesel at all India level; LCVs, HCVs and Buses together account for about 38% Cars and UVs category contribute nearly 22% of the diesel sales, in which private vehicle consumes little less than 60% of total in this category.
- Agriculture sector accounts for around 13%.
- Railway sector accounts for 3.24%.
- Industry other purposes and Gensets account for 4.96 % & 6.45% respectively.

## V. TAIPA'S RECOMMENDATIONS

*Active Infrastructure sharing:* The economic and energy efficiency can be achieved in case the scope of passive sharing is extended to active infrastructure sharing as well. As per TRAI's recent report on 5G published in 2019, the active infrastructure sharing can further enhance the capex and opex savings. Opex savings are directly related to reduced energy expenditure as well.

TRAI's white paper on "Making India 5G ready" estimates the savings on account of active infrastructure sharing to the extent of 25-35% in Opex and 33-35% in Capex.

| Type of sharing | Capex savings | Opex savings | Total Savings |
|---|---|---|---|
| Passive infra sharing cost savings | 16-35% | 16-35% | 32% |
| Active infra sharing ( excl. spectrum) | 33-35% | 25-35% | 58% |
| Active infra sharing (incl spectrum) | 33-45% | 30-33% | 63% |

National Digital Communication Policy, NDCP 2018, notified in October 2018 by DoT, under the aegis of Ministry of Communications, clearly acknowledges the importance of active infrastructure sharing. Under the Mission Connect India: creating robust digital India Communications Infrastructure, one identified strategy is promotion of active infrastructure sharing through independent neutral hosts, *i.e.* Infrastructure providers. The relevant para 1.1f is reproduced below:

- Encourage and facilitate sharing of active infrastructure by enhancing the scope of Infrastructure Providers (IP) and promoting and incentivizing deployment of common sharable, passive as well as active, infrastructure.

The implementation of the above mentioned policy initiative as per NDCP 2018 would also lead to substantial savings in energy/ reduced Carbon footprint.

*Implementation of DoT committee recommendations:* The suggestions made by DoT committee in 2014, regarding RET incentivisation need to be implemented. Key recommendations of the committee are:

- Government to consider financial assistance, under various government schemes such as MNRE cluster based scheme for providing micro-grids and mini-grids with telecom as anchor load and Ministry of Power capital subsidy scheme under Rajiv Gandhi Grameen Vidyutikaran Yojana (RGGVY).
- The Government may also consider support through (National Clean Energy Fund) NCEF or bilateral financing agencies like World Bank or (Asian Development Bank) ADB to fund capital requirements for green telecom initiatives.

In order to progress further in this matter, DoT may formulate a special task force in association with MNRE.

- *Accelerated depreciation and long-term loans:* Despite the inclusion of Telecom as an Infrastructure subsector in the harmonised master list, the benefits for accelerated depreciation and concessional loans with longer tenure have not been extended to telecom companies. DoT may facilitate, being administrative ministry for these benefits so that the Industry qualifies for claiming depreciation on the capital cost of PV system with associated tax benefits. This would support in faster deployment of RET in telecom sector.

1. *Uninterrupted Power supply and uniform tariff:* The DoT committee also recommended that telecom sector should be given uninterrupted power supply and preferential uniform tariff for mobile tower installation. The relevant text of DoT recommendation is as given below:
   Telecommunications being a critical infrastructure contributing to economic growth of the nation, the Ministry of Power may be approached to provide "Un-interrupted

Power consumer" status and a preferential uniform tariff to mobile tower installation."

2. *Viability Gap Funding:* It is suggested that for the sites / locations with less than 12 hrs power availability, may be funded/ subsidised for installation of Renewable Energy Technology solution, subject to the technical feasibility of the solution at the location. MNRE may be approached to incentivize RET installations at such locations. This facilitation would be for Viability Gap Funding. For accelerating high efficiency storage solution utilization, we need to see if incentive scheme like FAME – II (Faster Adoption and Manufacturing of Electric Vehicles) for automotive sector, can be extended to telecom sector.

3. *KisanUrja Suraksha Evam UtthaanMahabhiyan (KUSUM) benefits:* The Government has come up with a scheme, wherein capex subsidy is provided to farmers for installing solar solution on infertile land. The scheme should be extended to RESCOs which would help them to proliferate in the untapped areas and supply power for the telecom sector.

4. *Issues related to open access and metering:* Some additional suggestions related operational aspects, which, Ministry of Communications being the administrative ministry, may facilitate in order to promote the RET adoption.For applicability of Open Access, Cumulative Load should be considered for each infrastructure provider for each State.

   For applicability of Gross metering enablement *i.e.* total consumption of all IP sites should be compensated against renewable energy generation at all sites so that site demography issues be taken care of. There should be no threshold for Open Access using solar power generated through solar rooftop structures. Further, the overhead voltage should not be a defining factor for allowing open access as LT lines are also drawn from the same T&D agency. Hence, 33kV / 11 kV should not be a mandatory condition.

   Scheduling charges should be applicable on the cumulative load and not on site wise load. For power generated through Solar, scheduling charges should be waived off completely.

REFERENCES

[1] Telecom Regulatory Authority of India( TRAI)'s white paper on 5G, https://main.trai.gov.in/sites/default/files/White_Paper_22022019_0.pdf
[2] Robust solar allocations and a duty scare https://www.crisil.com/content/dam/crisil/our-analysis/views-and-commentaries/sector-round-up/robust-solar-allocations-and-a-duty-scare.pdf
[3] Central Electric Authority, https://cea.nic.in/
[4] All India Study on Sectoral Demand of Diesel and Petrol http://ppac.org.in/WriteReadData/Reports/20141111032945006974OAllIndia Study on Sectoral Demand of Diesel.pdf
[5] TAIPA members data collated by TAIPA secretariat from TAIPA members.

**Tilak Raj Dua,** FIETE is Director General, TAIPA and Chairman ITU-APT. Possesses over 35 years experience in the telecom sector. His experience includes all facets of telecom be it Product Development, Business Development, Telecom Licensing, Regulatory issues with respect to interconnection / roaming / unified licensing and infrastructure sharing / Mobile Number Portability, Spectrum Management, Spectrum Related Issues Like Spectrum Pricing, Efficient Utilization and Spectrum reframing, finalization of joint ventures, Technical collaboration, Introduction of new products, Launch of cellular services in India and finalization of licence agreements / interconnect agreements etc.

Held prestigious positions as Director in leading telecom companies like Bharti Airtel Ltd., Shyam Telecom Ltd., Cellular Operators Association of India (COAI), Vice Chairman and Global ICT Standardization Forum for India.

Mr. Dua is an engineering graduate with diploma in Business Management and export Marketing.