Carbon Footprint:

1 How should the carbon footprint of Indian telecom industry be estimated?

1. The prime reason for this rise in telecom sector's GHG emission is large number of Mobile Network towers which runs on communication equipment that are based on old and obsolete technologies, and highly inefficient in energy consumption.

   As a first step TRAI should ask all Telecommunication service operators to disclose their carbon emission under the Green House Gases (GHG) protocol of World Resource Institutes (WRI). This framework is widely used in Industrial sector for carbon emission accounting. As per the framework, carbon emission of the telecommunication companies should cover all three scopes of emission as follow:

   Scope 1: Direct emission

   Stationary Combustion (from production of electricity. Steam, heat) eg. Diesel generator or captive power plant

   Mobile consumption (transportation of raw materials / equipment for use / waste disposal)

   Fugitive emission (mainly from HFC from refrigeration / cooling / chilling plants)

   Scope 2: Indirect emission

   Stationary combustion (consumption of purchased electricity, heat or steam)

   Scope 3: Indirect emission

   Stationary combustion (production of purchased materials)

   Process emissions (use of purchased materials)

   Mobile combustion (transportation of raw materials/ equipments/ waste, employee business travel, employee commuting)

   For any company, accounting of emission under scope 1 and 2 is essential. However, for better accounting and so corresponding better target setting, it is important that companies should also do Scope 3 accounting as well. The boundary setting for

emission accounting shall be as per the GHG corporate protocol of WRI framework.

The second step for monitoring the emission is verification and assurance of carbon emission figures by third party i.e. accredited Energy accounting agency under UNFCCC. This will help in ascertaining the correct carbon emission of the company and which in turn help in identifying the area where company can reduce its carbon emission.

The third step, based on assurance given by third party verifiers, the company should set a target for carbon emission reduction within specified time-period. Identification of base year is important for setting base year.

For fixing target for carbon emission reduction, the company should fixed at-least 20 % emission reduction from its base year (either fixed or rolling) from its entire operation.

For transparency and effective monitoring, the carbon emission figures and corresponding reduction under the set target should be reported regularly to the compliance authority. Also these figures should also be unconditionally disclosed in public domain through company's Sustainability reporting.

Further a working group should be appointed by TRAI, to observe the implementation and proper estimation of the sectors carbon footprints.

2.What is your estimate of the carbon foot print of the fixed, mobile and broadband networks?

2.There is no specific data available at present regarding total energy consumption / carbon emission of Indian telecom sector. However the mobile segment alone is estimated to be reponsible for 7 million tonnes carbon emission annuallywith a minimum of 5.2 million kg of CO_2 is emitted into the environment per day, considering 3 lakh telecom towers currently installed. This is likely to increase with 3G and 4G technology in future and the number is expected to increase to 4.5 -5 lakh towers with 900,000 tenants in the next three years itself.

Given the frequent power cuts, each tenant consumes almost 3,000 liters of diesel

every year on a shared tower. (Industry sources and COAI)

India is expected to have 1 billion mobile phone subscribers by 2015, which would mean about 250,000 more mobile towers being added and projected emission close to 30 million tons CO2. (approx going with current fig).

3. In the case of mobiles, what would the individual footprints of the radio access network and the core network e? How are these likely to change with 3G and 4G technologies?

3. With the Indian government mandating rural coverage as a priority, there is a real need for Indian operators to find cost-effective and less polluting ways of expanding basic 2G GSM coverage. As per Bell labs the present network infrastructure is 1000 times less efficient than it should be. Use of better and efficient technology and phasing out outdated inefficient technology is an important step in this direction.

Also with transition steps to replace the present 2nd Generation GSM network to 3rd Generation or even better Long term evolution technology as per the NGN program, could not only make the network efficient and would be great for both economy and ecology.

Carbon credit Policy:

4.How should the carbon credit policy for Indian telecom sector be evolved? What should be the timeframe for implementing such a policy?

