



# **CONSULTATION PAPER ON GREEN TELECOMMUNICATIONS**

**Reliance Communications Response to TRAI**

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# TRAI CONSULTATION PAPER ON GREEN TELECOMMUNICATIONS

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## RCOM RESPONSE

- We welcome the TRAI's initiative to come up with a consultation paper focused on "Green Telecom". As networks are expanding and more operators entering the telecom field, the challenges related to providing electricity to these expanding networks are becoming greater. Energy costs are among the largest operating expenses for network operators, and energy consumption from telecom networks is an increasing contributor to global greenhouse gas emissions. This environmental issue requires initiatives to improve the energy efficiency of telecom networks and reduce their associated carbon emissions.

### **Low Frequency Spectrum Bands for reducing Green House Gases**

- Government can substantially contribute in reducing GHGs by ensuring spectrum availability, especially by making harmonised low-frequency spectrum available for mobile and broadband networks. Government has allocated 2.1 GHz band for 3G services and 2.3 GHz band for BWA services. It takes three times as many base stations to build a 3G network using the 2.1 GHz spectrum band as it does using 900 MHz. Cell sites account for most of the energy consumed by a mobile telecoms network. Mobile networks operating in lower frequency spectrum bands can reduce the environmental footprint by cutting the number of BTS sites required. GSMA has estimated impact of operation on number of base stations and the findings are as under:<sup>1</sup>

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<sup>1</sup> GSMA Report on " Environmental Impact of Mobile Communication Networks"

Frequency	Cell Radius	Relative Capex
700 MHz	10 km	100%
850 MHz	8.9 km	126%
2100 MHz	5.5 km	328%
2500 MHz	4.7 km	455%
3500 MHz	3.9 km	675%
5800 MHz	2.9 km	1230%

- **Since GHGs emission in higher spectrum bands is much higher the Government should urgently earmark 698-806MHz (700MHz band) for mobile and broadband services. There is a strong synergy and feasibility emerging for running 4G operations in 700MHz band and therefore allocation of this spectrum band would help substantial reduction in the GHGs while meeting Broadband objectives.**
- Government should also consider 900 MHz spectrum band re-farm immediately and make it available for broadband networks deployment.
- The above mentioned two suggestions would alone help in controlling GHGs from telecom networks more than any other action point.

### **Backbone Networks**

- TRAI in its recommendations on Broadband Plan has suggested creation of a fiber backbone network. In many parts of the country there is enough fiber available which can be effectively utilised to meet the Broadband objectives. It is suggested that the existing public and private networks should be pooled and used for setting up of backbone network. This will meet two objectives namely public funds would not be invested in creation of duplicate network and also help containing GHGs on account of running a parallel backbone network.

### **Active and Passive Infrastructure Sharing**

- Passive sharing is becoming increasingly common. This help reduction of the carbon footprint of mobile networks by cutting the number of BTS sites required by each company. To further promote passive infrastructure sharing, it is suggested that:

- **New towers in urban should not be allowed within 500 mts of existing towers, unless tenancy of 3 is reached on existing towers.**
  - **In Rural areas, this limit can be kept at 1 Km with min tenancy of 3 on existing towers.**
  - **It should also be mandated to ensure all IBS sites are shared among operators to avoid multiple macrosites / IBS deployment leading to increased power consumption.**
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- Active sharing, which shares the site electronics, can have a much larger impact on the networks' carbon footprints, but it has only been implemented in a few markets to date. Active infrastructure can be promoted by changing certain policies. IP-I companies can provide assets such as dark fiber services. **The Authority should consider extending the provision of providing lit fiber by IP-I as asset to the licensed telecom service providers.** This would encourage active infrastructure sharing and also reduce dependence on MW links in the backhaul. Active infrastructure has potential to significantly reduce GHGs emissions b telecom networks.

