Green Telecom – An Indian Perspective

Tilak Raj Dua

Global ICT Standardisation Forum for India, Suite 303, 3rd Floor, Tirupati Plaza, Plot No. 11, Pocket-4, Sector 11, Dwarka, New Delhi 110075, India;
e-mail: tr.dua@gisfi.org, tilakrajdua@gmail.com

Received 12 September 2011; Accepted: 28 September 2011

Abstract
Eco friendly, energy efficiency, green are the key words in today’s market. The reason is not only the health of our planet but also the impact on our business. Combating climate change, securing energy supply and meeting ever increasing energy requirements are the main challenges our society is facing in the present times. There is a vast potential for application of renewable energy options such as wind, bio mass, solar and energy recovery from wastes for meeting partial or total requirement of thermal as well as electrical energy in various industry sectors.

Keywords: Green telecom, India, energy efficiency.

1 Introduction
Combating climate change, securing energy supply and meeting ever increasing energy requirements are the main challenges our society is facing in the present times. There is a vast potential for application of renewable energy options such as wind, bio mass, solar and energy recovery from wastes for meeting partial or total requirement of thermal as well as electrical energy in various industry sectors.

India’s high economic growth will lead to an increase in emission of environmentally harmful green house gases that contribute to global warming,
but adopting methods to replace greener or more efficient technologies can help it tap new opportunities as well as get other benefits.

The adoption of greener or more efficient technologies can give India:

- Energy security.
- Inclusive growth.
- Better quality of life.
- Leadership in emerging growth business.

1.1 India’s Commitment

India has just announced its commitment to a reduction of 20–25% in carbon intensity from 2005 levels by 2020 through mandatory fuel efficiency standards as announced by Shri Jairam Ramesh, Hon’ble Minister of State for Environment and Forests in the Lok Sabha on December 3, 2009.

1.2 Green Requirement in the Telecom Sector

‘Going green’ is no more an option for telecom operators. It has become a necessity in a market where margins are nose diving due to tariff wars, denting the profitability of the established service providers. At present the energy expenses (opex) is nearly 25% of the total network operating costs. It is all the more imperative that efficient power management methods/mechanism should be adopted to reduce the operating costs and improving financials.

Equipment vendors, tower companies and network services provider are investing heavily in bringing out green products and solutions to cut operators’ opex. While a pan-India deployment looks some time away, however incase subsidies and easy availability of renewable energy sources can be ensured it is predicted that up to 20% reduction in energy requirements is achievable in the near future.

In addition, there is awareness building around hybrid and alternative energy sources for the cell sites. The government MNRE has even decided to provide monitory support/subsidy to help operators explore renewable energy and other green technology options.

It is our belief that the telecoms sector must join other industries in going green, to adopt responsible investment strategies, seek out innovative solutions to reduce their carbon emissions, and ultimately established energy security to ensure a long term, sustainable future.
2 Increasing Carbon Footprint – Contribution of the Telecom Industry

A carbon footprint is “the total set of greenhouse gases (GHG) emissions caused by an organization, event or product”. For simplicity, it is often expressed in terms of the amount of carbon dioxide, or its equivalent of other GHGs, emitted.

Rapid advancements in telecommunications have resulted in unprecedented growth, record infrastructure investments and accelerated service innovation. But as billions of devices access the growing number of networks and platforms on the global information grid, the energy that is used to keep the data flowing and networks buzzing is running out and changing the world’s climate.

Though, as an industry, telecommunication generates less pollution and tends to be relatively clean. However, as many other industries, it consumes energy and generates waste.

Greenhouse Gas (GHG) Emissions from the Mobile Industry arise from a number of sources:

- Energy consumed by the network in operation.
- Embedded emissions of the network equipment, for example, emissions associated with the manufacturing and deployment of network equipment.
- Energy consumed by mobile handsets and other devices, when they are manufactured, distributed and used, as well as their embedded emissions.
2.1 Energy Requirements by the Telecom Sector in India

Some of the indicative energy requirement trends in India are:

- Energy related expenditure accounts for nearly 70% of total operating cost per cell site in the rural areas.
- The power requirement of a BTS currently varies from 1300–1500 watts.
- A large percentage of these deployments are still indoor type needing air conditioning.
- Current SLAs (with operators) need shelter temperature to be maintained between a range of 22–25°C.
- Powering systems are largely dependent on grid supply as primary source with diesel generators as stand by sources and storage batteries as secondary sources.
- In view of the current power deficit scenario where load shedding and / or voltage irregularity is at frequent intervals, most of the cellular operators and independent telecom infrastructure providers pre-dominantly use Standby Diesel Generator Sets at their cell sites around the state in order to provide 24 × 7 uninterrupted cellular mobile services to the end users.

