Dirty Talking?

Case for telecom to shift from diesel to renewable

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Image on the cover page: Mobile tower using indoor BTS along with diesel generator for electricity generation.

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CONTENTS

SWITCH OFF DIESEL

GREENPEACE

Executive Summary

India is now the second largest of the global telecom markets and is projected to overtake China. The telecom industry has attracted eight per cent of the cumulative foreign direct investment (FDI) over the last two years, with a cumulative flow of FDI worth USD 10.26 billion to the sector between April 2000 and January 2011. Indian telecommunication companies are now set to make a major impression globally. India's telecom equipment manufacturing sector is also emerging as one of the largest in the world.

However, this growth has been, and continues to be, at the cost of the climate. In India, the sector has been continually reliant on diesel, and as a result is responsible for over 6 million tonnes of CO_2 emissions from diesel generated power annually.

Energy is a dominant cost component for telecom companies. Currently, the sector requires fourteen billion units of electricity annually to power its network infrastructure, in order to provide uninterrupted service to its consumers . This is projected to grow to around twenty six billion units of electricity by 2012.

As telecom networks focus on sustaining growth and expansion into new markets and areas, they are increasingly troubled by the inadequacies of the power grids and risks of unexpected outages, sometimes of extended duration. While the current model of diesel-powered networks offers the sector short-term profits, such a model of operation is likely to limit growth and profit generation prospects of the sector in the long term.

The growing appetite for energy, the implications of climate change, our continuing damage to the environment, plus the scarcity and increasing prices of fossil fuels, create the appropriate conditions to develop the sector's use of renewable energy. For telecom operators, the benefits of a more proactive approach to carbon and energy-oriented management will be significant. The market is extremely competitive and open for movers. However, telecom companies are yet to integrate low energy and low carbon considerations across their operations and portfolio to any serious level.

Some of the key aspects this report include:

- The cost and energy savings that the sector and the companies within it could benefit from, by making a shift towards renewable sources to power their network operations.

- A shift in power sourcing to renewable technologies, such as solar photovoltaic, will result in 300 per cent reduction in total costs (CAPEX + OPEX) for telecom operators, in comparison to a diesel generator (DG) based tower over ten years. Over three years, the reduction will be over 120 per cent. Telecom operators and tower companies currently spend around INR 126 billion annually on running diesel generators to power network operations.

- The telecom sector has witnessed staggering growth with gross revenues in excess of USD 35.6 billion and FDIs in the range of USD 2.35 billion in 2008-2009. The potential of rural markets is estimated to be a further USD 10 billion. Yet despite this growth and scope, the sector is yet to disclose its carbon emissions and commit to reduction of emissions in a public and transparent manner on a consistent basis. Major telecom companies within the sector are particularly guilty of this. Similarly, telecom operators have yet to shift the sourcing of their power requirements to renewable sources at scales of significance: less than three per cent of existing network towers currently run on renewable sources.

- The telecom sector in India emitted over 5.6m tonnes of CO_2 in 2008 as a result of diesel[2] use. Emissions have since risen and are likely to increase significantly with the sector's predicted exponential growth over the

[2]The overall emission of telecom network towers (diesel consumption and grid connected electricity in combination) was around 13.6 m tons.

next few years. Considering the absence of proactive movement from within the sector, it is imperative for the government to expedite the process by establishing stringent regulatory frameworks that hold the telecom industry accountable to their carbon emissions.

- Simultaneously, the government subsidy on diesel has been aggressively exploited by the telecom sector, given the absence of dual or differential pricing of the fuel. This has also encouraged inefficient consumption of diesel by the telecom sector. The sector annually consumes around 3 billion litres of diesel to power its network towers. This results in an annual loss of around INR 26 billion to the state exchequer.

The Information and Communication technology (ICT) sector can lead the drive to a sustainable and green economy and play a transformative role in how we produce, deliver and use energy. ICT based solutions can contribute towards the reduction of global GHG emissions by 15% by 2020and in the process also deliver energy savings to the tune of over €600 billion to global business.

Wireless telecom enables remote monitoring through machine-to-machine (M2M) 'smart services' using cellular connections. Of the wide range of possible opportunities for wireless telecom to reduce carbon emissions and energy costs, some of the key areas include virtual alternatives (offices, video conferencing etc), smart grids and energy network monitoring, smart logistics like urban traffic management, e-commerce and mobile banking, tele-medicine and education.

With its immense contribution to India's growth over the last two decades, the telecommunication sector is well placed to transit to a business model that relies on energy efficiency measures, in combination with harnessing clean energy sources for its operations.

Greenpeace is calling on the telecom industry to focus on managing its energy and carbon by substantially shifting its power generation for network operations to renewable sources, and to proactively advocate for economy-wide policies that combat climate change and increase the use of renewable energy.

SWITCH OFF DIESEL
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CHAPTER 01

Overview of Indian Telecommunication sector

Chapter 01

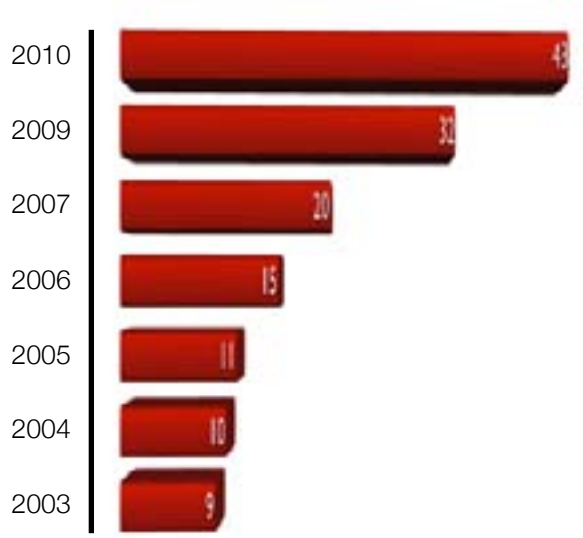
In the last two decades, the Indian telecom sector, and mobile telephony in particular, has caught the imagination of the country. It has revolutionised the way we communicate and share information, and through its staggering growth has helped millions stay connected. The sector has witnessed consistent growth over the last five years due to rollout of new circles by operators, successful auction of the third-generation (3G) and broadband wireless access (BWA) spectrums, network rollout in semi-rural areas and increased focus on the value added services market[2].

Broadly, the sector can be divided into four sub-sets:

1.Network infrastructure companies, such as Alcatel-Lucent, Vihaan Networks Limited (VNL), Nokia – Seimens, Cisco, Ericsson and Huawei Technologies.
2.Telecom service providers, such as Bharti-Airtel, Vodafone, Reliance Communication and Idea Cellular.
3.Equipment manufacturers, such as Nokia, Motorola and Samsung.
4.Infrastructure providers such as Indus Towers, Bharti Infratel, Global Telecom Limited (GTL), and VNL.

Telecom service providers are the major force in the sector, covering utilities such as telephones, radio, television and internet.

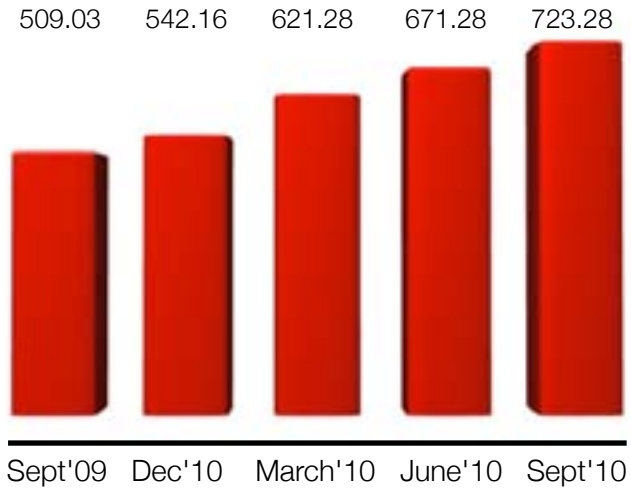
Figure 1.1
Revenue of the Mobile Sector,
Revenue (USD Billions)



Source: Indian Telecom Services Performance Indicator Report - Telecom Regulatory Authority of India www.trai.gov.in

India is now the second largest telecom market globally and is projected to overtake China, with gross revenues exceeding USD 35.6 billion and a compound annual growth rate (CAGR)[3] of forty-five per cent. By 2012, fixed line revenues are expected to touch USD 12.2 billion, while mobile revenues are expected to reach USD 39.8 billion[4]. To put this growth in perspective, the country's cellular base witnessed close to fifty per cent growth in 2008, with an average 9.5 million new customers every month. In India, there are currently eight to ten million new mobile subscriptions added each month.

Figure 1.2
Telecom Subscriber base (millions)
Subscriber base (millions) - Quarter endings



Source: Indian Telecom Services Performance Indicator Report - Telecom Regulatory Authority of India www.trai.gov.in

This would translate into 800 million mobile subscribers, accounting for a tele-density of around fifty-one per cent by 2012. The telecom sector is likely to see tremendous growth in India's rural and semi-urban areas, in particular[5].

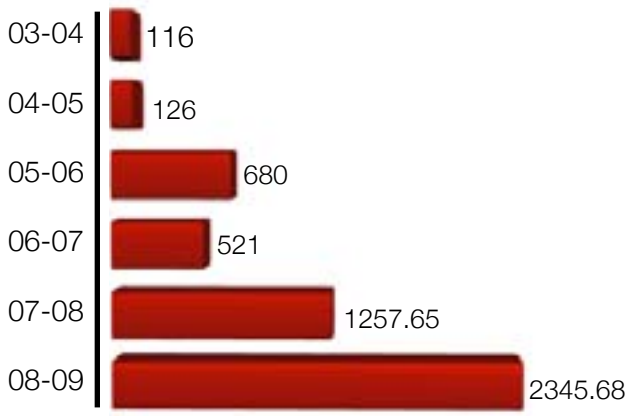
[2]Indian Telecom Services Performance Indicator Report - Telecom Regulatory Authority of India www.trai.gov.in
[3]Refer to http://www.dot.gov.in/osp/Brochure/Brochure.htm
[4]Frost & Sulivan and http://economictimes.indiatimes.com/news/news-by-industry/telecom/indian-telecom-sector-to-grow-to-100-bn-by-2015-bcg/articleshow/7269853.cms
[5]Indian Telecom Services Performance Indicator Report - Telecom Regulatory Authority of India www.trai.gov.in

In just three months (July 2010 to September 2010) the number of telecom subscribers in India grew from 671.69 million to 723.28 million: a growth of 7.68 per cent[6]. Similarly, the number of telephone subscribers grew from 787.28 million in December 2010 to 806.13 million at the end of January 2011: an overall tele-density of 67.67 per cent[7].

Foreign direct investments

The telecom market has been attracting huge amounts of investment, which is likely to accelerate with the entry of new players and launch of new services. The sector has attracted eight per cent of the cumulative foreign direct investment (FDI) over the last two years with a cumulative flow of FDI worth USD 10.26 billion in the sector in India between April 2000 and January 2011[8].

