Huawei Comments to TRAI Consultation Paper on GREEN TELECOM

Estimating Carbon Footprint issues emerge for consultation:

CARBON FOOTPRINT

3.3 In case of mobile what 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?

In present scenario, Individual footprint of RAN and Core network is estimated to be around 70:30 ratio (Radio: Core).

Access network carbon footprint optimization:

RAN sharing between two or more operators for 3G or BWA can further help in reducing the carbon footprint as many of the access elements can be shared among them to provide a lower overall power consumption.

Since the frequencies of currently allocated 3G (FDD) and 3.9G (TDD) technologies are 2100MHz and 2.3/2.6 GHz, the access network elements have to be separate for each of the network deployments. The Re-farming of the spectrum for 3G and 3.9G will create further possibilities of reducing the carbon footprint by using the Single RAN platform from Huawei where one single platform supports GSM/UMTS/LTE simultaneously.

Core network carbon footprint optimization:

Due to implementation of the new network elements for packet core (ePC) there will be a duplication of the core NE's during the transition phase in the combined 2G/3G and LTE networks. Finally the ePC will take over as a single & unified packet core for both R5, R7 and beyond architectures and thus reducing NE's and providing carbon footprint reduction.

However, Due to energy efficient technologies, network elements will require much lesser power consumption for 3G and future technologies. Please refer to reply to clause 3.15 for more details.

AVAILIBILITY OF POWER

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

As per Huawei analysis , taking in to consideration of indoor site, One 3G site with site configuration of S111 takes 410 Watt.

If Active sharing is not allowed than two operator's deploy their equipment separately than total power consumption will be = 820 Watt.

In case if Active sharing is allowed than two operator will deploy single equipment which can support more than one carrier and consume total power consumption = 510 Watt

Total saving if Active sharing is allowed = 820 – 510= 310 watt/site

I KWh consumes = 0.84 Kg co2, Assume that electrical power available = 24 Hr, Total power consumption of one 3G site with two operator =

Total saving of co2 emission due to active sharing = 0.310*24*0.84
= 6.25 Kg per day per site = 2281 Kg saving per year

App 2.3 Ton Co2 is saved per site

Note: Active sharing is limited to antenna, feeder cable, NodeB, RAN, Transmission system only. We have given example of only NodeB , if we consider all other things also than there will be huge saving by deploying active sharing.

Active sharing can bring down the operational expenses to about 35-40 % with same footprint

DOMESTIC EFFORTS FOR REDUCTION OF CARBON FOOTPRINT

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?

Total 15% sites (app 50K) are operational where on grid power supply is very less or app less than 8 hrs. Use of renewable energy resource should be taken on priority as it increases the maintenance of operators in terms of opex.

For that, USOF should be utilize properly and atleast 25% of existing 50K off grid sites should be considered for next five year, as the capex of renewable energy resource is very high with consideration of govt plan to enhance the on grid power supply in rural areas.

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?

If using solar power, than total saving of atleast 24 litres diesel equivalent to 63.12 Kg of CO2 emission will be saved per day/site for offgrid site.

The following table provides a matrix of the peak sun available in zones of India and the feasibility to deploy renewable sources of energy, based on the configuration of the base stations.

Region	Weather condition		Recommendation			
	Peak sun hour (h)	Wind speed (m /s)	0 ~ 800W	800W ~ 1300W	1300W ~ 2000W	Above 2000W
East	5.33	5.33	Solar	Solar +wind	Solar +DG / Solar +wind	Solar +DG +wind
South	5.83	4.49	Solar	Solar +wind	Solar +DG / Solar +wind	Solar +DG +wind
Central	5.39	2.76	Solar	Solar +DG	Solar +DG	Solar +DG
West	6.52	4.7	Solar	Solar +wind	Solar +DG / Solar +wind	Solar +DG +wind
North	4.93	5.79	Solar /Solar + wind	Solar +wind	Solar +DG / Solar +wind	Solar +DG +wind

EB (Electricity Board) can be added to all above solutions, where available

Saves **8760kWh** electricity & decreases **11 tons** CO_2 release per site per year

Green BTS (<800W), Makes It Possible To Use Green Energy

3.11 How can migration to renewable sources be expedited?

It is recommended to formulate a new subsidizing policy to offset the capex for deploying renewable energy resource in telecom sector.