#### **Solar Energy for Tower Infrastructure**

- There are about 25% towers in the country which have access to power supply for less than 12 hrs. These towers have about 60% of the total diesel consumption by telecom towers in India. Our focus should be to reduce consumption of diesel on account of these towers. If these towers can be equipped with solar cells, the diesel consumption can reduce from 60% to 30% ( by assuming that solar supply remains available for 12 hrs per day) . Solar infrastructure companies or existing IP I companies can be structured for this purpose.
- The long term arrangement for solar power can compete favourably with electricity generated from DG sets if subsidy available for commercial diesel is also extended for solar power. However, Government is not supporting solar power for tower companies in the same manner as subsidy available for diesel.
- The Department of Non-conventional Energy Resources has launched a scheme to provide for solar power but the subsidy is enough to meet the losses. The Department has also restricted subsidy for only 100 BTS towers for each service provider which is not enough to meet the green telecom objectives.

#### **Grant of incentives for adoption of renewable sources of energy**

- The Industry has taken number of initiatives to address the environmental concerns. Renewable sources of energy are being deployed wherever found feasible. Service

providers are using green shelters or deploring outdoor BTS wherever found feasible to reduce the power consumption. While we are confident of the technical feasibility, it is evident that financial viability for solar/ solar-wind/ fuel cell hybrid renewable energy systems in shared mobile infrastructure sites in rural/remote areas will need to be supported by government incentives.

- To reduce direct emissions also rely on the development of an enabling regulatory and subsidy framework and the creation of tax and subsidy incentives to support the business case.
- The high usage of number of Diesel Generator Sets are causing very high carbon emission and high usage of Diesel in addition to exorbitant cost of operation of the sites. With more and more sites getting added to the network it is imperative to start using non conventional energy sources (such as fuel cells, hybrid fuels, bio-diesel, solar etc) for Telecom sites. However the present cost of using such technologies based on Solar, Wind and fuel cell etc is prohibitively expensive and the payback period for such investment is high. Hence we believe that the Authority should considers the incentives schemes for adopting renewable sources of energy. The Consideration by the Authority could be in the form of tax rebates, capex subsidies, and availability of USO funds for investment in alternate energy technologies. It is important that subsidy scheme must be based on viability gap funding and not just part of the CAPEX or OPEX. Certain percentage of towers must be supported with 100% subsidy under various schemes for using non-conventional energy. The support should increase over the years so that all towers are setup for non-conventional energy where grid power is not available or it is not very reliable.

**Our comments on specific issues raised in the consultation paper are given below:**

## CARBON FOOTPRINT

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

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

- To understand the carbon footprint of the Indian telecom industry it is important to understand the network architecture of wireless and wireline networks. Cell sites account for most of the energy consumed. Following parameters are important to measure carbon footprints for wireless networks in the country:
  - Number of BTS towers in the country
  - Average Power Consumption per Indoor and outdoor BTS.

- DG running per Sites
- Average Availability of Grid power.
  
- Using the above parameters, it is possible to estimate consumption in terms of diesel and grid power. The power consumed can be converted into CO<sub>2</sub> emissions by using the following relationships:
  - 1 litre of diesel is equivalent to 2.7 kgs of CO<sub>2</sub>
  - 1 KWH of grid electricity is equivalent to 0.84 kg of CO<sub>2</sub>
  
- Almost all mobile operators are taking initiatives to improve their sustainability and reduce Green House Gases emissions. However, **the complexity of measurement, variety of business models and sector growth has led to different approaches to estimate carbon footprint. Internationally, the mobile industry is working through GeSI<sup>2</sup> to develop and agree a standardized mechanism for measuring emissions.**