Figure 1.3
Foreign direct investments in the Indian telecom sector, FDI - USD millions



Source: Indian Telecom Services Performance Indicator Report - Telecom Regulatory Authority of India www.trai.gov.in

Simultaneously, Indian telecommunication companies are now set to have a major global impact. India's telecom equipment manufacturing sector is also emerging as one of the largest in the world. Revenues are estimated to grow at a CAGR of 26.6 per cent from 2006 to 2011, touching USD 13.6 billion[9].

Key players

The entry of new players into the telecom industry has made competition intense, in particular over the last four years. The dominant players in the market currently include Bharti-Airtel (20.09 per cent of the Indian market), Reliance Communications (16.70 per cent), Vodafone (16.54 per cent), BSNL (11.41 per cent), Tata Tele Services (11.08 per cent), Idea (10.97 per cent), and Aircel (6.76 per cent[10]) (Refer to Annexure 3). As can be seen from these figures, the crowded market place has led to a fragmented industry, and the pressure on margins is now causing some of the key operators to spread risk by entering new rural and semi-urban areas.

[6]Indian Telecom Services Performance Indicator Report - Telecom Regulatory Authority of India www.trai.gov.in
[7]Indian Telecom Services Performance Indicator Report - Telecom Regulatory Authority of India www.trai.gov.in
[8]Department of Industrial Policy and Promotion (DIPP) and refer to http://www.dot.gov.in/osp/Brochure/Brochure.htm
[9]Market Trends – Global Telecommunications Market, Gartner, July 2010
[10]Refer to Annexure 3

CHAPTER 02

Image: Grid connected mobile tower, two-third of mobile towers in India are grid connected. Almost all mobile towers even those grid- connected, use diesel generators for back-up power due to inconsistent power availability.

Overview of energy management and challenges

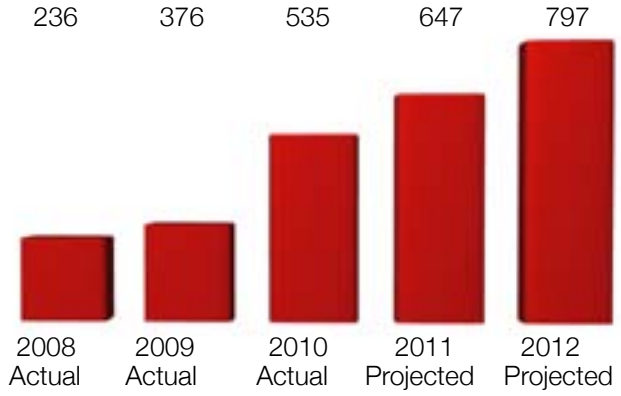
Chapter 02

Energy is a dominant cost component for telecom companies. Maintaining the growth of the sector requires increased access to energy, as does the expansion of the network required to support value-added services, as does the key business of further penetration of tele-density in the rural segment.

Telecom service providers are now eyeing the largely untapped rural mobile market. Industry estimates indicate the size of this rural market to be INR 400 billion (USD 9 billion)[11]. To support this growth, over 300,000 new base transceiver station (BTS) sites will be required to roll out in three to five years, thereby doubling the existing numbers[12].

Currently, the sector requires fourteen billion units of electricity annually to power its network infrastructure, in order to provide uninterrupted service to its consumers[13]. This is projected to grow to over twenty six billion units of electricity by 2012.

Figure 2.1
Existing and projected rollout of Base Transceiver Stations, BTS roll out in thousands



Source : B & K 2009, IDFC 2009, Industry discussions, KPMG analysis

The gap between the demand of customers connected to the grid and the available electricity supply reported by the Central Electricity Authority for 2009–2010 was almost 84 TWh, which is 10% of the total requirement. The peak demand deficit was more than 15 GW, corresponding to a shortage of 12.7% . As with other industrial, commercial, and residential consumers, this demand-supply gap poses a significant challenge for the continued operation of telecom towers, especially those located in rural and semi-urban areas.

Of around 400,000 mobile towers in India, a majority of them are located in rural and semi-urban areas where either grid-connected electricity is not available or the electricity supply is irregular[14]. Further, close to 25% of these are located in areas with no grid connectivity. The cost of establishing a network tower is approximately INR 3 million, assuming the infrastructure to derive power from the grid exists. In its absence, the service or infrastructure provider is required to bear the costs[15].

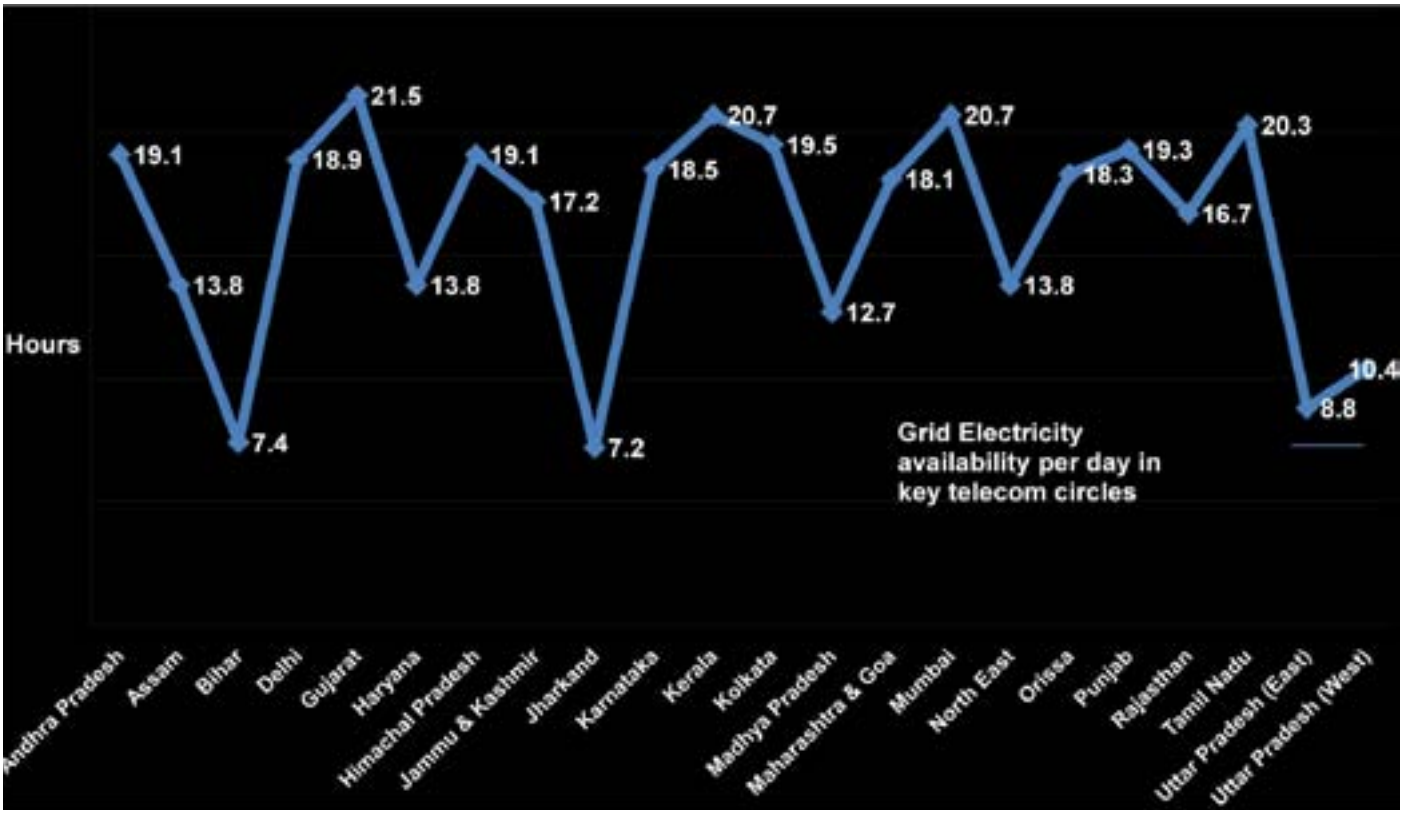
As can be seen from figure 2.2 electricity available over a day ranges from about 7 to 21 hours across the major telecom circles in India. As telecom networks expand into these markets they are increasingly troubled by the inadequacies of the power grids and risks of unexpected outages, sometimes of extended duration.

Additionally, back-up power sources could be required to handle the entire load of BTS, including air conditioning and inevitable power losses. Typically, BTS sites are backed by a 15-25 kVA or 40 kVA diesel generators. Most sites are located in grid deficit areas that need diesel generators to run, for up to twenty hours per day. According to industry estimates, one third of the operational expense of BTS in India is the fuel cost to run the power back-up equipment.

As a result, mobile towers in these areas heavily rely on Diesel Generator (DG) sets to power their network operations. Energy expenses constitute around one third of total OPEX costs for telecom towers.
(Please refer to fig 2.3)

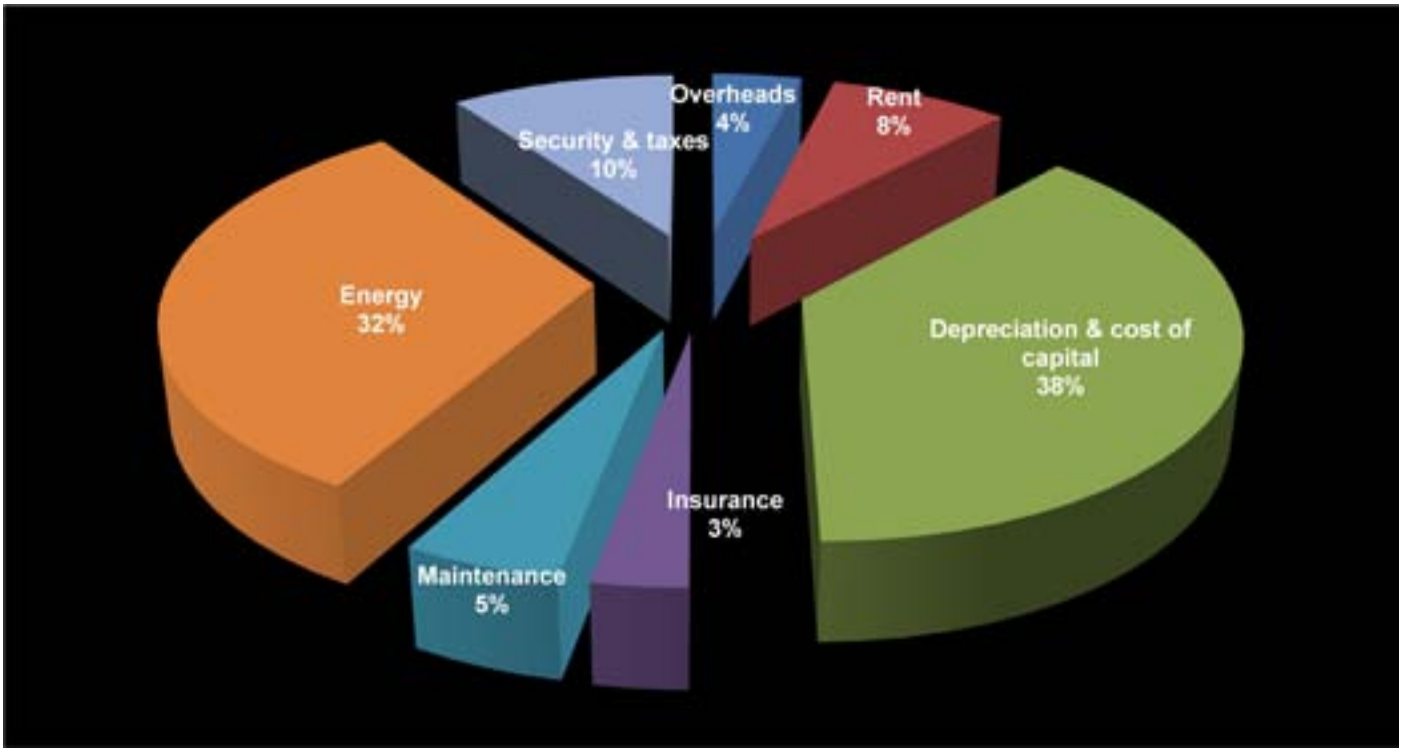
[11]CMAI – Role of Renewable Energy in Telecom
[12]CMAI – Role of Renewable Energy in Telecom
[13]http://www.gtllimited.com/pdf\corporate_forum\GTL-Sharat_Chandra-Telecom_Energy_Management_v2.0.pdf
[14]http://www.communicationstoday.co.in/oct2007/telecom-towers-a-combination-of-passive-and-active-infrastructuresharing-seems-to-be-the-way-to-go-2637-41.htm
[15]Telecom Regulatory Authority of India – Green Telecom Paper