4. The carbon credit policy of the Indian Telecom sector should be based on proper assessment of the potential for mitigation within the sector. So before initiating a process to evolve a credit centred policy, Indian Telecom companies should come out and do their bit by fixing targets for reduction in emissions from their inventories as per guidelines GHG protocol.

Also any form of impractical mitigation action supported by CDM under UNFCCC

framework within the sector needs cautious approached.

What is required is demarcation of low-cost and high cost action with only high cost mitigation be considered for CDM funding, if at all.

At this time though there are no clear assessment of carbon emission and identification of mitigation areas for the sector. It is still understood that most of mitigations within the sector will be of low-cost measures like, energy efficiency and phasing out diesel, which ideally should be funded by the companies themselves. Specially when it goes with their own growth expansion plans and revenue maximization targets in future.

There are close to 1 billion people waiting to fill in the digital gap existing in the country today . These one billion people has been recognised as of great potential, in terms of new jobs, exciting entrepreneurial rural opportunities and self sustainable economic models. (Industrial sources).

Time frame for implementation for any such kind of policies should be in alignment of the post assessment scenario of the sectors emission.

5. What should be the framework for the carbon credit policy?

5.The idea of building a framework for a carbon credit policy is impractical before a proper carbon assessment as suggested before.

However such framework would require determined effort both from private and public as well as significant deployment of new technologies in non conventional alternative energy sources. GSMA funding mechanism programs like Green power for mobile with IFC (World Bank) for developing economies and DOT's Universal Service Obligation fund could be possible area of exploration for TRAI while building any such framework.

International carbon trading and crediting mechanisms are contingent on the 2nd commitment period of kyoto protocol which currently being deliberated in international UNFCCC negotiations and is not a sure shot option so TRAI should focus on sure financial mechanism like IFC or DOT

6.What should be the metric to ensure success of the carbon credit policy in reducing the carbon footprint of the telecom

industry?

6. The carbon credit policy as suggested in its paper by TRAI under CDM mechanism does not guarantee reduction in the carbon footprints for the sector as it would hamper the domestic mitigation capacity of the Indian Telecom sector. Encouraging CDM based policy would work towards promotion of a impractical and illogical business based on carbon offsetting.

TRAI should do a careful study of the development of domestic carbon markets in future than depend on CDM.. However these are all small steps considering a giant step the Telecom companies themselves can take, which will definitely guarantee reduction of the sectors carbon.

Availability of power:

7.What proportion of tower infrastructure is in rural areas? Please comment on the grid/electricity board power availability to these towers.

7.TRAI 's analysis of rural electrification confirms the grim situation of power in India and shortage of power to run telecommunication infrastructure in the country. Already there are more than 1 lakh 25 thousand towers in rural India. These numbers will tend to multiply many folds in years to come as network expands to bridge the digital divide and demand for quality power becomes a challenge.

Electric Generation in India is seriously below the peak demand for it. The government had targeted capacity increases of 100,000 megawatts (MW) over the next ten years. Also, the electric grid of the country is still not complete, although the government has started on the unification of state electricity boards (SEB).

 In the time when Indian Government is talking about completing Electric Grid, implementation of smart grid is a big challenge. A smart grid in simple terms is an electrical network using information technology and the current challenges to power the newly developing telecommunication infrastructure in the country could be an opportunity to improve the above the power crises in the country.

8. To what extent can active sharing reduce the carbon footprint and operational expenses?

8. Active components mainly includes antennas, feeder cables, BTS, and other transmission equipment. However the common trend is more towards Passive Infrastructure Sharing in which the passive components like tower, site, masts,and so on, are shared. Unlike passive sharing that is prevalent across the world and has been permitted by 70% of operators globally, active sharing is still very niche.

India is one of the few countries where the mood for active sharing of infrastructure has just started and encouragement is on, but still a long way to go. Europe is the only other region where there has been some infrastructure-sharing activity. Sharing power supplies reduces energy consumption, which helps in reducing carbon emissions.