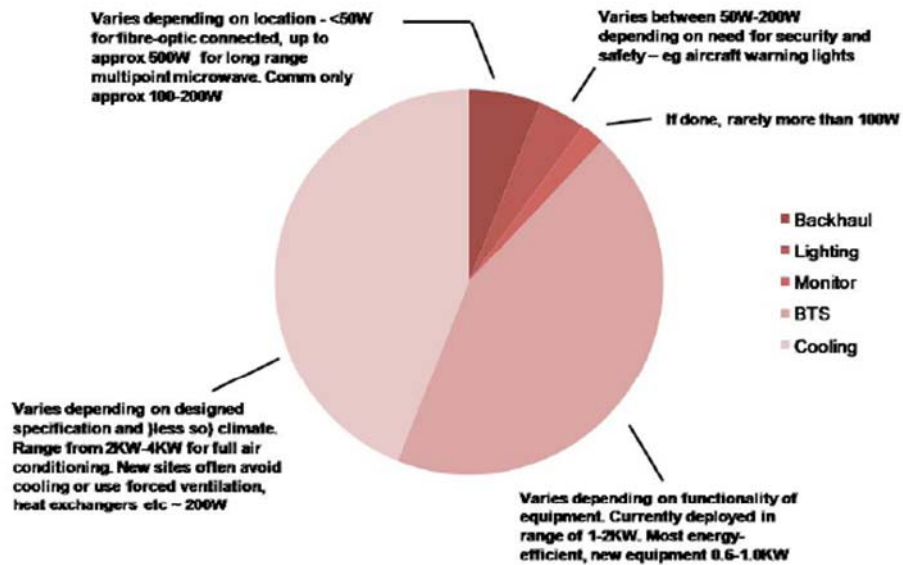
### 3.3 In case of mobile would be the individual footprints of the radio access network and the core network? How are these likely to change with 3G and 4G technologies?

- Cell sites account for most of the energy consumed by a mobile telecoms network. As the power consumption of the BTS is reduced, the power consumption of the infrastructure equipment, such as cooling systems, can be reduced. Approximately half of the energy consumed by a cell site has been used for cooling the telecom equipment.
  
- It may be seen from the following figure published by GSMA in its report “Mobile Green manifesto” that the energy consumed in the Radio network is significant.

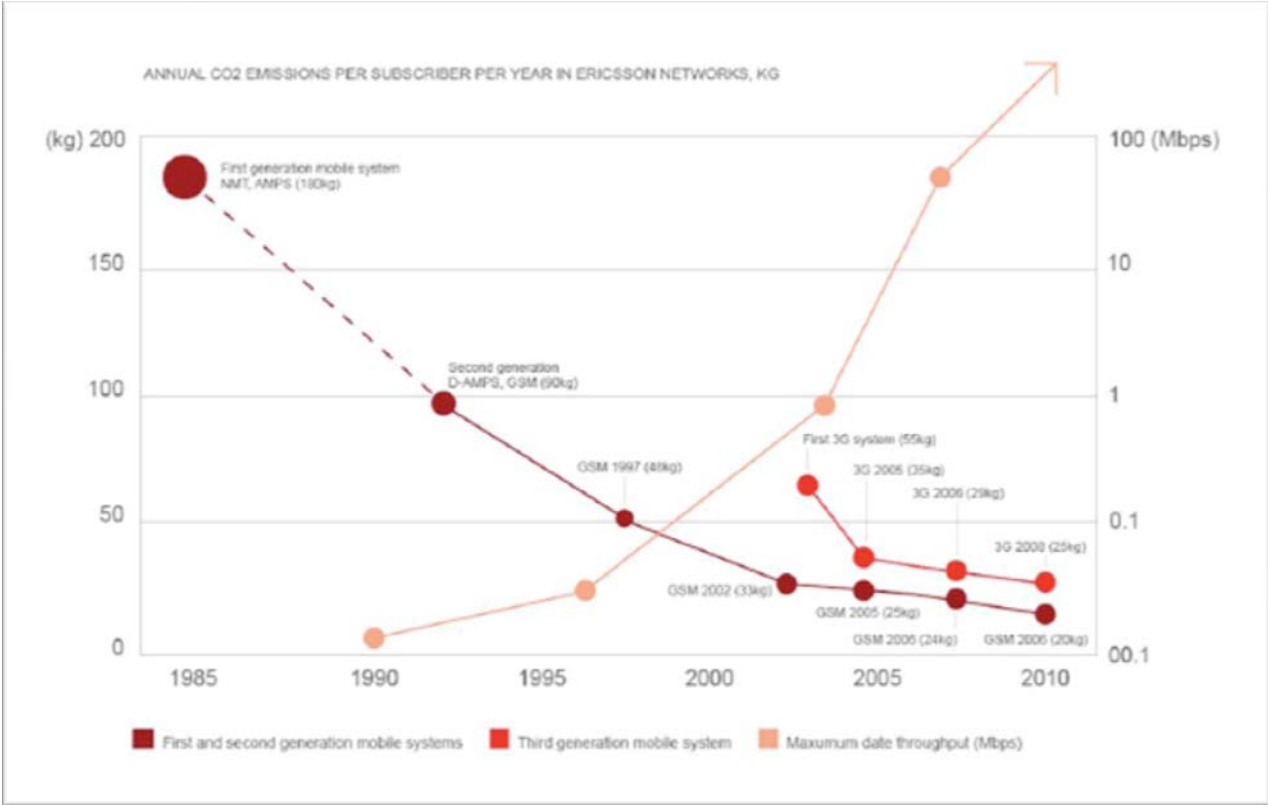
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<sup>2</sup> GeSI: Global e-Sustainability Initiative, an international strategic partnership of ICT companies and industry associations committed to creating and promoting technologies and practices that foster economic, environmental and social sustainability and drive economic growth and productivity. Formed in 2001.