Figure 2.2
Grid connected electricity available across major telecom circles over a day



Source : Central Electricity Authority, Ministry of Power, Government of India

Figure 2.3
Existing and projected rollout of Base Transceiver Stations, BTS roll out in thousands



Source : WCS Opinions - The Green Telecom Story

Given the power deficit, almost sixty per cent of the power requirement of telecom towers is met by diesel-generated electricity[16]. Each tower currently consumes an average of 4,000 litres of diesel every year, implying an annual consumption of about 1.8 billion litres of diesel every year[17]. The telecom operator spends INR 3 billion (USD 67.42 million) every month towards running diesel generators in remote locations where grid base power is limited[18]. This translates to an operational energy expense of around INR 65 billion annually to operate network towers, especially in off-grid locations. Due to this high dependence on diesel, the operational costs of the sites increase drastically to around 200 per cent more than those where grid power availability is regular[19].

The key challenges facing the sector include:

- The lack of availability of grid power and high energy-related OPEX, due to running diesel generators for long hours and the higher costs of diesel fuel. The quality of power in rural areas is very poor, usually limited to a few hours of electricity provision a day or none at all. However, market competition requires operators to run BTS efficiently, so forcing local power generation based on diesel. This dependency on diesel significantly increases in rural areas as grid availability decreases. In rural areas, diesel generator sets often operate between twelve to sixteen hours every day. The inaccessibility of many of these areas further raises OPEX costs through the transportation of diesel, and pilferage accounts for fifteen to twenty per cent[20] of energy cost per tower.

- Difficulties in measuring actual power consumption

- Indoor BTS requires cooling that consumes fifty per cent of power to the telecom tower

- Most direct and indirect sources of power emit carbon dioxide

[16]Telecom Regulatory Authority of India – Green Telecom Paper
[17]'GIL Annual Report 2010', GIL Company Website, March 2010
[18]MAZAR & CMAI - "Role of Renewable Energy in Telecom"
[19]Telecom Regulatory Authority of India - final paper on Green Telecom inputs, COAI, 2011
[20]Industry estimates suggest that a leading operator company loses around INR 5 billion per annum as a result of pilferage of diesel.

Image: Roof top mobile tower in urban area, commonly found and powered by diesel generator.

CHAPTER 03

Overview of carbon emissions

Chapter 03

In 2008, the Climate Group and the Global e-Sustainability Initiative (GeSI) issued SMART 2020: enabling the low carbon economy in the information age[21]. The study highlighted the significant and rapidly growing footprint of the information and communication technology (ICT) industry. With more and more subscribers being added to the telecommunication networks, energy consumption and the contribution of the telecom sector to global greenhouse gas emissions is increasing.

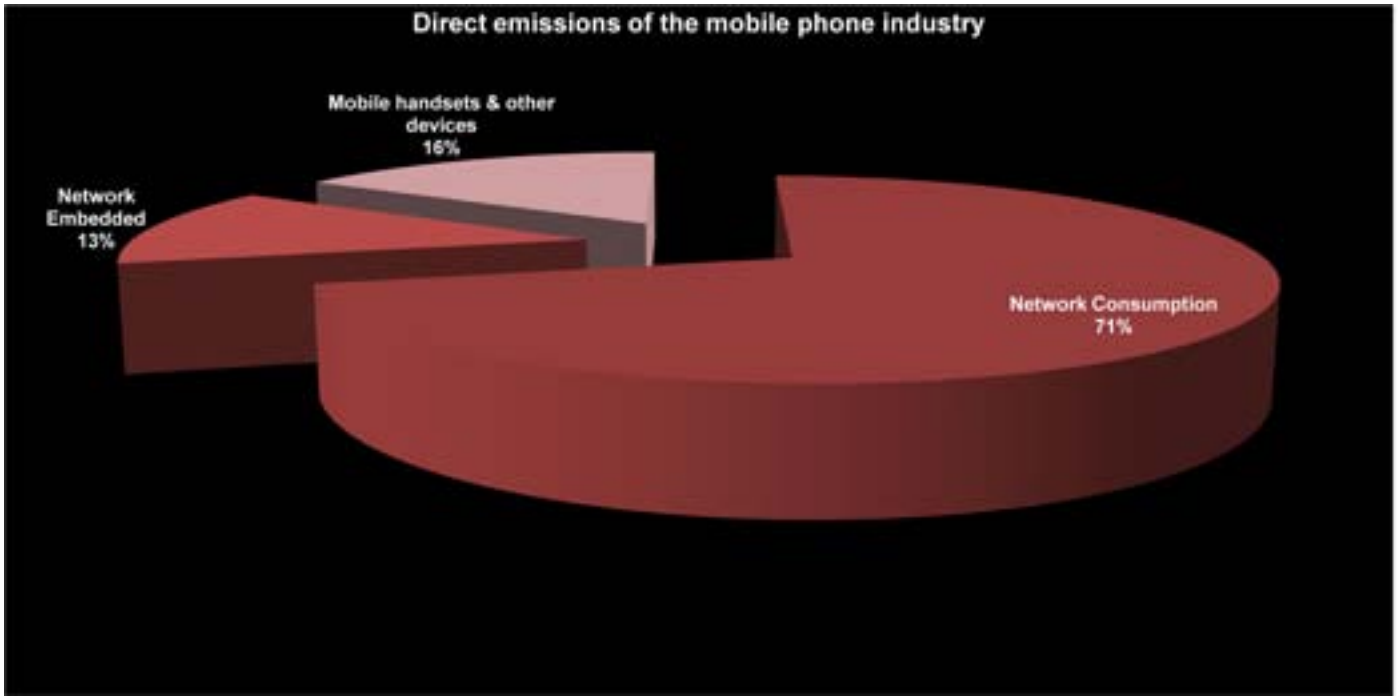
Figure 3.1
How big is the carbon footprint of the Information and Communication Technology sector

	Emissions 2007 (MtCO2e)	Percentage 2007	Emissions 2020 (MtCO2e)	Percentage 2020
World	830	100%	1430	100%
Server farms / Data centres	116	14%	257	18%
Telecoms infrastructure and devices	307	37%	358	25%
PCs and peripherals	407	49%	815	57%

Source : Make IT Green – Cloud Computing and its contribution to climate change; Greenpeace International

[21]Climate Group and the Global e-Sustainability Initiative (GeSI)(2008). SMART 2020: enabling the low carbon economy in the information age. Available at http://www.smart2020.org/_assets/files/03_Smart2020Report_lo_res.pdf

Figure 3.2
Direct emissions of the mobile phone industry



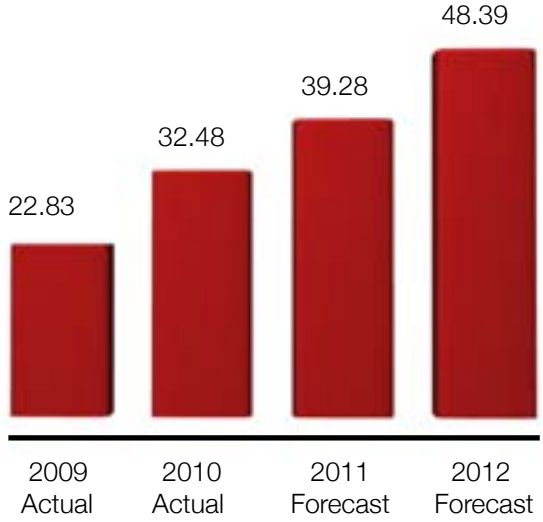
Source : GSMA, Green Manifesto for Mobile Industry

The ICT industry alone accounts for two percent, or 860 million tonnes, of the world's greenhouse gas emissions. Within that, the telecommunication network and devices contribute about 0.7 per cent of global emissions[22]. The forecasted electricity consumption of the telecom sector is estimated to be 951.72 billion kWh, and that of the total ICT sector at 1,963.74 billion kWh, by 2020[23].

The telecom sector in India is expected to continue on its growth trajectory. This growth, however, has been and continues to be at the cost of the climate, powered by an unsustainable and inefficient model of energy generation and use. With such growth also comes an increasing demand for energy, at a time when climate change and reducing emissions from energy use is of paramount concern.

Many rural and semi-rural areas have deficient power supply. Estimates indicate that about forty per cent of the power requirement of these towers is met by grid electricity and sixty per cent by diesel generators.

Figure 3.3
Emissions of base transceiver stations



Note: Emissions calculated on the basis of BTS rollout as per Telecom Regulatory Authority of India (TRAI) projections.

[22]Climate Group and the Global e-Sustainability Initiative (GeSI)(2008). SMART 2020: enabling the low carbon economy in the information age. Available at http://www.smart2020.org/_assets/files/03_Smart2020Report_lo_res.pdf
[23] Greenpeace International - Make IT Green – cloud computing and its contribution to climate change

Policy initiatives

As part of the National Action Plan on Climate Change (NAPCC), the solar photovoltaic programme of the Jawaharlal Nehru National Solar Mission (JNNSM) provides support for the installation of stand-alone solar photovoltaic (SPV) power plants with capacities ranging from 1-10 kWp installed capacity without distribution networks, and above 10 kWp installed capacity with distribution networks. In addition, rooftop solar photovoltaic systems from 10 kWp to 100 kWp installed generating capacity is given central financial assistance. Funds available are applicable for 13.5 mWp for decentralised SPV and 4.25 mWp for rooftop SPV systems over the period from 2009 to 2012.