Provisioning of single-window services in terms of necessary guidelines for implementing renewable energy sources effectively.

METRICS FOR CERTIFICATION OF PRODUCT & SERVICES

3.13 & 3.14 What should be the metric for certifying a product green?

Standardize the equipment through testing and certification, with Set up of test lab to validate the product in terms of (what was required to produce, deliver and operate the product in the network to provide the service, energy efficiency, eco friendliness and to assess annual CO2 emission during the life cycle of its operation).

Any threshold recommended by a carbon credit policy, should be given for certifying a product green.

ADOPTION OF ENERGY EFFICIENT TECHNOLOGIES

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

- We have developed a series of innovative technologies to significantly reduce the energy consumption and emission of base stations. These technologies involve improving the power amplifier efficiency, raising the base station working temperature to eliminate the air-conditioning system, adopting the distributed and integrated central office and using the intelligent shutdown technology.

- Huawei's SingleRAN solution based on the software-defined radio (SDR) system to truly integrate multiple networks. SingleRAN is the first commercial solution in the industry to simplify energy-using nodes and save energy by way of network convergence. This solution effectively reduces the number of sites and is deployed on a commercial basis successfully in many parts of the world.

- Use a high performance, advanced and unified hardware platform to reduce the average power consumption. Such as ATCA (Advanced Telecom Computing Architecture) platform strategy for core network, that is, a unified platform for most of core elements. In our solution, this layered modular-designed architecture are widely adopted. The applications covers SGSN, SG, HLR, MSC server both in mobile and fixed area and IMS.

- Use device pool solution, such as MSC POOL, SGSN POOL, etc. That will not only increase the network reliability, but also increase the usage rate of equipment, and therefore reduce the overall energy consumption.

- Huawei has launched a series of hybrid power solutions mentioned below with MPPT based charge controller unit, tailored to the base station sites.
    - Solar energy solution,
    - Wind and Solar hybrid power solution
    - Solar and Diesel hybrid power solution to provide renewable energy

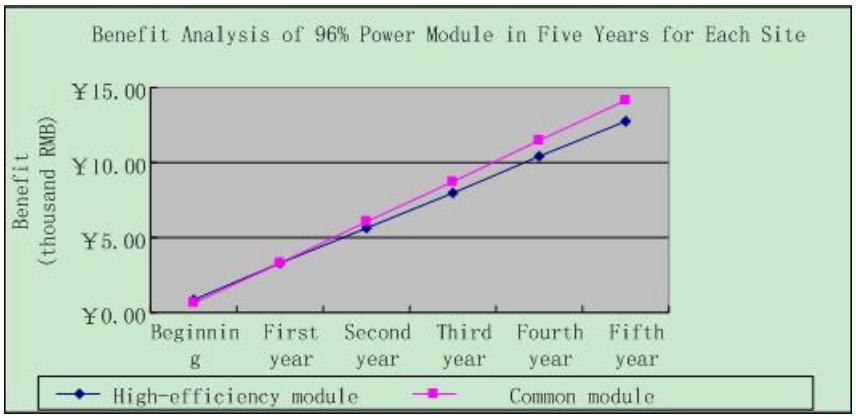
3.16 How does the cost of energy-efficient and the normal equipment compare?

The capex of green products could be higher than normal products in some cases. This is due to the extra R&D efforts, manufacture control, supply chain control and management. Having said that, Huawei, as a leading telecom vendor, and a responsible corporate citizen, will keep investing in this area to support the green cause

Huawei has carried out a comprehensive green solution across the communication network, including access network, core network and transmission network. It's estimated that power consumption by wireless access network accounts for 80% of the whole mobile network. Therefore, developing a series of power-efficient base stations will be very attractive for the suppliers.

Conforming to the above, the following table outlines the percentage increase in Capex in deploying energy efficient modules vise-s-vise normal equipment. This initial rise in Capex is subsequently offset in the yearly operational costs as shown below:

BTS number	1	Analysis of profits generated by the power modules with the efficiency of 96% and 91% (unit: ten thousand RMB)				
Type	CAPEX	First Year	Second Year	Third Year	Fourth Year	Fifth Year
High-efficiency module	0.9000	3.27	5.64	8.00	10.37	12.74
Common power module	0.6000	3.312	6.03	8.74	11.45	14.16
Profit (RMB)	-0.30	-0.04	0.39	0.73	1.07	1.42



USE OF RENUABLE ENERGY TECHNOLOGIES:

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

Fuel cell and solar cell both are most promising renewable energy resource for powering telecom network in India. Regarding opex, solar has much more efficient resource.