It is also suggested to explore the possible option of multiRAN enabled active RAN sharing which eliminates the use of physical infrastructure to wireless infrastructure. With base stations becoming virtual, and with operators being able to control and manage their base stations remotely through software, hardware can be reduced to a commodity. This will add up more towards efficiency and thus reducing the footprints.

Domestic Efforts for Reduction of Carbon Footprint

9 .What proportion of non-grid power supply to towers in rural areas can be anticipated to be through renewable sources of energy in India in the next 5 years?

11.How can migration to renewable sources be expedited?

9&11. Pakistan and several other countries have made renewable energy mandatory for

towers in rural areas. In India also no new tower in rural part should be allowed to be run on fossil fuel. Time frame should be fixed for conversion of existing towers.

Methods for reducing Carbon Footprints:

Metrics for certification of product and services

13.What should be the metric for certifying a product green?

13. Metric for certifying a product Green:

* Full lifecycle carbon emission and efficiency of their

products, this can enable operator to choose more efficient and greener product in a

much more transparent manner.

* Also from waste generation point of view less toxic products should be developed in compliance with RoHS standard under E-waste rule notified by MoEF Adoption of global best practices like EU ROHS II
* In absence of any energy standardisation for Telecom sector. US EPA rating standards should be considered for certifying a product green.

14. Who should be the metric for certifying a network or service as green?

14. TRAI should recommend Telecommunication Engineering Centre(TEC) and BEE to take up this initiative in consultation with all stakeholders.

Adoption of Energy efficient Technologies:

16.How does the cost of energy efficient and the normal equipment compare?

16. Energy efficient equipments is the need of the hour as they help in overall increase in efficiency of the Telecom sector. It not only help in reduction of overall GHG and help mitigate Climate Change but also reduces Operational expenses for the sector.

TRAI should explore global standardisation for Telecom equipments like US EPA ratting standards and even should consider developing stringent standards in house. TRAI approach in this direction should be first exploring the options for adoption of such standards, prior to any comparison of the costs.

Infrastructure Sharing

18.What is the potential of infrastructure sharing in reduction of energy consumption?

18. Infrastructure sharing has a huge potential in reduction of energy consumption within the sector. The Indian Telecommunication sector has quite earlier realised this and even TRAI has encouraged the sector to go for more sharing models. Sharing helps the operator avoid CAPEX on building a new tower and still continue to expand, beside it helps in reducing the OPEX. It is already established that energy is a huge factor of the total OPEX and sharing helps in reduction of the cost of operation. However having said that of more than 3 lakh towers present today in India, more than 1 lakh are unshared. Another fact is that many of the older towers are small and were made keeping only one tenant in minds, this perception needs to be changed, and TRAI can make a significant contribution in this by its recommendation. Also there should be more encouragement towards active tower sharing.

Moreover the model of sharing could be used in advantage for the sector to adopt Renewable Energy to power their infrastructure. As the CAPEX for installations of RE could also be shared.

Waste Management:

19.What is the current procedure for storing, disposing and recycling telecom waste by the service providers and manufacturers?

19. The rules E waste disposal framed by MOEF should be followed for making waste management green .

Better network planning:

21.What steps can be taken by the service providers in planning green networks?

21.The present network in India is mostly 2nd generation based and slowly getting into 3$^{rd.}$ With large volume of traffic serving millions of consumers, the present network is not going to stand for longer, while the Telecom sector has to bridge the digital divide too with obligation to do so. Also, given the known facts that the present network is inefficient both for the economy and the ecology. The need of the hour is a clean green efficient network. Good for the planet as well as for the economy.

The following steps could be taken in this direction:

- Understanding the current status of next generation network, and its effect on the sector and other cross sectors.

- Estimating the carbon footprints of their present network and comparing with those projected.

- Forecasting how and where next generation networks will be developed and how it can help in reduction of their carbon footprints and the society in large.

- Adoption of energy efficient standards, processes, measurement methods and technologies during this entire process .

- Development of a go to rural market strategies to help build sustainable networks in remote areas where ARPU is low. These could include exploration of local contents and innovation, like Telebanking, Teleducation, Telemedicine, etc. Thus building a sustainable business model helping towards a low carbon economy.