As part of the first phase of the JNNSM, developers could be asked by the NTPC Vidyut Vyapar Nigam Ltd (NVVN) to share costs on tariffs determined by the Central Electricity Regulatory Commission, to distribute the risks between NVVN and the developer[24].The project developer that offers the maximum sharing of costs is selected.

Simultaneously, the government has introduced a range of subsidies for the developers harnessing power through renewable sources across multiple technologies. In addition to introducing defined policies for wind generation at the central and state levels (in particular Maharashtra, Tamil Nadu, Madhya Pradesh, Karnataka and Gujarat), other incentives introduced include: 100 per cent accelerated depreciation for tax purposes in the first year of installation of projects and systems if the project is commissioned before 30th September of the financial year, or 40% if the project is commissioned before 31 March of the financial year. Companies have the option to choose AD and GBI; low import tariffs for capital equipment, materials and components; and competitive prices under alternate power purchase policies by state governments, for power generated through renewable sources and fed to the grid.

However, these incentives are yet to align and match the expectations of the telecom business. Industry sources clearly indicate the need for modifications, including a change from the basis of selection being the highest discounts offered on prices, as this leads to undercutting and makes projects unviable.

As part of delivery of the first phase of the solar mission, the Ministry of New and Renewable Energy has made provisions to support telecom operators and tower companies in their shift to renewable sources to power network towers. However, this support is restricted to an insignificant allocation of just 100 network towers per company. In a market space with currently around 400,000 operational towers and another 150,000 anticipated in the near future, this provision does not offer the companies any significant support.

In the case of SPV technology, under the above scheme, all deployment should also use modules and cells manufactured in India. More flexibility is required for the scheme to be relevant and drive change for the telecom sector, more flexibility is required, as the current supply of modules and cells manufactured in India will not be able to cater to all the needs. The scheme should allow for modules and cells to be procured from other sources and countries with proven technologies.

Indirect subsidies to the telecom sector – loss to the exchequer

Oil prices are increasing. While fluctuations may result in a momentary drop in prices, in the mid-term and long term the price of this finite fuel is set to go only in one direction – up. Already, at around $90 per barrel now, crude oil is expected to sell once again in the triple digits. As a distillate of oil, the price of diesel will also rise.

Figure 3.4
Price per barrel of oil

Year	Price (USD/ barrel)	Projected imports to India (barrel)	Projected Costs on imports (USD/barrel)
2010	95	896	80,640
2020	110	1526	167,860
2030	120	2625	315,000
2040	130	4228	549,640
2050	140	6755	945,700

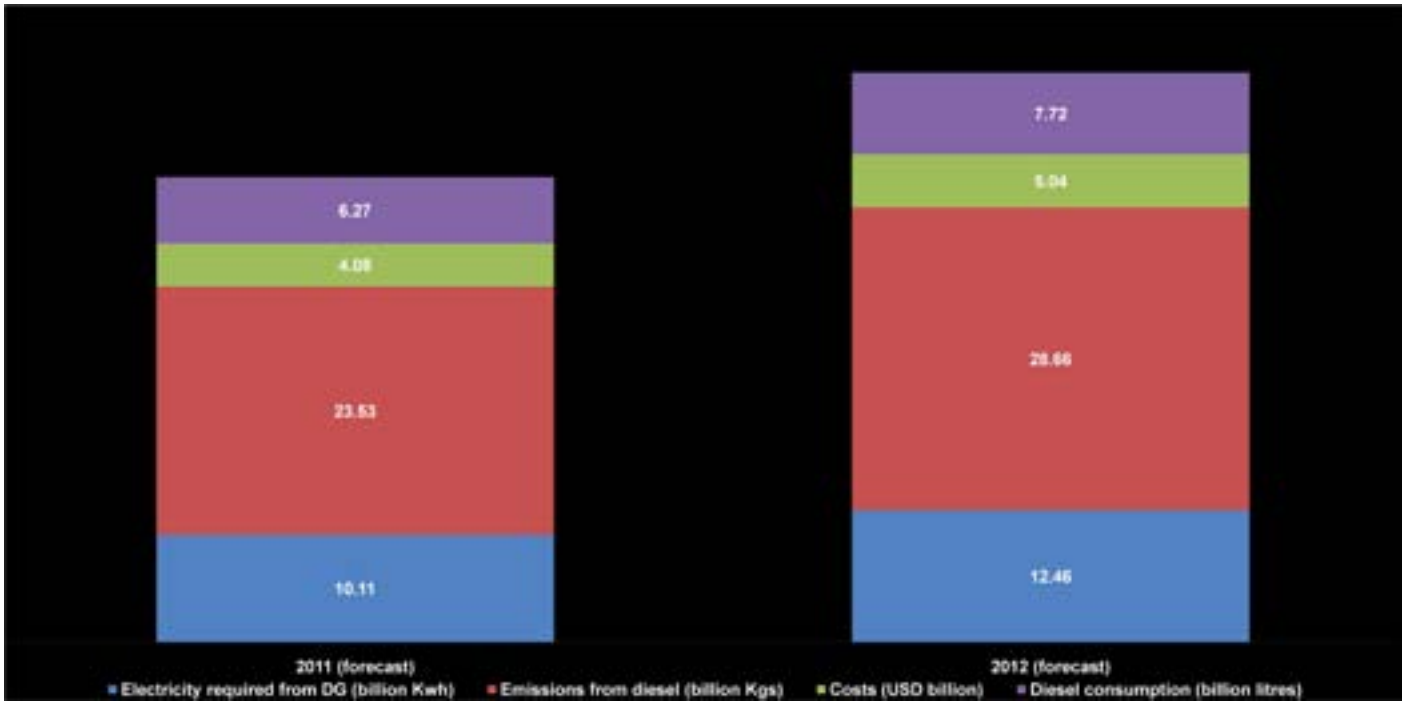
Source: Greenpeace - Energy [R]evolution www.energyblueprint.info; Reliance Industries Future of Energy Options for India in an interdependent world, http://www.worldenergy.org/documents/p001145.pdf

While the prices of most goods and services in India are market determined, administered pricing exists in certain sensitive sectors, including diesel. Diesel subsidies artificially reduce the cost of the fuel by around twenty-one per cent, allowing it to be sold at a lower price primarily for the transportation of essential goods, public transport and agriculture. This is partly because an increase in transportation costs would directly lead to an increase in the prices of most food items, which would, in turn, hurt the vulnerable sections of the population.

[24] NVVN is the designated nodal agency for entering into power purchase agreements with solar power developers to purchase solar power fed to 33 kV and above grids.

However, the subsidy on diesel has been aggressively exploited by the telecom sector, given the absence of dual or differential pricing of the fuel. This has also encouraged inefficient consumption withinin the telecom sector. According to the Ministry of New and Renewable Energy, the consumption of diesel by the telecom industry was 2 billion litres from 2007 to 2008. This figure increased to over 3 billion litres per annum by 2010.

Figure 3.5
Emissions of base transceiver stations



Note: Emissions calculated on the basis of BTS rollout as per Telecom Regulatory Authority of India (TRAI) projections.

The consumption of diesel by the telecom sector, at current rates, results in an annual loss of around INR 26 billion to the state. Considering year-on-year projections, on the basis of existing models of power generation for network towers, this is likely to increase significantly in the future.

If the current subsidy on diesel used by the telecom sector were removed, its annual expenditure to power its network towers would increase to INR 150 billion. Interestingly, this would be equivalent to the CAPEX required over the next 10 years at current electricity demand to solarise around 500,000 network towers.

There is no longer any option but to act. The government clearly must remove the existing fiscal distortion in price and policy as far as the telecom sector is concerned. Without a correction on its use of diesel, the government's fiscal management programme will be adversely affected.

The options before the government in this regard should be to mandate a rapid phase-out of diesel use in network towers by 2015, and consider introducing a taxation scheme to fast-track such a phase-out.

Simultaneously, the government should consider provisions to provide incentives to ensure that atleast fifty per cent of urban and hundred per cent of network towers in rural and semi-urban areas use renewable sources of energy for their operations.

Regulatory frameworks

For telecom operators, the business case for sustainability is a robust one. In addition to the lowering of costs and improved brand reputation, operators can look forward to a greater share of the growing market of businesses and consumers that demand higher environmental standards of their suppliers.

At the moment, there is no established regulatory framework relating to carbon emissions and efficiency standards for telecom operators in India to comply with. The Telecom Regulatory Authority of India (TRAI) has recently released its recommendations for an approach towards green telecommunications. This publication attempts to address carbon emissions in three areas: network operations, manufacturing of telecom equipment and disposal of telecom waste[25].

[25] Telecom Regulatory Authority of India - http://www.trai.gov.in/WriteReadData/trai/upload/ConsultationPapers/244/contdradiv3feb11.pdf

While the recommendations provide clarity in identifying critical issues, they clearly fall short in effectively addressing the issue of emissions from the telecom sector's operations in India, or in setting targets that are ambitious but feasible. Moreover, there is no plan currently in place to institute such regulations. In the continued absence of any regulation, it is unlikely that many telecom operators will take any significant action towards the reduction of emissions of their network operations.

Information on the initiatives taken by the telecom sector in general to reduce their carbon emissions and shift to renewably powered network towers is not also publicly available. Operators within the sector are particularly guilty of this.

Cost reduction is, however, beginning to emerge as a key influence, driving operators to reduce their energy use. Whilst regulation is certainly a driver for change, it is still at an embryonic stage in India. In the absence of a well-developed regulatory framework, issues relating to public disclosure of carbon emissions and the sourcing of renewable energy clearly lack transparency, given that a majority of the telecom operators abjectly fail to share this in a public and transparent manner on a consistent basis.

Assessment of top telecom brands' position on climate and energy

Fact File: Bharti Airtel

Company	Bharti Airtel
Market Share	20.09%[26]
Position on mandatory GHG emissions	No visible support as per information available on website[27]. No reference specific to the UNFCCC process.
Disclosure of carbon emissions (GHG emissions) through company's operation	Company associated with The Carbon Disclosure Project (CDP). No reference in annual report[28]. As per the CDP, the company disclosed its figures in 2007 Since 2008, the company has not responded to CDP queries on emission disclosure[29].
Commitment to reduce GHG emissions from company's own operations, on specific timelines	No specific targets. However, refers to a host of initiatives as part of Think Green program towards reduction of carbon emissions, including green shelter and passive infrastructure sharing[30].
Renewable energy used in company's operations	Bharti Infratel (a wholly owned subsidiary) has committed to achieve a target of solarising 2000 mobile towers by 2010. However, specific information on progress and achievements is not publicly available[31].
Lobby / advocacy in favour of renewable energy	No specific information is publicly available. The company did not provide its response to TRAI's green telecom consultation process[32].