2.2 Concerns

There are the following concerns of the telecom service providers and the environmentalists with regard to the energy requirements:

- Base Stations are still power intensive.
- Grid supplies in rural areas are often erratic and unavailable requiring long runtime of DG sets.
- Diesel generators need regular maintenance.
- Diesel thefts are very prominent – they could be as much as 20% diesel theft.
- Prices of petroleum products are continuously increasing.

3 The Need for Carbon Credit Policy for the Telecom Sector

a. The Kyoto Protocol, 1997, urges all countries to reduce their greenhouse gas emissions by 5% from their 1990 levels by 2012, or pay a price. A carbon credit refers to one tonne of carbon dioxide emissions avoided by the adoption of a certain practice when compared with a business-
as-usual (baseline) scenario; it can be sold on the carbon market to a
company in the developed world looking to offset excess emissions.
b. The World Bank has built itself a role in this market as a referee, broker
and macro-manager of international fund flows. The scheme was entitled
The bank subsequently handed over $10 mn to India’s Infrastructure De-
velopment Finance Company to fund clean projects that would generate
saleable carbon credits.
c. The concept of carbon trading arrived in India in 2002, and since then
India has developed an attractive CDM portfolio with a market share
close to 12%.
d. Carbon Credit Policy for Indian Telecom Sector: The following are some
of the suggestions:

- In a bid to promote environment-friendly telecom infrastructure,
it is suggested that the Government may propose to give carbon
credits to operators for using eco-friendly fuels to power their
exchanges and mobile base stations.

- Government/regulator may recommend giving financial incentives
in terms of lower revenue share to operators deploying non-
conventional sources of energy such as solar and wind energy
wherever possible, as the operational cost to provide backup power
supply in case regular electric supply is erratic, is very high.
Moreover, since the use of generators for long hours results in
pollution, there is a need to encourage use of non-conventional
sources of energy.

- If a service provider uses, say, solar energy to energize base
stations, the company may be considered for certain incentives.
Taking a cue from similar concepts being used internationally
to reduce pollution. These incentives should be based on the
International Best practices.

- The telecom players are now investing in a host of telecom
products that are increasingly contributing towards both building a
greener tomorrow and helping the country’s economy, while show-
ing its customers that being environment-friendly is profitable. The
energy solutions companies are innovating on technologies that
can reduce GHG emissions drastically, in process making the unit
or the project eligible for carbon credits in large volumes.
With over 60,000 sites of telecom operates using the green energy solutions, more than 840,960 tonnes of carbon is being saved each year. Credits that can be earned from this is quite large.

4 Methods and Options to Reduce the Carbon Footprint by the ICT Industry in India

The mitigation of carbon footprints through the development of alternative projects, such as solar or wind energy or reforestation, represents one way of reducing a carbon footprint.

Methods to reduce the carbon footprint by ICT industry in India calls for a combination of incentives and subsidies, including market and fiscal mechanisms to help environment management by industry and people in their day-to-day working. Environment education and awareness is also critically important in this context. Other options are:

i. Energy consumption is a significant ingredient in running and maintaining telecom networks. Reducing the carbon footprint should be adopted as a good practice for the telecom sector, inclusive of service providers and the associated industries of the sector, particularly, the telecom equipment manufacturers.

ii. Government should provide incentives for the development and use of alternative energy such as solar or wind energy.

iii. The guidelines need to be in place for recycling of waste materials.

iv. The procedure for installation of new infrastructure should be aligned with the environmental policies.

v. Adequate thrust should be on Environment education and awareness creation.

vi. Investment in new technology which contains less hazardous material and is, thus, easy to recycle.

vii. Introduction of energy-efficient technologies.

5 Options for Environment Friendly Alternate Energy Sources

Many telecom companies are now exploring multiple sources of renewable energy, like solar, wind, biofuels, etc. A lot many are going with choices like green wireless networking equipment.
Other countries have started getting huge outputs from their stakes in renewable energy. By 2010, five solar thermal electricity generators in the Australian desert will produce enough electricity for a million homes.

Exploring alternative sources of energy is not only imperative now but is also seen as a viable option that can help with a cleaner and greener environment and also generate job opportunities in the rural part of the country.

In India, more than 80,000 villages do not even have a grid electricity pole anywhere near. Supplying power to these areas still remains a challenge for telecom companies.

Adapting alternative sources of energy for powering BTS sites is essential. It is estimated that 118,000 renewable energy base stations could save up to 2.5 billion litres of diesel a year and cut annual carbon emissions by up to 6.3 million tons (Industry Estimates).

Various sources of energy that can power the BTS are:

(a) Solar Energy
   - Solar-DG Hybrid
   - Solar-wind Hybrid

(b) Wind-DG Hybrid
(c) Biomass Gasifier
(d) Biofuels blending with diesel

(a) Solar Energy
Solar Energy is the most matured of all such technologies. The main advantages are:
- Clean & green.
- No moving parts – minimal maintenance cost.
- Easier to manage.