- Effective deployment of 3G/LTE technologies across municipal and rural locations where ever possible, through pilot initiatives.

Standardisation of Equipments:

22.What standards do you propose to be followed in Indian telecom network for reducing the carbon footprint?

22.TRAI should facilitate a common framework to measure the mobile industry's energy and

environmental performance, and that of other sectors, for example by aligning national and regional methodologies with those being developed internationally. ITU and GSMA has been working on it.

TRAI can refer some of these, from Global Standards Collaboration (GSC):

- The IEEE -SA Green standards (http://www.itu.int/dms_pub/itu-t/oth/21/05/T21050000010076PPTE.ppt.)

- ETSI (http://www.itu.int/dms_pub/itu-t/oth/21/04/T21040000010088PPTE.ppt)

- ATIS (http://www.itu.int/dms_pub/itu-t/oth/21/05/T21050000010086PPTE.ppt)

23.Who should handle the testing and certification of green equipment and networks?

23.TRAI can recommend TEC (Telecom Engg. Centre) of DoT who has its own testing and certifying labs to handle the testing and certification of green equipment and networks. This could be well supported by institutes like IISc and IIT's.

Manufacturing process :

24.How can manufacturers help in reducing GHG across the complete product life-cycle?

24.As stated above, Manufacturers should develop products keeping life cycle assessment in mind. Manufacturers must go by the following:

- **Process efficiency standardisation while manufacturing:** Efficient assembly line .Phasing out toxic chemical at design stage as toxic chemicals can be recycled and its treatment cause more energy means more emission.

- **Product level efficiency:**Efficient products based on standards adopted by sector and harmonize with global best practices

- **Responsible longer product life efficiency:**

There should be longer life of product with easy upgradablity to new technology demands over the life of the product. It also help in less waste generation and in turn less GHG

emission from waste management

Monitoring and Reporting

26.Please give suggestions on feasibility of having energy audit in the telecom sector on the lines of energy audit of buildings.

26.Energy audit of telecom installations should be made compulsory.

27. What should the monitoring mechanism for implementation of green telecom?
28 Who should be the monitoring agency?

27.28/ There should be a separate monitoring wing under TRAI for implementation of green telecom. The above suggested working group who would look into the implementation of Green Telecom could be

29.What type of reports can be mandated and what should be the frequency of such reports?

29.The report on the lines of the energy used and reported from their carbon disclosures may be used. The frequency of report should be on an annual basis.

Incentives for Green Telecom.

30.What financial and non-financial incentives can be useful in supporting the manufacturers and service providers in reducing

the carbon footprint?

30. Subsidy from USO fund and MNRE should be extended to service providers for reducing the carbon fooprint in their networks. Similarly the tax benefits should be extended to the manufacturers for reducing carbon foot print

Promoting R&D for Green Telecom:

31.What R&D efforts are currently underway for energy efficient and renewable energy telecom equipment?

31. Last year budget ,GOI with an idea of influencing companies to invest more in research and new product development, proposed an increase of in-house R&D from 150 percent to 200 percent. Such initiative should continue and companies needs to invest more in Green Telecom R &D. This will help in reducing the cost of operation and easy adoption of more efficient technology and cheap clean energy alternative sources. Thus will help both in reduction of sectors growing emission and net profit as well.

32.How can domestic R&D and IPR generation be promoted?

32. Protecting the intellectual property rights for domestic technology owners, in order to sustain and broaden investments in clean technology innovation and efficiency improvements is of extreme importance. Apart TRAI should possibly explore other cross sectoral association in this direction like Renewable Energy sector innovation in Tele power.

33.Would it be a good idea for TRAI to evolve a best practices document through a process of consultation with the stakeholders?

33.TRAI should evolve a best practices document for CSR and community services in reference to the community power program by GSMA. Example; The Telecom installations in

off grid area should extend phone charging and solar lanterns charging facilities as well. Also look beyond in exploring possibilities of micro grids in these areas.

This could be a guidelines for the sector to follow up with.