[26]Telecom Regulatory Authority of India – as on February 28th, 2011
[27]Refer to http://www.airtel.in/annual-report/annualreport.html (last accessed on May 3rd 2011)
[28]Refer to the Company's Annual report http://www.airtel.in/annual-report/annualreport.html (last accessed on May 3rd 2011)
[29]Refer to https://www.cdproject.net/en-US/Pages/CDPAdvancedSearchResults.aspx?k=airtel (last accessed on May 3rd 2011)
[30]Refer to https://www.cdproject.net/en-US/Pages/CDPAdvancedSearchResults.aspx?k=airtel (last accessed on May 3rd 2011)
[31]Refer to http://www.bharti-infratel.com/cps-portal/web/gogreen.html (last accessed on May 3rd 2011)
[32]Refer to http://www.trai.gov.in/ConsultationPapers_content.asp

Fact File : Reliance Communication

Company	Reliance Communication
Market Share	16.70%[33]
Position on mandatory GHG emissions	No reference to specific to UNFCCC process and mandatory emission reductions in policy[34]. However, in its submission to TRAI's Green Telecom Consultation, company has supported the need for binding long-term targets for global emission reduction. Has highlighted the need for legally binding agreements to enable carbon credit policies to apply and work for the sector[35].
Disclosure of carbon emissions (GHG emissions) through company's operation	No information available on website[36]. In its submission to TRAI's Green Telecom Consultation, company has accepted the need for estimation of carbon emissions by the Indian telecom industry. Fails to provide any information on own energy consumption or emissions.
Commitment to reduce GHG emissions from company's own operations, on specific timelines	No information on website[37]. In its submission to TRAI's Green Telecom Consultation, company has indicated support of the need to increase adoption of renewable energy. However, it has not specified a target[38].
Renewable energy used in company's operations	No information on website[39]. In its submission to TRAI's Green Telecom Consultation, company mentions various steps being taken towards utilising renewable sources of energy. However, it does provide any details or specify the steps undertaken or ongoing.Highlights and argues in favour of solar energy, for the operation of mobile towers, mentioning potential reductions in OPEX by 50-60%[40].
Lobby / advocacy in favour of renewable energy	No Information on website[41]. In its submission to TRAI, company supports the need for the accelerated and significant use of renewable energy in the Indian telecom industry, while calling for government support on capital expenditure subsidy and waiver of customs and excise duties for installation[42].

[33]Telecom Regulatory Authority of India – as on February 28th, 2011
[34]Refer to http://www.rcom.co.in/Rcom/personal/home/index.html (last accessed on May 3rd 2011)
[35]Refer to http://www.trai.gov.in/WriteReadData/trai/upload/ConsultationPapers/248/Reliance_N.pdf (last accessed on May 3rd 2011)
[36]Refer to http://www.rcom.co.in/Rcom/personal/home/index.html (last accessed on May 3rd 2011)
[37]Refer to http://www.rcom.co.in/Rcom/personal/home/index.html (last accessed on May 3rd 2011)
[38]Refer to http://www.trai.gov.in/WriteReadData/trai/upload/ConsultationPapers/248/Reliance_N.pdf (last accessed on May 3rd 2011)
[39]Refer to http://www.rcom.co.in/Rcom/personal/home/index.html (last accessed on May 3rd 2011)
[40]Refer to http://www.trai.gov.in/WriteReadData/trai/upload/ConsultationPapers/248/Reliance_N.pdf (last accessed on May 3rd 2011)
[41]Refer to http://www.rcom.co.in/Rcom/personal/home/index.html (last accessed on May 3rd 2011)
[42]Refer to http://www.trai.gov.in/WriteReadData/trai/upload/ConsultationPapers/248/Reliance_N.pdf (last accessed on May 3rd 2011)

Fact File: Vodafone Essar

Company	Vodafone - Essar
Market Share	16.54%[43]
Position on mandatory GHG emissions	Globally, have highlighted the failure of the UNFCCC COP 15 summit at Copenhagen and committed to push for a legally binding agreement on emissions by engaging in various forums[44]. However, there is no information available on company's Indian website[45].
Disclosure of carbon emissions (GHG emissions) through company's operation	Company's sustainability report discloses carbon emission for India as 2.28 million tons (excluding emissions from air travel), of which 2.2 tons originate from mobile towers[46]. This information is not available on the Indian website[47].
Commitment to reduce GHG emissions from company's own operations, on specific timelines	The Vodafone Group has set a reduction target for carbon emissions of 50% by 2020, with 2006/07 as the base year. For emerging markets, including India, it proposes to establish emission intensity reduction targets[48]. However, there are as yet no emission reduction targets even on the basis of emission intensity reductions set for its operations in India.
Renewable energy used in company's operations	The Vodafone group draws 23% of its global operational energy from renewable sources through various means of direct installation, renewable tariffs and grid-mix. No separate information on renewable energy use in India[49] is provided.
Lobby / advocacy in favour of renewable energy	The group is supportive of and lobbying for the deployment of low-carbon technologies and legally binding commitments for global emission reductions at various international forums. No specific lobby initiative has been mentioned in the Indian context[50].

[43]Refer to Telecom Regulatory Authority of India – as on February 28th, 2011
[44]Refer to http://www.vodafone.com/content/dam/vodafone/about/sustainability/reports/vodafone_sustainability_report.pdf (last accessed on May 3rd 2011)
[45]Refer to http://www.vodafone.in/pages/index.aspx (last accessed on May 3rd 2011)
[46]Refer to http://www.vodafone.com/content/dam/vodafone/about/sustainability/reports/vodafone_sustainability_report.pdf (last accessed on May 3rd 2011)
[47]Refer to http://www.vodafone.in/pages/index.aspx (last accessed on May 3rd 2011)
[48]Refer to http://www.vodafone.com/content/dam/vodafone/about/sustainability/reports/vodafone_sustainability_report.pdf (last accessed on May 3rd 2011)
[49]Refer to http://www.vodafone.com/content/dam/vodafone/about/sustainability/reports/vodafone_sustainability_report.pdf (last accessed on May 3rd 2011)
[50]Refer to http://www.vodafone.com/content/dam/vodafone/about/sustainability/reports/vodafone_sustainability_report.pdf (last accessed on May 3rd 2011)

Fact File : BSNL

Company	Bharat Sanchar Nigam Limited (BSNL)
Market Share	11.41%[51]
Position on mandatory GHG emissions	No information available on company's position on mandatory reduction of emissions[52].
Disclosure of carbon emissions (GHG emissions) through company's operation	No information about carbon emissions. available on website. In its submission to TRAI on the Green Telecom Consultation, company accepts that all telecom operators should account their energy and emission figures, yet makes no specific reference to its own emissions from mobile towers[53].
Commitment to reduce GHG emissions from company's own operations, on specific timelines	No information available on website[54]. Company has not commented on this aspect in its submission to TRAI's green consultation[55].
Renewable energy used in company's operations	No information available on website[56]. Supportive of the argument that that solar energy is the ideal renewable source for reducing emissions and to help reduce OPEX by 30% in mobile towers. However, fails to provide any specific figure on the use of renewable energy in its operations[57].
Lobby / advocacy in favour of renewable energy	Company calls for an increasing number of telecom towers to be subsidised on solar energy under the Jawaharlal Nehru National Solar Mission[58].

[51]Telecom Regulatory Authority of India – as on February 28th, 2011
[52]Refer to http://www.bsnl.co.in/ (last accessed on May 3rd 2011)
[53]Refer to http://www.trai.gov.in/WriteReadData/trai/upload/ConsultationPapers/248/BSNL.pdf (last accessed on May 3rd 2011)
[54]Refer to http://www.bsnl.co.in/ (last accessed on May 3rd 2011)
[55]Refer to http://www.trai.gov.in/WriteReadData/trai/upload/ConsultationPapers/248/BSNL.pdf (last accessed on May 3rd 2011)
[56]Refer to http://www.bsnl.co.in/ (last accessed on May 3rd 2011)
[57]Refer to http://www.trai.gov.in/WriteReadData/trai/upload/ConsultationPapers/248/BSNL.pdf (last accessed on May 3rd 2011)
[58]Refer to http://www.trai.gov.in/WriteReadData/trai/upload/ConsultationPapers/248/BSNL.pdf (last accessed on May 3rd 2011)

Fact File: Tata Teleservices

Company	Tata Teleservices Ltd (TTSL)
Market Share	11.08%[59]
Position on mandatory GHG emissions	Aligns to the Tata Group's position on climate change and advocates the need for global emission reduction[60].
Disclosure of carbon emissions (GHG emissions) through company's operation	While there is no clear information available on the website, in its submission to the TRAI Green Telecom Consultation the company provides annual carbon emission figures from its mobile network[61]. However, there is no evidence of this figure being externally verified.
Commitment to reduce GHG emissions from company's own operations, on specific timelines	No specific information related to emission reduction targets, either on website or in company's submission to TRAI's Green Telecom Consultation[62].
Renewable energy used in company's operations	No information available on website[63]. As per its submission to TRAI's Green Telecom Consultation, company has deployed 31 cell sites that are powered by solar power and fuel cells[64]. Plans to undertake multiple pilot projects on fuel cells based on LPG, hydrogen and hydrogen recombination technology, thus endeavouring to obtain clean power without the combustion of fossil fuels.
Lobby / advocacy in favour of renewable energy	Company believes that direct emission reductions of Indian telecom companies can only happen if there is a direct tax incentive and capital subsidy provided by governmentfor installing capacity based on renewable energy.It asks TRAI to formulate carbon credit policy for the installation of renewable energyby telecom companies in India[65].

[59]Telecom Regulatory Authority of India – as on February 28th, 2011
[60]Refer to http://www.tatateleservices.com/t-aboutus-corporate-sustainability.aspx (last accessed on May 3rd 2011)
[61]For FY 2010-11, the total carbon emission of TTSL from its mobile networks is 617,172 million tons. Refer to http://www.trai.gov.in/WriteReadData/trai/upload/ConsultationPapers/248/TTSL.pdf (last accessed on May 3rd 2011)
[62]Refer to http://www.tatateleservices.com/t-aboutus-corporate-sustainability.aspx and http://www.trai.gov.in/WriteReadData/trai/upload/ConsultationPapers/248/TTSL.pdf (last accessed on May 3rd 2011)
[63]Refer to http://www.tatateleservices.com/t-aboutus-corporate-sustainability.aspx (last accessed on May 3rd 2011)
[64]Refer to http://www.trai.gov.in/WriteReadData/trai/upload/ConsultationPapers/248/TTSL.pdf (last accessed on May 3rd 2011)
[65]Refer to http://www.trai.gov.in/WriteReadData/trai/upload/ConsultationPapers/248/TTSL.pdf (last accessed on May 3rd 2011)

Fact File : Idea Cellular

Company	Idea Cellular
Market Share	10.97%[66]
Position on mandatory GHG emissions	No reference to climate change or emissions in annual report or on website[67].
Disclosure of carbon emissions (GHG emissions) through company's operation	No disclosure of carbon emissions[68].
Commitment to reduce GHG emissions from company's own operations, on specific timelines	As published in the annual report, the chairman's speech refers to energy conservation through (i) solar-DG hybrid solutions; and (ii) hydrogen fuel cell solutions[69].
Renewable energy used in company's operations	While the reference to energy conservation and the utilisation of solar-DG hybrids in some mobile towers is made in the chairman's speech, there are no further specific details available[70]. In its submission to TRAIs green consultation, company takes the position that renewable energy has the potential to reduce OPEX by 20-30% in mobile towers[71].
Lobby / advocacy in favour of renewable energy	In its submission to TRAI green consultation, company has suggested a framework for carbon credit for Indian telecom industry in line with EU's emission trading system. It has also suggested fiscal incentive and tax exemption for renewable energy generation and its installation in mobile towers[72].