Where can we leverage Solar Energy?
- Use Solar Energy as primary source in a ‘NO Grid’ situation.
- Ideal for rural area with little chance of shadow effect.
- Zero carbon emissions.
- Less possibility of site outage as site running on solar power during day time.

Suggested configuration:
- a. Solar-DG Hybrid
- b. Solar-Wind Hybrid
Figure 2 Schematics of solar deployment for Telecom.

(b) **Wind-Based System**

This provides *free, clean & green* energy.

- Advanced systems are widely available.
- Smaller systems can be mounted on existing radio-masts, reducing costs.
- Horizontal wind turbines are more efficient.
- Systems available with low “cut-in” speeds of 2.4 m/sec.

Some challenges are:

- Site-selection must be carefully done for deployment of wind turbines, (ISO-820 wind maps must be studied before deploying wind turbines)
- Wind velocity is often erratic. Thus we need a very efficient charge controller and a sink for excess power
- Sink for excess power can be a tube well for example

(c) **Biomass Gasifier**

Biomass gasification is basically a conversion of solid fuels (wood/wood-waste, agricultural residues, etc.) into a combustible gas mixture normally called Producer Gas.

The process is typically used for various biomass materials and it involves partial combustion of such biomass partial combustion process occurs when air supply (O₂) is less than adequate for the combustion of biomass to be completed
The DG which is part of the previous hybrid solution can be made to use biomass instead of costly and polluting fossil fuel. It reduces the dependence on diesel.

Some concerns are:

- Availability of raw material on continuous basis at identified locations.
- Requirement of large covered storage space for biomass storage.
- Dedicated manpower 24 × 7 for day to day operation.
- Safe disposal of ash/residue.

(d) **Biodiesels**

Biofuel is a fuel oil made mainly from organic vegetable oils or animal fats. The production process is called transesterification. Every vegetable oil molecule consists of fatty acids and glycerin, the transesterification process separates the fatty acids from glycerin by adding an alcohol and a catalyst. This results in biodiesel with properties similar to fossil diesel. The use of biodiesel in a conventional diesel engine results in substantial reduction of unburned hydrocarbons, carbon monoxide, and particulate matter compared to emissions from diesel fuel.

Biodiesel is an alternative fuel to regular conventional diesel (fossil fuel) and can be produced from vegetable oils, acid oils, fatty acids, fish oil, mutton tallow and used cooking oils. Few of the non-edible vegetable oils like Pongamia and Jatropha also can be used to produce biodiesel.

This fuel meets all the international standards namely ASTM/EN/BIS standards and can be used as 100% or in various blends with regular diesel. It is accepted by global players, such as Mercedes Benz, Volkswagen, Caterpillar, Cummins, Skoda, etc.
Biodiesel in India:
- India is the 6th largest diesel consumer in the world.
- Indian railways alone consume 4 billion liters per annum.
- Projected annual growth of diesel usage in India is 5.8%.
- India consumed around 52 million metric tons of diesel in the last year.
- The estimated demand for biodiesel is between 3.15 million metric tons to 12.60 million metric tons by 2010 (subject B5 to B20).
- Around 130 million acres of wasteland available in India.
- Can produce around 130 million tons of biodiesel through biodiesel plantations in the wastelands, considering 40% land suitable for biodiesel plantation.
- At present Jatropha and Pongamia are the plantations considered as biodiesel plantation.
- The Government of India is encouraging biodiesel plantations by extending various subsidies to farmers.

6 VAS Green

There have been recent initiatives by the mobile operators wherein they have promoted a slew of value added services like mobile newspaper, receive e-bills on mobile, mpayments and transactions, issue e-tickets and boarding passes, thereby saving tonnes of paper each day.

The operators have long been talking about the business sense in adopting green measures. It is one industry that pays hefty energy bills. The initiative to educate subscribers on the use of mobile applications that can help subscribers cut down their carbon footprint is an encouraging step towards the long journey.

Industry experts say VAS usage may not contribute in a big way, but definitely it can make a significant impact in the long run. A whole variety of value added services are on the offer that help you mind your carbon footprints. Their carbon emission calculators, alarms for mobile and what not, but services like mobile newspaper and e-tickets on mobile definitely make a direct contribution.

Most of the Indian telecom service providers have on and off been making some efforts to encourage subscribers to adopt green practices. For example, on Diwali operators made offers where a subscriber opting to get e-bills would stand a chance of getting his house painted for free. In India, their prepaid and postpaid ratio is skewed. Though a majority of the subscribers
are prepaid, the number of postpaid customers is around 6 to 7%. Thus, there is a huge amount of saving that can be done by receiving bills online rather than getting prints of bills.