**Analysis of site power consumption**



- With more 3G and 4G networks there would be more requirements of towers and correspondingly power consumption will increase. **Although power consumption in the absolute term would increase to meet societal requirement of ubiquitous coverage of networks and higher throughput but the CO2 emission in terms of per subscriber is continuously going down.**
- GSMA in its Report on “Mobile Green Manifesto” has estimates that mobile industry emissions were 90 mega-tonnes of carbon dioxide equivalent in 2002 rising to 245 Mt CO<sub>2</sub> by 2009. During this period, the mobile industry grew from 1.1 billion to 4.6 billion connections, whilst network coverage increased to over 90% of the world’s population in 2009 from 50% in 2002 and a new generation of mobile broadband networks, 3G HSPA, began to be built out. **Emissions per connection actually fell by 30% from 2002 to 2009.**
- In recent years, the energy efficiency of mobile network equipment has improved markedly. By way of example, following figure shows how the annual CO<sub>2</sub> emissions per subscriber in has declined over the past 20 years, at the same time as the data throughput of mobile communication technologies has increased dramatically. **This shows that there would not be increase in per subscriber GHGs rather it would go down.**



CARBON CREDIT POLICY

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

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3.5 What should be the framework for the carbon credit policy?

- For the success of carbon credit policy it is imminent that **binding global long-term targets for the reduction of greenhouse gas emissions is established as the successor to the Kyoto Protocol**. The new treaty, emissions reduction policies must be implemented or continued at a country, state and/or regional level. Greenhouse gas cap and trade schemes should deliver a stable and effective long-term price for carbon credit must be remunerative to stimulate innovation and the green economy.



- Unless legally binding agreement to reduce GHG emissions is implemented, carbon credits would not command significant premium. To encourage deployment and adoption of green technologies carbon credit should have significant demand and premium.

### 3.6 What should be the metric to ensure success of the carbon credit policy in reducing the carbon footprint of the telecom industry?

- The initiatives of the Indian mobile industry to reduce its direct emissions can only sustain through subsidy framework and the creation of tax incentives. The carbon credit policy for telecom sector would be an incentive for operators choosing to use renewable sources of energy but the its success programme. However, large scale deployment of renewable sources of energy based on carbon credits would depend on premium it commands.

## AVAILABILITY OF POWER

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

- There are almost 50% of the total towers are in rural areas.
- Operators have started setting up tower infrastructure in rural areas. Due to unreliable grid electricity there is more dependence on expensive diesel generator sets and as a result the cost of energy has substantially increased. Attempts have been made to reduce diesel generators by storing energy in batteries but due to very erratic supply of electricity even these measures are not of much help.
- The average grid power availability in various circles given in the following table:

Circle	EB Availability (Hrs)
AP	19.1
Assam	13.8
Bihar	7.4
CG	19.7
Delhi	18.9
Gujarat	21.5
Haryana	13.8

Himachal Pradesh	19.1
J&K	17.2
Jharkhand	7.2
Karnataka	18.5
Kerala	20.7
Kolkata	19.5
Madhya Pradesh	12.7
Maharashtra & Goa	18.1
Mumbai	20.7
North East	13.8
Orissa	18.3
Punjab	19.3
Rajasthan	16.7
Tamil Nadu	20.3
Uttar Pradesh (E)	8.8
Uttar Pradesh (W)	10.4

- We have significant number of towers in rural and semi-urban areas with grid power availability of only 10-14Hrs a day.