[66]Telecom Regulatory Authority of India – as on February 28th, 2011
[67]Refer to http://www.ideacellular.com/wps/wcm/connect/ce52db004464cb9c8775b76d9d64bafa/Annual_Report_2009_10_1.pdf?MOD=AJPERES&CACHEID=ce52db004464cb9c8775b76d9d64bafa (last accessed on May 3rd 2011)
[68] http://www.ideacellular.com/wps/portal (last accessed on May 3rd 2011)
[69]Refer to http://www.ideacellular.com/wps/wcm/connect/ce52db004464cb9c8775b76d9d64bafa/Annual_Report_2009_10_1.pdf?MOD=AJPERES&CACHEID=ce52db004464cb9c8775b76d9d64bafa (last accessed on May 3rd 2011)
[70]Refer to http://www.ideacellular.com/wps/wcm/connect/ce52db004464cb9c8775b76d9d64bafa/Annual_Report_2009_10_1.pdf?MOD=AJPERES&CACHEID=ce52db004464cb9c8775b76d9d64bafa (last accessed on May 3rd 2011)
[71]Refer to http://www.trai.gov.in/WriteReadData/trai/upload/ConsultationPapers/248/Idea.pdf (last accessed on May 3rd 2011)
[72]Refer to http://www.trai.gov.in/WriteReadData/trai/upload/ConsultationPapers/248/Idea.pdf (last accessed on May 3rd 2011)

Fact File: Aircel

Company	Aircel
Market Share	6.76%[73]
Position on mandatory GHG emissions	No reference made and no information available on website or any public domain[74].
Disclosure of carbon emissions (GHG emissions) through company's operation	No information available on website or any public domain[75].
Commitment to reduce GHG emissions from company's own operations, on specific timelines	No information available on website or any public domain
Renewable energy used in company's operations	No information available on website or any public domain
Lobby / advocacy in favour of renewable energy	No information available on website or any public domain

[73]Telecom Regulatory Authority of India – as of February 28th, 2011
[74]Refer to http://www.aircel.com/AircelWar/appmanager/aircel/delhi?_nfpb=true&_pageLabel=books_Home_book (last accessed on May 3rd 2011)
[75]Refer to http://www.aircel.com/AircelWar/appmanager/aircel/delhi?_nfpb=true&_pageLabel=books_Home_book (last accessed on May 3rd 2011)

CHAPTER 04

Image: Mobile tower powered by solar photo-voltaic cells. This mobile tower is run by Vihaan Network Limited (VNL). Solar energy is economically feasible and technologically viable clean option for energy need of mobile tower.

Economic case for the shift to renewables

Chapter 04

The growth of the telecom sector continues at the cost of the climate. Simultaneously, this growth has also come at significant and growing loss to the state exchequer, raising fundamental questions on its long-term robustness and profitability[76].

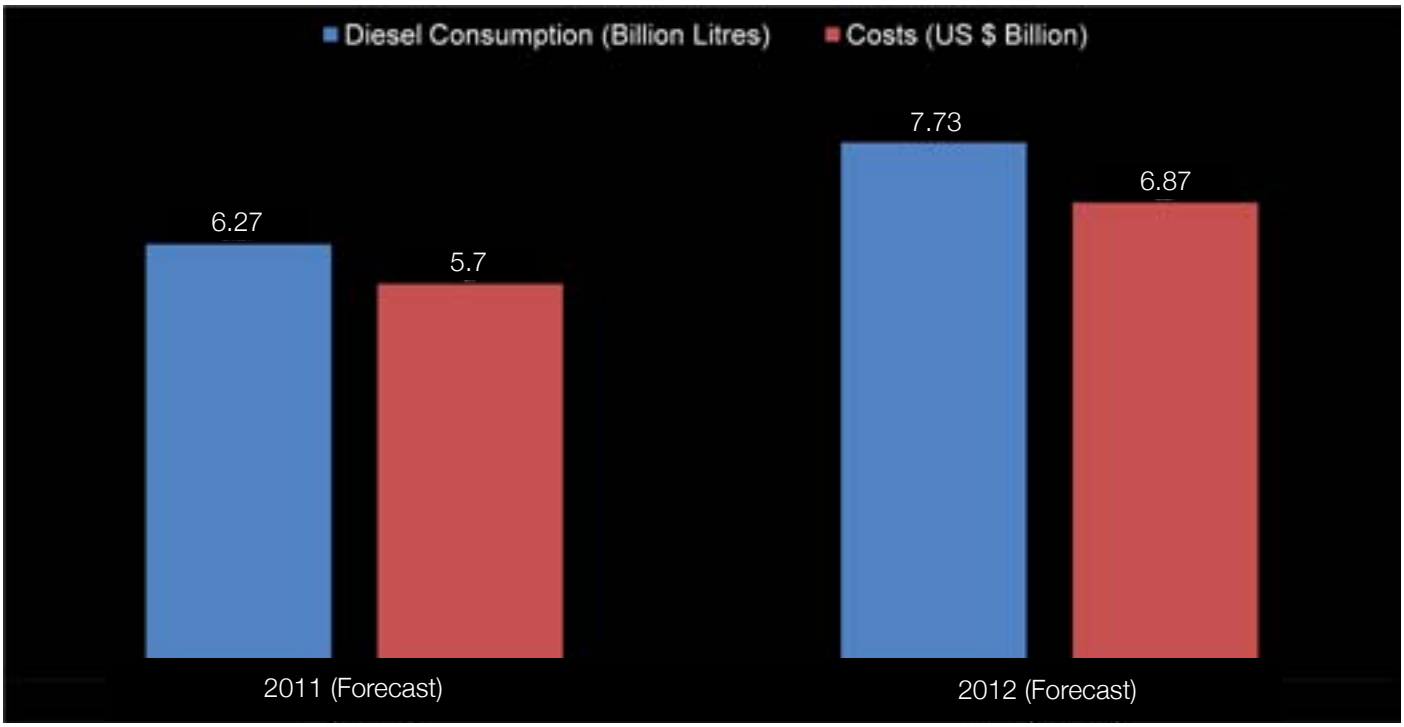
Two aspects assume critical importance for the sector:

• Managing energy
Costs can be saved by powering network operations through renewable sources, combined with optimal energy efficiency measures and standards.

• Managing carbon
The sector's continued reliance on diesel for its energy needs results in higher emissions, representing a serious liability in terms of carbon and climate change. The growth of the sector should not be at the cost of climate.

The non-availability of reliable grid power, especially in rural and semi-rural areas, adds to the already high costs of operations as telecom towers need to be powered by diesel generators. Diesel generators have been the choice of telecom operators despite their high carbon footprint, primarily because diesel is heavily subsidised and therefore low cost. If these subsidies were to be removed, the prices of power generation for the telecom sector could jump by 30-40%[77].

Figure 4.1
Diesel consumption and costs - forecasting



Note: consumption and costs are calculated based on BTS projections by the Telecom Regulatory Authority of India and assumptions are made on a minimum of 60% power generated through DG sets in rural areas. Cost calculations account for pilferage and DG phase-out costs.

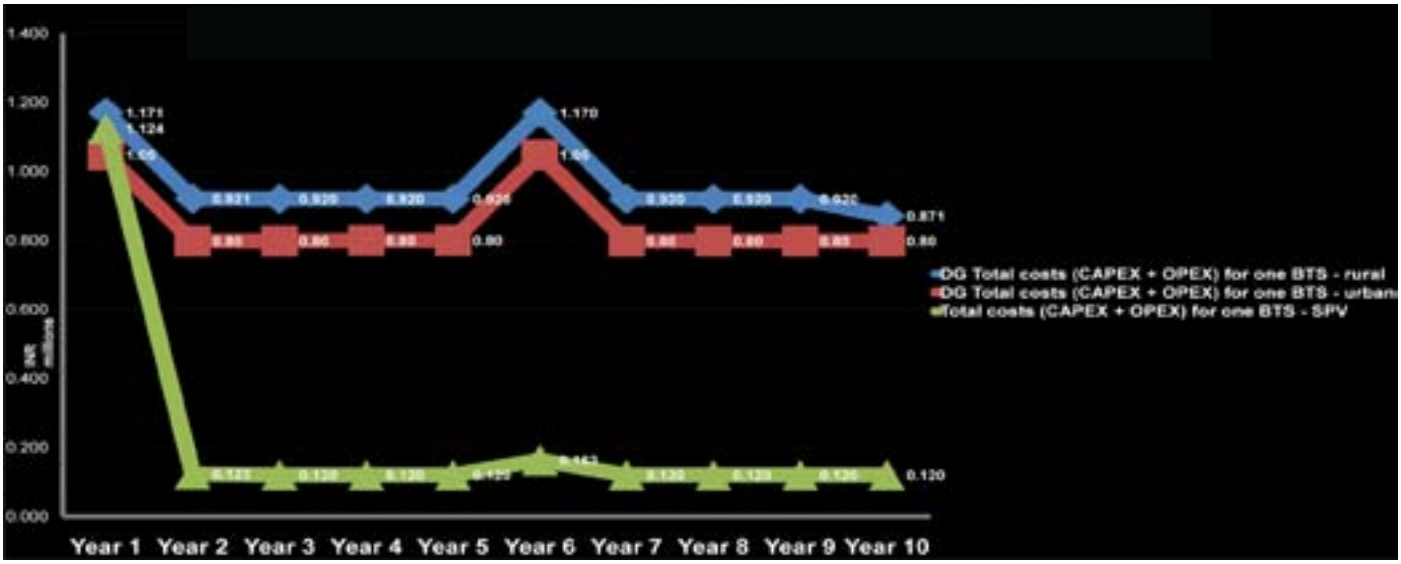
[76]In addition to the high operational expenses for the sector, this also results in a loss of around INR 26 billion to the exchequer, considering the indirect subsidies the sector benefits from, in relation to diesel.
[77]WCS Opinions - The Green Telecom Story

Steps have been taken to reduce costs through sharing infrastructure, wherein a single installed telecom tower unit is shared by multiple telecom providers. However, the sector continues to depend heavily on diesel generators to power more than 350,000 towers across India, hardly considering renewable sources at any scale of significance: less than three per cent of network towers are powered by renewable energy. The cost expenditure on energy ranges between thirty and thirty-five per cent of total network operations costs[78].