DCDG and advanced cyclic batteries are also good options to reduce opex.

Soft loans/ subsidy on capex can expedite use of technologies mentioned above.

INFRASTRUCTURE SHARING

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

Passive infrastructure is already accepted in the industry while Active infrastructure sharing need to be promoted which will result in approx. 40-50 % reduction of energy consumption.

WASTE MANAGEMENT

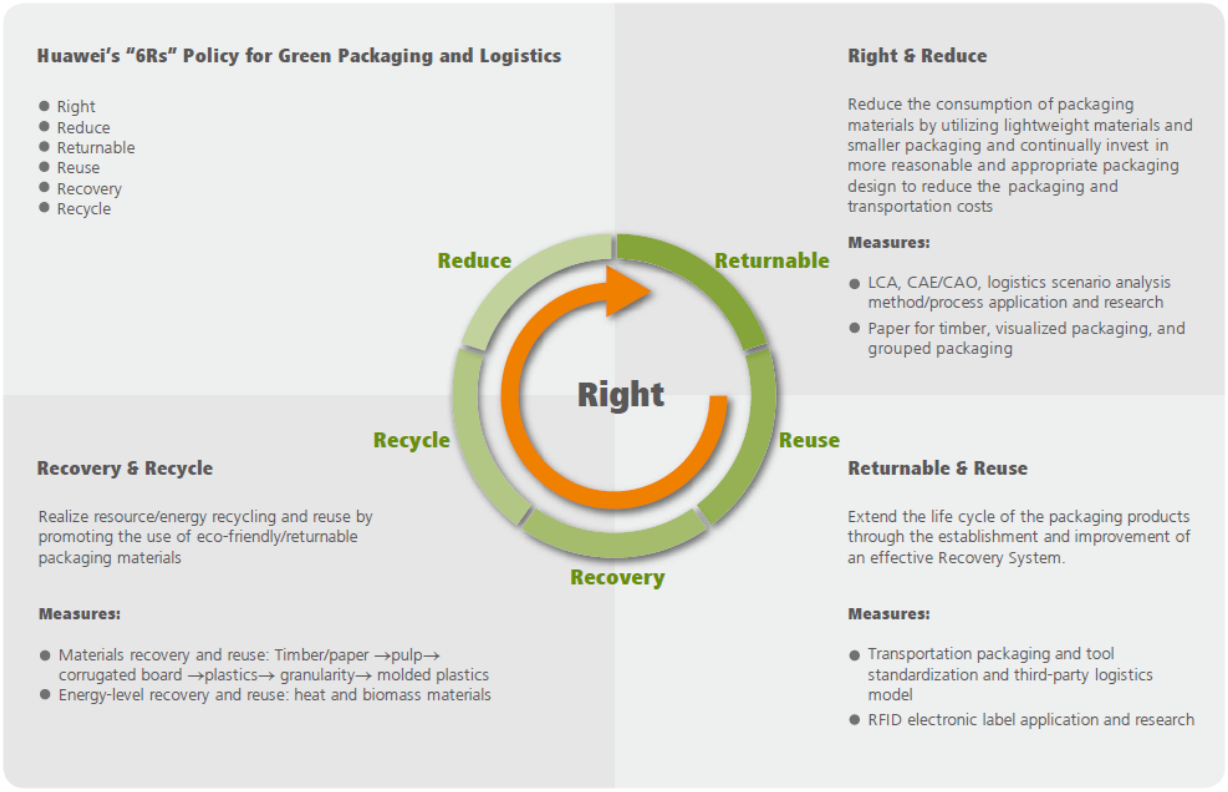
3.19 What is the current procedure for storing, disposing and recycling telecom waste by the service providers and manufacturers?

Huawei has effectively saved energy in the area of packaging and logistics under a "6Rs" (Right, Reduce, Returnable, Reuse, Recovery and Recycle") philosophy, and in compliance with the following:

- Restriction of the Use of Certain Hazardous
- Substances in Electrical and Electronic Equipment (RoHS) Directive
- Waste Electrical and Electronic Equipment (WEEE) Directive
- EcoDesign Requirements for Energy Using Products (EuP) Directive
- SA8000 Social Accountability Certification Standards

Huawei has proactively fulfilled its corporate responsibilities and environmental commitments under the "6Rs" policy. We have reduced non-reusable packaging waste by 25% through design optimization.