7 Contribution of the Industry to Reduce the Carbon Footprint

The industry can contribute by having specific focus groups and programs in areas such as:

- Awareness building and knowledge dissemination – Indian ICT industry needs to be educated about impact of ICT on CO₂ emissions – both the negative impact and how ICT can be used to reduce emissions.
- Energy labeling programs – There is a need to enhance existing Energy Labeling programs in India.
- Metrics programs – There is a need to come out with metrics and performance indicators for energy efficiency of all relevant ICT activity in India. This includes harmonization of global best practices and guidelines for India. Also, there is scope to develop new guidelines for areas in which there are no global standards or best practices so far – for example energy efficiency metrics for Radio Base Stations.
- Code of conduct – There is a need for establishing a Code of Conduct for Indian ICT operations similar to the European Code of Conduct for achieving time bound targets of energy efficiency.

7.1 Global Efforts in Green ICT

i. Global e-Sustainability Initiative
   - GeSI is a non-profit organization, headquartered in Brussels, Belgium that brings together ICT companies, industry associations and NGOs to further the cause of sustainable economy using innovative use of ICT.
   - GeSI’s activities include development of standards, methodologies, best practices and promotion of good conduct in the areas of Climate Change, Energy Efficiency, E-waste and Supply Chains.

ii. The Green Grid
   - The Green Grid is global consortium of over 180 organizations worldwide.
iii. Climate Savers Computing Initiative

– The Climate Savers is a non-profit organization started in 2007 by Google and Intel.
– The focus of this group is on energy efficient PC and servers.

iv. US Energy Star Program

– Energy Star is an initiative of the US Environmental Protection Agency and Department of Energy.
– The Energy Star program for computers aims to generate awareness of energy saving capabilities and accelerate the market penetration of more energy-efficient technologies.

v. Smart Grid Interoperability Panel

– The Smart Grid Interoperability Panel (SGIP) is a membership-based organization created by the US National Institute of Standards and Technology (NIST).
– NIST is responsible for coordinating the development of and publishing a framework, including protocols and model standards, to achieve interoperability of Smart Grid devices and systems.

vi. Initiatives of the European Commission

– EC has acknowledged the importance of use of innovative ICT-based technologies for achieving a low carbon emission targets in a cost effective manner.
– The Commission is promoting R&D projects for developing ICT tools to improve energy efficiency

8 Conclusions

– India is well positioned to take off for alternative energy revolution; however organized efforts are yet to pick up stream.
– The telecom sector must join other industries in going green, to adopt responsible investment strategies, seek out innovative solutions to reduce their carbon emissions, and ultimately established energy security to ensure a long term, sustainable future.
• Government support in terms of subsidy is required to bolster up the Green Energy usage in the telecom sector.
• The Government should consider USOF support to encourage operators to opt for green energy and biofuel as an alternative for powering BTS.
• More efforts are required to educate the industry on the need for cleaner fuel, its environmental importance and the socio-economic benefits of biofuel for the rural areas.
• The green VAS initiatives of the operators can be a milestone in educating subscribers on the use of mobile applications that can help subscribers cut down their carbon footprint is an encouraging step towards the long journey.

It is yet to be seen that ‘green’ does not remain just a marketing differentiator, but actually becomes a compulsory ingredient of all the equipments, products that are rolled out by telecom operators in India.

References
[1] GISFI Standardisation Workshops.

Biography
T.R. Dua is a B.Sc. Engineering graduate with a diploma in Business Management and Export Marketing. He has more than 35 years of experience in Telecommunication in various fields, such as product development, the introduction of new technologies, technical collaborations, joint ventures, telecom regulations, and spectrum management (spectrum auction, pricing, and allocation). He was Director of Shyam Telecom Ltd., Director of Bharti Airtel Ltd., and Deputy Director General of COAI.

Dr. Dua is a member of: ITU – APT, PTC India, Fellow Institution of Engineers (India), Fellow Institute of Electronics and Telecom Engineers, Computer Society of India, Indian Science Congress, Optical Society of India, 3GPP, WWRF, GSMA, Task Group on Spectrum – Digital dividend, and the National Working Group on Spectrum WP5D/NWGS. Furthermore, he is
currently on the Governing Council of “Global ICT Standardization Forum of India”.

In 2010 he was awarded the prestigious “Evangelist Mobile Infrastructure Award”. He has published and/or presented numerous papers on Spectrum optimization Techniques, Transition from IPV4 to IPV6, Green Telecom, Mobile Money Transfer, VOIP Security & Mitigation Techniques, EMF radiation/alleged hazards.

Currently his interests include: EMI/EMC, satellite, microwave, and spectrum optimization.