Telecom operators or service providers are better placed powering their network towers through renewable energy, despite significant capital expenditures. For while the initial CAPEX is higher as a result of research and development investments, manufacturing control, supply chain control and management, this can be offset by significantly lower OPEX, further supported by government subsidies.

Figure 4.2

Comparative analysis of total costs (CAPEX + OPEX): DG-based BTS vs SPV BTS



Note: the comparative analysis is between a DG-based tower for which at least 60% of power is generated through DG sets. The subsidy provided to solar (INR 100 per Watt) is not factored into the analysis.

Simultaneously, there are additional savings considering that there is no expenditure towards grid supply or diesel generators. For instance, a solar-based power solution on a three-tenant tower can reduce DG runs from 16 hours to less than 4 hours per day, reducing energy OPEX to INR 10,000 per month. As a DG-dependent tower can have energy OPEX of INR 40,000 per month, this is a monthly saving of INR 30,000, which ploughs back in to offset the higher CAPEX.

As OPEX play a vital role in determining the sustainability and profitability of a telecom network site, be it BTS, repeaters, or boosters, the business case for renewable energy is highly compelling.

Power is being generated from renewable energy sources such as wind, biomass, small hydro and solar energy in both grid-interactive and off-grid modes to meet electricity requirements in locations across the country. Further, decentralised renewable power projects using wind energy, biomass energy, hydro power, and wind-solar hybrid systems are being established to meet energy requirements of areas that are not likely to be electrified in the near future.

[78]Debashis Ghosh, Audit Department, Indus Towers

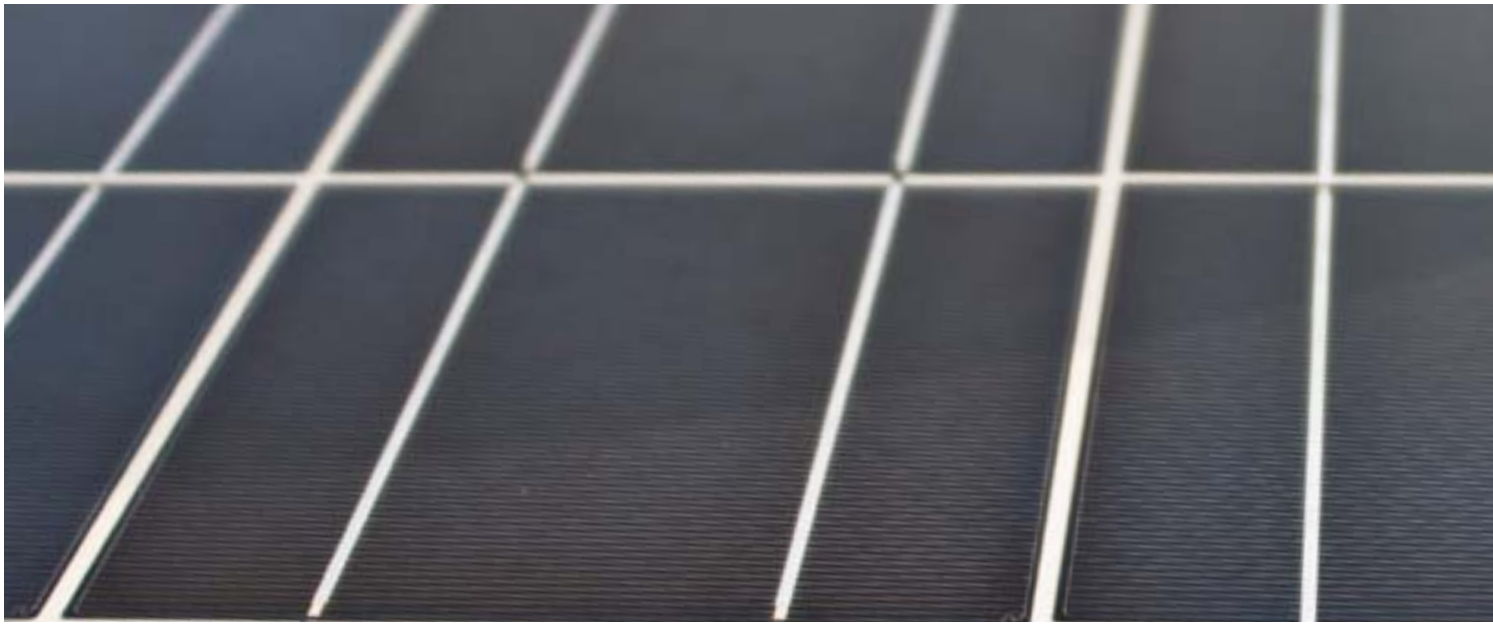
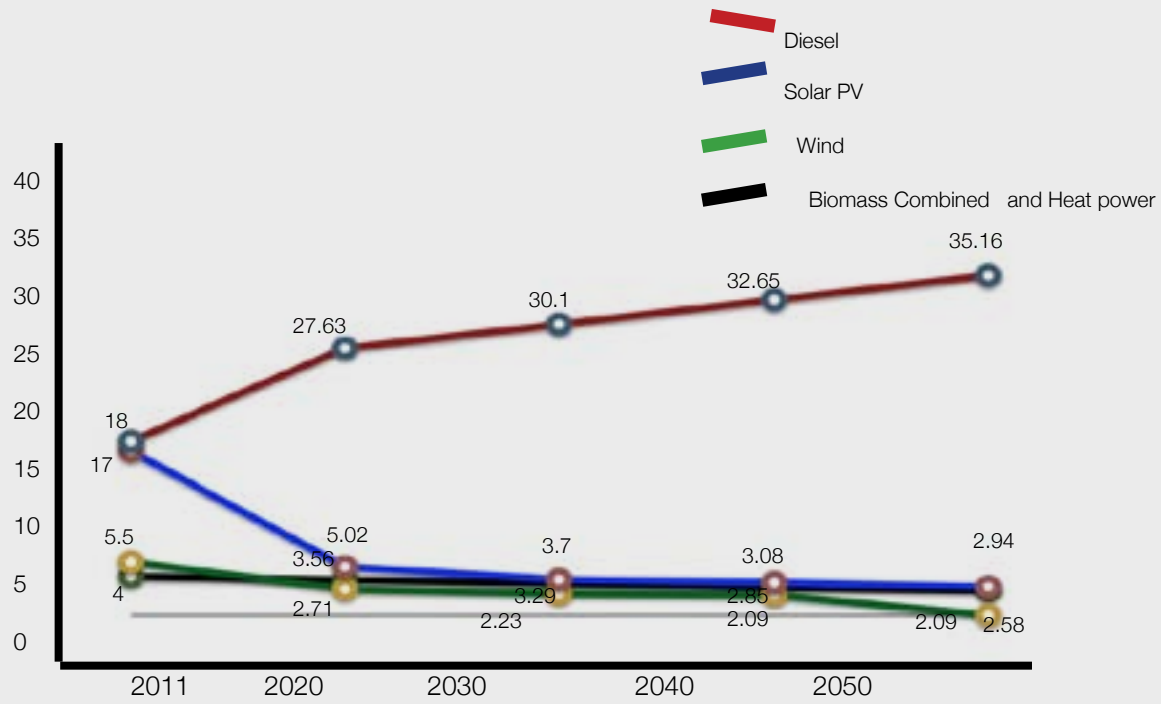


Figure 4.3
Cost of generation per unit of electricity



Note: Diesel costs account for pilferage and DG phase-outs. Diesel costs projections on the basis of report of The Expert Group on A Viable and Sustainable System of Pricing of Petroleum Products February 2, 2010 http://petroleum.nic.in/reportprice.pdf
Renewable costs projections on the basis of Greenpeace's Energy [R]evolution scenario www.energyblueprint.info

Renewable energy sources are among the most cost-effective in widening the reach of telecommunications in remote areas.

Image: A solar PV module.

Case Study 01: Huawei Technologies[79]

Huawei solutions demonstrate that resource conservation at base stations can be realised through the continuous improvement of efficiency standards, while improving their total cost of ownership (TCO) through the use of low-power BTS based on a green design.

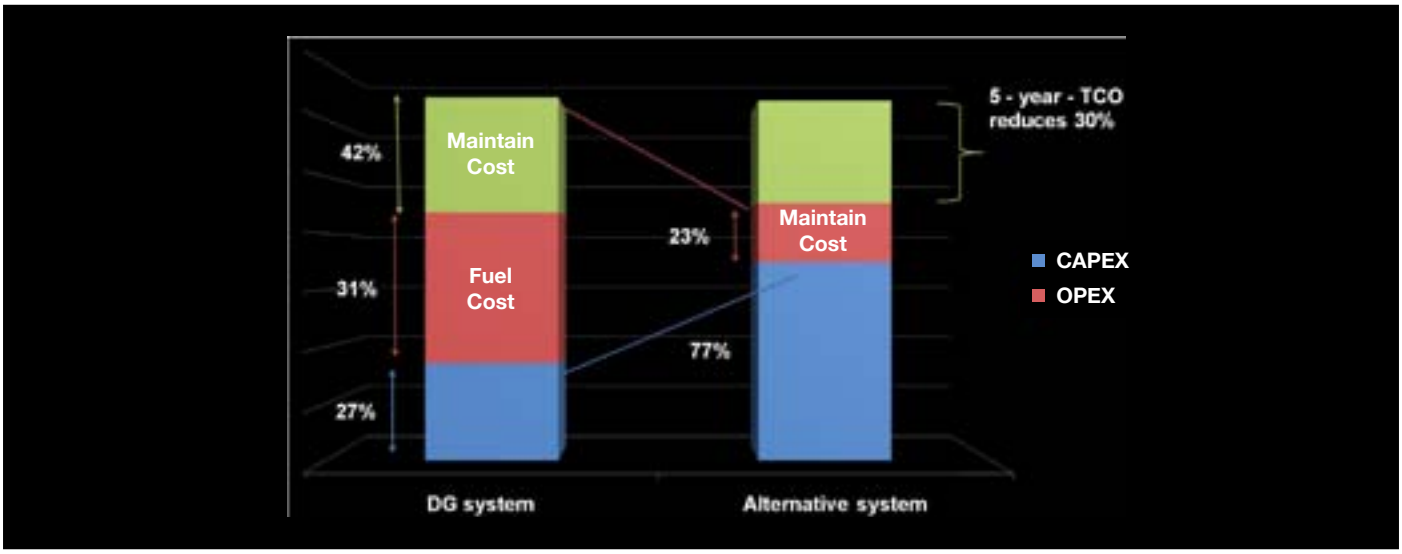
The solution has been adopted in a remote location in South Africa that has no grid connectivity. Normally, operators in such a scenario would use two DG sets to feed the BTS site, allowing it to run continuously for twenty-four hours. The implementation of this hybrid solution accrues savings of up to USD 19,000 annually on OPEX. This has been achieved by upgrading the site to have the following features:

- Huawei 3900E BTS
- PV modules – 1320W
- Battery – 400AH
- Removal of one DG set

Fuel savings that can be achieved through combining renewable energy with improved energy efficiency:

- Diesel fuel saving of USD 8672 per tower per year
- Diesel refueling fee of USD 2200 per year
- Routine DG maintenance saving of USD 8100 per year

Cost distribution and optimisation of site energy



[79]Information as provided by Huawei Technologies

Case Study 02: VNL's solar-powered GSM[80]

VNL's WorldGSM TM is the first mobile network designed to serve rural populations in developing markets - and do it profitably. A village site typically has a nine metre pole with an omni or directional antenna on top, solar panels, batteries and the WorldGSM VBTS – a complete two TRX BTS including backhaul. Unlike traditional GSM base stations, the village site needs no shelter, air conditioning, grid power, generator or diesel fuel.