Under the "6Rs" policy, Huawei developed a "transportation cabinet + visualized packaging" product, in partnership with China Mobile, in order to develop a green industry chain of mobile communications.



This solution is based on recycled wood materials, visualized packaging technology, assembly technology, standardization, and appropriate design.

Together with a universal logistics platform, it reduces the consumption of natural resources, such as wood from forests, at the packaging and logistics stage, and promotes the sustainable development of resource-saving and environmentally friendly packaging and logistics within the industry.

By working in partnership with our customers on their network implementation projects, we have shown that, compared to legacy packaging solutions, this solution can reduce 90% off timber usage, reduce weight of packaging materials by about 22%, and raise operational efficiency by about 82%.

Huawei is aware of the importance of recycling waste products into new resources for the sake of environmental protection. As a leading telecom solutions supplier, Huawei takes its responsibility for waste product treatment seriously. Huawei strictly complies with waste electronic equipment management regulations enacted by all countries worldwide and proactively promotes waste reuse and recycling.

The EU Waste Electrical and Electronic Equipment Directive (WEEE Directive) requires producers to establish a recycling and utilization system for waste electrical and electronic equipment and pay the related treatment expenses. Huawei has established a waste electrical and electronic equipment reuse and recycling system to fulfill the extended producer responsibility.

In accordance with the WEEE Directive, Huawei has added WEEE recycling logos to the labels of products sold to the EU market, since August 13, 2005.

Huawei is strictly fulfilling regulations obligations through active worldwide participation in waste packaging materials and waste battery reuse programs.

In collaboration with the world's leading environmentally friendly service providers, Huawei has built a global waste treatment platform to dismantle and recycle Huawei and its customers' retired telecom equipment under a one stop treatment approach to ensure environmentally friendly treatment, recycling, and reuse of electronic waste.

We have set up a waste treatment control center in Shenzhen and established regional waste treatment platforms in partnership with waste service providers in Latin America, Europe, Africa, Asia Pacific and China, in order to facilitate the waste treatment process of recycling and to ensure zero waste from any usable resources.

At present Huawei has a recycling partner in India to manage the process for disposal and waster management.

3.20 How can waste management be made more green?

1. Reuse of Visible Cabinet Package Saves 50% Wood Consumption
2. Intelligent shut down feature at site level
3. Reuse of legacy equipment and components and software upgradable for future technologies
4. By reducing E-waste – Flexible software platform, Using common network management software for different technologies.

The product manufacturing phase consumes a great deal of materials, natural resources and energy. Huawei is dedicated to reducing resource consumption during the design and manufacturing processes.

Manufacturing and the production of raw materials, such as metal and plastic, requires consumption of vast amounts of natural resources, and this has a

significant impact on the environment. Huawei adopts measures to reduce consumption of raw materials. On average, the rate of reduction can be over **10%.** For example, we used a diversified weight reduction design to save about 15,000 tons of steel, and reduce carbon emissions by 48,000 tons annually.

Furthermore, Huawei has greatly reduced the consumption of spray materials and energy sources through various optimized measures to reduce or remove spray. Huawei has reduced the consumption of water through design improvements, thus saving 90,000 tons of water annually.

We promote environmental protection measures internally, whereby energy saving and environmental protection are integrated into corporate operations and employee activities. In daily operations, Huawei uses many effective energy saving and emissions reduction measures. For example, air-conditioning power consumption accounts for approximately 40% of total
power consumption at Huawei headquarters in Shenzhen.

During Summer, we set the air-conditioning temperature to above 26 Celsius degrees, which saves nearly 4 million kilowatts/ hours (kWh) annually. We use efficient new T5 energy-saving lights to replace ordinary daylight lamps, thereby reducing power consumption by over 40%. For outdoor lamps and light sources located near outdoor illumination of the buildings, light control is employed, saving Huawei 1.3 million kWh annually.

In addition, recycling of chopsticks is promoted in all employee canteens in China, saving as many as 16,800 trees and reducing carbon emissions by 1,800 tons.

In the second half of 2009, Huawei started the iTools project and promoted and implemented a series of tools and solutions to improve communication across different locations. For example, the unified communication tool and videoconferencing system improves working efficiency, reduces OPEX, and greatly reduces energy consumption and carbon emissions caused by business trips.