### 3.8 To what extent can active sharing reduce the carbon footprint and operational expenses?

- Passive sharing is becoming increasingly common and significantly reduces the environmental footprint of mobile networks by cutting the number of BTS sites required. The impact of passive infrastructure sharing can be understood from the fact that the largest power consumption is on account of cooling. Passive infrastructure sharing can help reduce power consumption.
- To further promote passive infrastructure sharing, it is suggested that:
  - **New towers in urban should not be allowed within 500 mts of existing towers, unless tenancy of 3 is reached on existing towers.**
  - **In Rural areas, this limit can be kept at 1 Km with min tenancy of 3 on existing towers.**
  - **It should also be mandated to ensure all IBS sites are shared among operators to avoid multiple macrosites / IBS deployment leading to increased power consumption.**
- Active sharing, which shares the site electronics, has also much larger impact on the networks' carbon footprints, but not implemented and adopted in the Indian market on

a very large extent. With active sharing the utilization of the available base power /capacity of the equipment. This permits no additional equipment installation and saves the additional power on separate active equipment installation resulting in reduced opex cost in terms of power fuel and passive equipment design.

- **The authority should consider extending the provision of providing lit fiber by IP-I as asset to the licensed telecom service providers.** This would encourage active infrastructure sharing and also reduce dependence on MW links in the backhaul. Active infrastructure has potential to significantly reduce GHGs emissions b telecom networks. Active infrastructure sharing may result in substantial savings in power consumption.

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## DOMESTIC EFFORTS FOR REDUCTION OF CARBON FOOTPRINT

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### 3.9 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?

- Around 40% of the telecom towers in the country have power availability for less than 10 hours. All these towers are potential sites to be powered through renewable sources of energy. However, large scale deployment would depend on:
  - Cost of renewable sources of energy;
  - Government subsidy/incentives for deployment of renewable sources of energy
- Considering the present cost of Fuel (@ Rs 42 /L ) and SEB( Rs 6.5/unit), DG Run hrs ( 12hrs average), SEB availability ( @ 8hrs, and balance on battery along with a assumed increase trend reaching to Rs 65/L for Diesel, the operating cost savings with solar will be around 30% to 40%.
- In case increasing price trend for Diesel continues and there is non-availability of power in rural areas, the telecom sites require renewable sources of energy.

### 3.10 How much saving accrues per tower if supply is through a renewable source instead of diesel for towers that do not get grid power for 12 hours or more?

- Considering the present cost of Fuel ((@ Rs 42 /L ) and SEB( Rs 6.5/unit), DG Run hrs ( 12hrs average), SEB availability ( @ 8hrs, and balance on battery , the operating cost savings with solar will be around 50% to 60%.

### 3.11 How can migration to renewable sources be expedited?

- **There is urgent need to sign a successor to the Kyoto Protocol, which expires in 2012.** Establishing binding global long-term targets for the reduction of GHG emissions. Greenhouse gas cap and trade schemes should deliver a stable and effective long-term price for carbon credit. A good Carbon Credit Policy will help the Industry invest in cleaner technology such as Solar, Wind, Bio Gas, etc.
- The Capital expenditure involved in setting up of non-conventional energy infrastructure should be fully subsidized by the appropriate authorities. **The Government should aggressively encourage the use of non-conventional energy sources by extending support in various forms like capital expenditure subsidy, concessional rates for various Government levies/taxes etc.**
- **All renewable sources of energy should be free of customs and excise tariffs to maximise uptake of these technologies.**
- **To support new green technology technologies development through (R&D and commercialisation) pilots, governments should use grants, soft loans and other incentives to encourage the increased deployment of green technologies.**

### 3.12 If you are a service provider what steps has your company taken towards use of renewable sources of energy? Have the gains from this move been quantified?

- **RCOM has taken number of steps towards use of renewable sources of energy. These steps include evaluations on Wind, solar and Fuel cell. Feasibility study has been carried out and proto testing have been completed.**

## METHODS FOR REDUCING CARBON FOOTPRINT

### Metrics for Certification of Product and Services

#### 3.13 What should be the metric for certifying a product green?

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#### 3.14 Who should be the metric for certifying a network or service as green?