Huawei headquarters in Shenzhen consumed 1.7 million tons of water in 2009, and 256.7 million kilowatts (kW) of electricity. In 2010, we plan to reduce water and electricity consumption by 7% and 11%, respectively

Based on the LCA findings, we optimized the energy use and emissions indicators for end-to-end network products, with a focus on the access layer. **Today, all our** products can achieve an energy savings of more than 30% compared to traditional solutions in the industry.

STANDARDISATION OF EQUIPEMENT

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

Huawei participates in energy saving standards such as EU's ETSI and JRC's CoC, North America's ATIS and Energy star, China's CCSA. In addition Huawei are also active in ITU-T's energy saving standards.

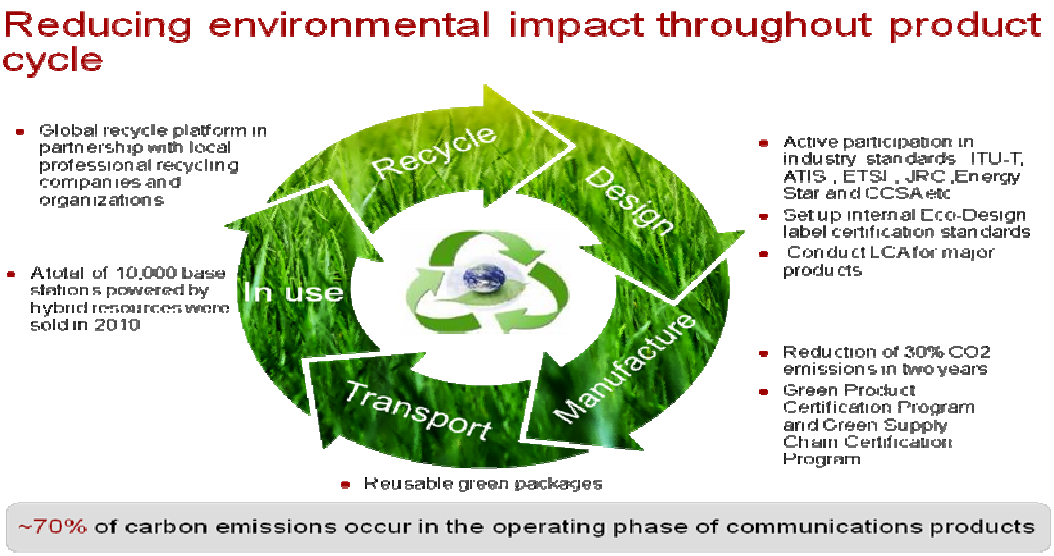
3.23 Who should handle the testing and certification of green equipment and networks?

So far only Energy Star provides certification service for PCs and Servers. There is no formal international test and certification for green telecom equipment so far because of lacking of practical matured standards. Currently, it is the operators to conduct test and certificate for wanted green products per their own green standards.

It is recommended govt. should Set up test lab to Standardize the equipment through testing and certification, with validation of the product in terms of (what was required to produce, deliver and operate the product in the network to provide the service, energy efficiency, eco friendliness, to assess annual CO2 emission during the life cycle of its operation).
Any threshold recommended by a carbon credit policy, should be given for certifying a product green.

MANUFACTURING PROCESS

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



Design:

- Active participation in industry standards: ITU-T, ATIS, ETSI, JRC, Energy Star and CCSA.
- Set up internal Eco-Design certification standards and energy-saving targets.
- Conduct LCA for analyzing power distribution and find improvement points
- Design smaller products and lower energy-consumption network solution by innovation such as smart power management policy and technology, high efficiency power suppliers, power amplifiers and radio technology etc.