- It has been submitted that Initially metric for certifying needs to be in consultation with the Industry and International bodies to formulate the norms on the basis of average carbon emission. Subsequently certifying should be left to TSP's.

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## ADOPTION OF ENERGY EFFICIENT TECHNOLOGIES

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### 3.15 As a manufacturer/service provider have you started producing/using energy efficient telecom equipment? How is energy efficiency achieved? Please explain.

There are number of ways in which energy efficiency is being achieved. Some of the measures are given below:

- By modifying networks to enable turning off extra TRXs of BTS during off-peak periods or night hours of low traffic.
- The maximum consumption of energy is on account of cooling. By modifying BTS as outdoor unit in place of Indoor BTS substantial savings have been achieved in cooling. The Air-conditioning consumes almost 60% of BTS power. Now many BTSs deployed are outdoor type and the trend will move up in next few years. Therefore, single innovation can help reduce cost relating to cooling by more than half.

### 3.16 How does the cost of energy efficient and the normal equipment compare?

- Energy efficient equipment cost around 20% to 25% more than normal equipment.

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## USE OF RENEWABLE ENERGY TECHNOLOGIES

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### 3.17 What are the most promising renewable energy sources for powering telecom network in India? How can their production and use be encouraged?

Most promising renewable sources of energy are as under:

- Hydro electricity
- Solar energy
- Wind Mill energy

- Fuel Cell: The fuel cells use Hydrogen and some other hydrocarbons to generate energy. There is no emission of Carbon from these cells

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## INFRASTRUCTURE SHARING

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### 3.18 What is the potential of infrastructure sharing in reduction of energy consumption?

Our response to the Q 3.8 may please be referred.

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## WASTE MANAGEMENT

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

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### 3.20 How can waste management be made more green?

- The overall objective of electrical and electronic waste management is to contain hazardous substances like lead, cadmium, beryllium, mercury etc. If these substances are not refurbished, recycled or disposed off in an environmentally sound manner, may harm human health and impact environment.
- The telecom items are only part of the large quantity of electronic and electrical goods disposed off annually and therefore to holistically address this problem it is suggested that a comprehensive approach addressing all electronic and electrical wastes should be formulated. An inter-ministerial coordination would be required to put in place a comprehensive framework for WEEE.

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## BETTER NETWORK PLANNING

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### 3.21 What steps can be taken by the service providers in planning green networks?

- In Radio Networks power saving techniques include network sharing, cell optimization, site optimization, integrated power saving features in the BTS, more efficient amplifiers, tower top-mounted radios etc. Due to very high energy cost it is business imperative to plan networks so as to minimise energy cost.

- Operators plan networks to optimise cost. Wherever possible and viable, energy efficient equipment are installed.

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## STANDARDISATION OF EQUIPMENT

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

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### 3.23 Who should handle the testing and certification of green equipment and networks?

- Standardisation benefits economies of scale, therefore lower unit costs and accelerated rate of growth. But the market is still innovating rapidly, therefore forcing standardisation may reduce innovation/advances
- Base stations and their locations/markets, spectrum band for operation, technologies are very different for operators and therefore at this stage it very difficult to select 'one size fits all' solution
- At present not much development has been made in the energy efficient technologies. It is requested that TRAI should carry out a study with the help of reputed consultants to suggest innovations and Research being carried out in this field. Setting up of standards may be considered after study has been done.
- The Telecom Engineering Centre (TEC), which is the technical body for telecom for government of India, should be fully involved in standardization of energy efficient technologies.

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## MANUFACTURING PROCESS

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### 3.24 How can manufacturers help in reducing GHG across the complete product life-cycle?

- Manufacturers can help reduce GHG across the complete product life cycle in number of ways. Few ways in which manufacturer can achieve this objective are:
  - Designing low energy base station sites which do not require airconditioning
  - Deploying base-stations powered by renewable energy
  - Reducing mobile device life cycle emissions through design and recycling

- Manufacturers are continuously innovating and providing new solutions to reduce GHGs. One example is recent launch of Solar mobile handsets in few countries.
- Handset vendors are also working on a variety of “green” handsets, with features ranging from simple reminders to unplug the phone when it is fully charged to using solar energy for charging. Some new models are made from recycled materials or from biodegradable plastics.
- Innovations mentioned above are continuously desirable to reduce GHGs. The government should create incentive schemes and create dedicated fund for R&D for designing green telecom technologies.