Manufacture:

- Started Green Supply Chain Certification Program
- Reduction of 30% CO2 emissions in two years

Transport:

- Reusable green packages

In use:

- Over 20% energy saving of BTSs
- Deployed 3000+ new energy BTSs
- Green broadband networks

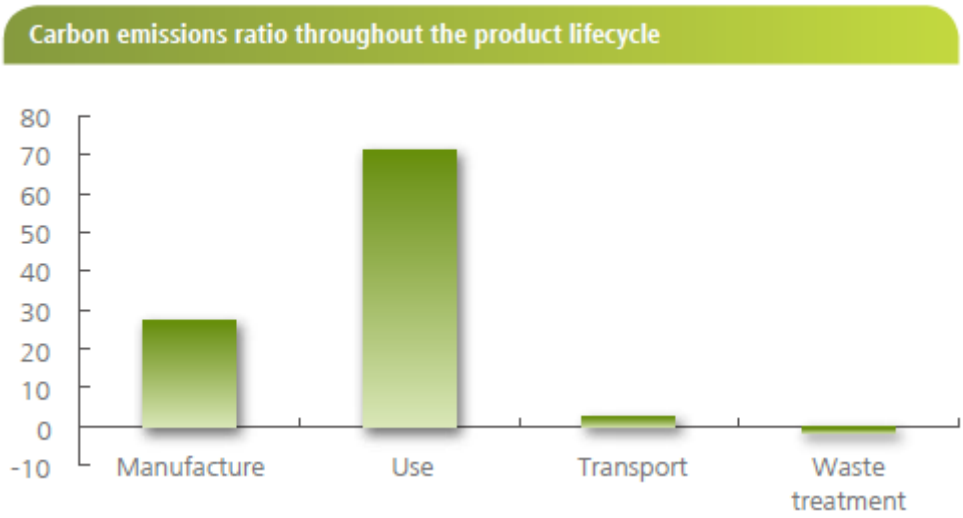
Recycle:

Global recycle platform in partnership with local professional recycling companies and organizations

To accurately assess the impact of products on the environment at each phase of their lifecycle, Huawei uses lifecycle assessment (LCA) to evaluate products, including raw material procurement, part and component manufacturing, product processing, transport, use, waste treatment, and recycling.

Through this process, products and their lifecycle phases that have a great impact on the environment can be clearly identified, key impact factors can be identified and green solutions can be developed to carry out various activities to reduce their impact on the environment.

Through LCA analysis, the impact of products on the environment with regard to climate change, carcinogens, longterm or non-biodegradable materials, radioactivity, ozone depletion, ecology toxicity, acidification, land occupation, **and mineral consumption** can be evaluated. Among these issues, climate change is of the most concern. The evaluation results of the index pertain to the total carbon emissions of the product throughout its lifecycle.



During product design and manufacturing, Huawei always regards “reducing products’ impact on the environment” as one of the most important indices for product quality evaluation. Reducing the adverse impact that products have on the environment is also Huawei’s social responsibility and commitment.

To evaluate the success of the indices, at the end of 2009, we started the Green Product Certification Program. We finished developing certification standards for “green products”, covering all regulations, directives, standards, and requirements in energy saving, emissions reduction, and environmental protection factors such as energy

efficiency, use of renewable energy sources, weight, package, harmful substance, retrieval, noise, and electromagnetic radiation safety.

In addition, we evaluated the products' environmental performance in each phase of product lifecycle, such as raw material, manufacture, transport, use, and waste treatment.

The Green Product Certification Program was launched and the standards were adopted through Huawei's integrated product development (IPD) process.
The programs make Huawei continuously improve products in terms of their environmental performance, thereby reducing resource consumption, improving energy efficiency, reducing manufacturing and operating costs, and reducing the impact on the environment throughout the products' lifecycle.

Through the lifecycle assessment of various types of equipment, we concluded that approximately 70% of carbon emissions occur in the operating phase of communications products.

MONITORING & REPORTING

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

At present the North America's ATIS standard and EU's ETSI standard are the main measurement standards for energy efficiency in telecom sector.

INCENTIVES FOR GREEN TELECOM

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

1. Import duty & Tax exemption
2. Subsidies on energy efficient telecom product
3. Support to set up local R&D & manufacturing plant
4. Provisioning of Soft Loan.

PROMOTING R&D FOR GREEN TELECOM

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

1. Easy Site solution for Rural
2. Multi mode multi band radio equipment
3. High Gain Antenna

4. Natural Cooling solutions
5. Spectrum efficient techniques
6. Enhance efficiency of solar PV module
7. New renewable energy resource except solar, wind , fuel cell
8. DC Diesel Generator
9. Dynamic power management technology

CSR & COMMUNITY SERVICE

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

We appreciate TRAI initiative to publish consultation paper on Green Telecom to take comments from various stakeholders of telecom sector to enhance green telecom and reduce carbon foot print in order to achieve a green eco friendly environment.