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## MONITORING AND REPORTING

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**3.25 What should be the rating standards for measuring the energy efficiency in telecom sector?**

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

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**3.27 What should the monitoring mechanism for implementation of green telecom?**

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**3.28 Who should be the monitoring agency?**

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**3.29 What type of reports can be mandated and what should be the frequency of such reports?**

- Almost all mobile operators are taking initiatives to improve their sustainability and reduce Green House Gases emissions. The power expenses is one of the biggest expense in the operator’s P&L and it is business imperative as well as Corporate Social Responsibility to adopt energy efficient technologies.
- The use of renewable sources of energy as a potential alternative to conventional sources of energy is still evolving. Further there is no uniform mechanism for measure emissions. The complexity of measurement, variety of business models and sector growth have led to different approaches to estimate carbon footprint.
- Operators are using various technologies and operating in number of different spectrum bands. CDMA and GSM technologies are operating in 800, 900 and 1800 MHz spectrum bands but 3G and BWA technologies are being deployed in 2.1 GHz and 2.3 GHz



spectrum bands. Each spectrum band has different number of tower sites requirement to provide desirable quality of services. Unless uniform mechanism to study emission is evolved, it would too early to start measuring energy efficiency in the telecom sector.

- Internationally, the mobile industry is working through GeSI<sup>3</sup> to develop and agree a standardized mechanism for measuring emissions.
- Since there are no standards at present to study emission and energy efficiency of equipment, it is requested that the Authority may consider to initiate a study with help of international reputed consultants. Experts from telecom and energy sector, academia may also be involved to study rating standards for measuring the energy efficiency in telecom sector. Any decision in this regard may be taken only after Authority has comprehensive information and framework in this regard.
- Energy Audits, star rating of equipment, monitoring of GHGs emissions etc may be evolved only after emission standards etc have been framed.

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## INCENTIVES FOR GREEN TELECOM

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### 3.30 What financial and non-financial incentives can be useful in supporting the manufacturers and service providers in reducing the carbon footprint?

- The use of non-conventional energy sources is presently not popular in telecom sector because of its prohibitive costs and large space requirements. Government in the initial stages need to support adoption of renewable sources of energy in forms like capital expenditure subsidy, concessional rates for various Government levies/taxes etc.
- The Department of Non-conventional Energy Resources has devised a scheme for operators to promote the use of solar power and alternative fuel sources specifically for use by the Telecom sector but that is not enough to meet the operational losses. These schemes should provide Viability Gap funding and not just part of the CAPEX and OPEX requirement.
- Soft loans for setting up renewable energy enterprises need to be available.

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## PROMOTING R&D FOR GREEN TELECOM

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<sup>3</sup> GeSI: Global e-Sustainability Initiative, an international strategic partnership of ICT companies and industry associations committed to creating and promoting technologies and practices that foster economic, environmental and social sustainability and drive economic growth and productivity. Formed in 2001.

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

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### 3.32 How can domestic R&D and IPR generation be promoted?

- To support new green technology technologies development through (R&D and commercialisation) pilots, governments should use grants, soft loans and other incentives to encourage the increased deployment of green technologies.
- Government has already created Centres of Excellence in addition to other research institutes like CDoT which are dedicatedly doing research on telecom. Such institutions should be encouraged to carry out dedicated research on Green Telecom. The government should create dedicated fund for funding these institutions.

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## CSR AND COMMUNITY SERVICE

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

- RCOM welcomes TRAI to evolve a best practices document through a thorough consultation with stakeholders so that the same could be referred by service providers, manufacturers, researchers and all other stakeholders.
- Since there are no standards at present to study emission from telecom networks and energy efficiency of equipment, it is requested that the Authority may consider to initiate a study with the help of reputed consultants. Experts from telecom and energy sector, academia may also be involved in this study.