Designed to deliver maximum coverage in rural networks, features of the GSM base station include being entirely solar powered, having no requirements for shelter, grid connectivity or DG sets, and having no requirements for air conditioning. The base station is ideal for simple transport and can be operational in a few hours.

Besides the extension of existing GSM networks to rural areas, the solar-powered GSM base station has a near-zero OPEX and a dramatically lower CAPEX, making telecom services profitable even at very low ARPU levels. It significantly decreases costs by replacing grid power and diesel generators with solar energy. Equipped with a battery autonomy of up to seventy-two hours, it also provides for flexible deployment configurations.

The key elements in its rollout are the rural site solution (RBTS backhaul and power), village site solution (VBTS backhaul and power), BSC and MSC.

Solar power	1 TRX	2 TRX	2/2/2 TRX
Panels (each 1m x 2m)	2	3	8
Sun free days		3	
Power consumption (including backhaul)	1 TRX	2 TRX	2/2/2 TRX
Maximum (Watts)	55	90	230
Average (Watts)	55	70	200
Backhaul system	1 TRX	2 TRX	2/2/2 TRX
5.8GHz	Integrated transmission		External Unit
Complete system	1 TRX	2 TRX	2/2/2 TRX
Footprints (metres)	2 x 2	2 x 3	2 x 8
Shelter required		No	
Gen. set required		No	
Grid power required		No	
Tower / pole	1 TRX	2 TRX	2/2/2 TRX
Height (metres)	9	9	Up to 18
Type	Pole mounted (integrated with solar panels and battery stand)		Self-supporting monopole
Wind load (km/hour)	170		170
Lighting arrestor	Yes		

[80]Information as provided by VNL

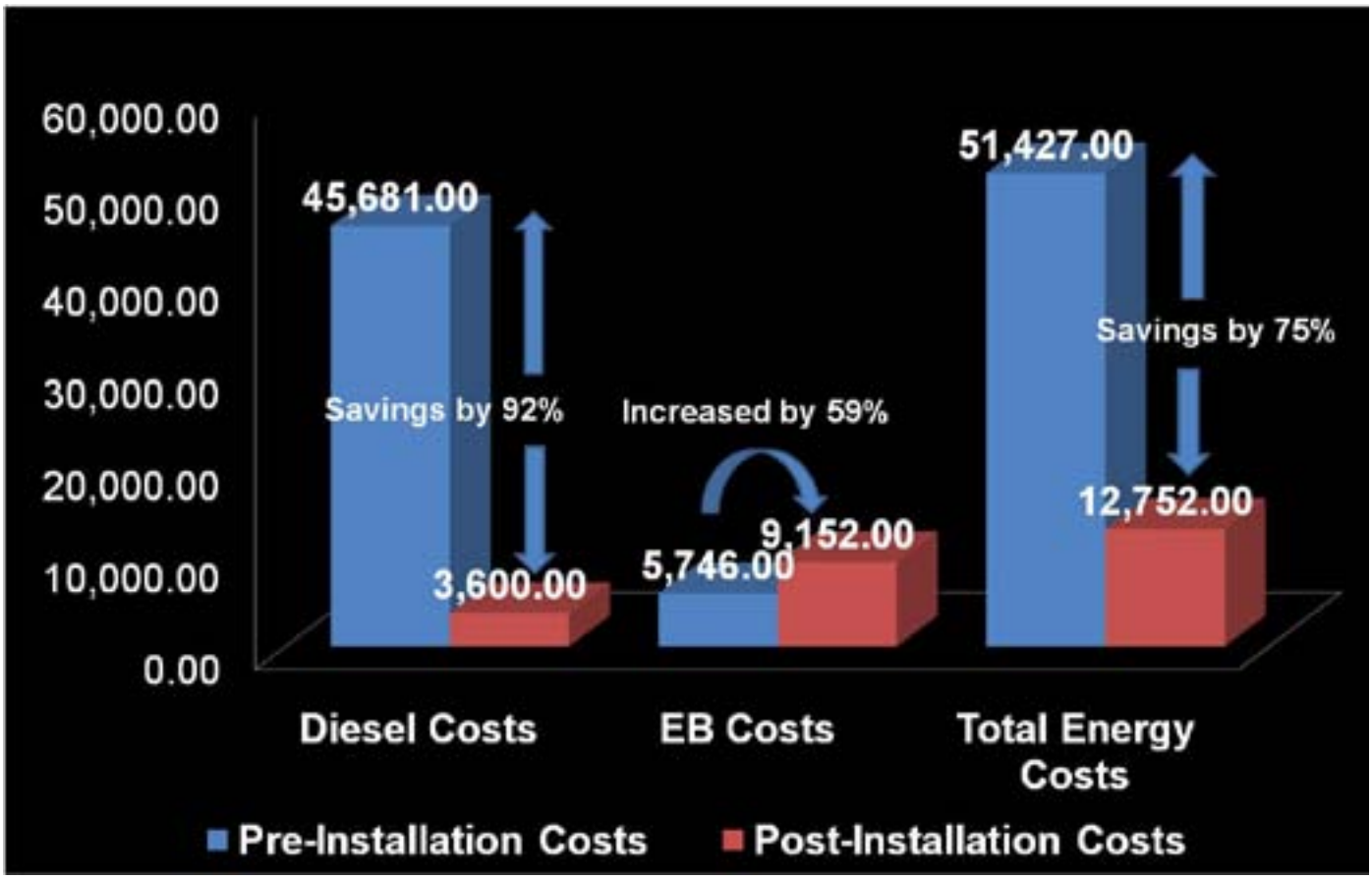
Case Study 03: Global Towers Limited[81]

The savings observed at sites where solar and energy management systems (EMS) have been integrated are phenomenal, exceeding twenty to twenty-five per cent of the total energy costs for all sites. The solutions help in the reduction of costs by reducing energy requirement, utilising existing energy sources optimally, and utilising renewable sources to reduce excessive dependence on non-renewable sources, in particular diesel.

Site details – Aharan, District Agra, Telecom Circle – Uttar Pradesh (West)
Commercial savings

	Pre-installation of EMS products	Post-installation of EMS products	Savings		
	INR / month	INR / month	INR / month	INR / year	%
Diesel Costs	45,681.00	3,600.00	42,081.00	504,972.00	92.00
Electricity board costs	5,746.00	9,152.00	-3,407.00	-40,884.00	-59.00
Total energy cost	51,427.00	12,752.00	38,675.00	464,100.00	75.00

Energy cost comparison – pre and post installation



[81] Information as provided by GTL

Telecom – A business opportunity and solution for climate change and beyond

The Information and Communication technology (ICT) sector can lead the drive to a sustainable and green economy and play a transformative role in on how we produce, deliver and use energy. ICT based solutions can contribute towards the reduction of global GHG emissions by 15% by 2020, and in the process also deliver energy savings to the tune of over €600 billion to global business.

Telecommunications can make a significant contribution to this daunting challenge. Wireless telecoms enable remote monitoring through machine-to- machine (M2M) 'smart services' using cellular connections. Increasingly, many industry sectors are integrating M2M smart services in monitoring and control systems. As many as a trillion networked devices could be in use by 2020[82].

Of the wide range of possible opportunities for wireless telecoms to reduce carbon emissions and energy costs, some of the key areas where these exist include

• Dematerialisation – replacing physical goods, processes or travel with 'virtual' alternatives, such as video conferencing or e-commerce, mobile tele-presence, virtual offices.

• Smart grids – improving efficiency of electricity grids through active monitoring and reducing reliance on centralised electricity production through energy network monitoring wherein wireless devices monitor losses and load capacity of the transmission and distribution network,, smart metering which support the sale of energy generated locally to utility companies for distribution locally and grid load optimisation.

• Smart logistics – monitoring and tracking vehicles and their loads to improve the efficiency of logistics operations by utilising vehicles more fully including centralized tracking through wireless vehicle tracking devices, decentralized tracking through onboard tracking devices which communicate wirelessly with nearby vehicles to adjust speed and routes (for example in freight companies), onboard telematics where data from vehicle sensors are used to plan predictive maintenance and encourage fuel-efficient driving and remote supply control where devices monitoring stock levels in vending machines as an example can be linked wirelessly to suppliers for more efficient deliveries.

• Smart cities – improving traffic and utilities management through urban monitoring and control systems that network traffic lights, and the remote monitoring of utilities.

• Telemedicine: Telemedicine is an innovative model of synergizing communication and information technology with medical sciences to deliver health care services to remote and, distant regions across India. These models connect patients with medical providers conveniently and efficiently. It combines high-definition video, advanced audio and network-transmitted medical data. Some existing examples are Cisco's Health Presence and ISRO's Telemedicine project.

• Mobile banking: While this is widely prevalent in India, it does not provide customers with options for money transfers (withdrawal and deposits). An upgradation of this kind would serve customers well, especially in rural areas, where people can withdraw or deposit money, repay or seek loan along with availing other banking facilities similar to physical bank. A mobile banking application 'M-Pesa' provided by Vodafone and Safaricom, in Kenya, continues to serve a large number of widely spread customers, effectively and efficiently.

• Mobile Education: Mobile phones can play a significant role in the domain of education in India. Major players in the industry are now developing the necessary applications to work towards mobile education like m-education or m-learning. However, its real potential is providing real-time education in rural areas. Combining Video conferencing technologies and education platforms, a virtual school system can be created through which children in rural far-flung areas can access quality education.

[82]David Clark (Senior Research Scientist, MIT) quoted in The Economist, Telecoms – A world of connections, 2007

Image: Low power roof top mini mobile tower powered by solar energy. This tower called as World GSM, world's smallest mobile tower, is developed by Vihaan Network Limited (VNL).

Image: A mobile tower.

CHAPTER 05

Towards Sustainable Telecommunication

Chapter 05

For telecom operators, the benefits of a more proactive approach to carbon and energy-oriented management will be significant. Revenue generation opportunities are there to be capitalised by the first movers in an extremely competitive market space. Unfortunately, telecom companies are yet to integrate low energy and low carbon considerations across their operations and portfolio.

Power deficits, coupled with the rising cost of diesel, pose a significant challenge for the sector. While the current model of diesel-powered networks offers the sector short-term capital gains, such a model of operation is likely to limit growth and profit generation prospects of the sector in the long term. Continued reliance on diesel will also substantially increase the energy costs of telecommunication companies, besides the added environmental costs in the form of carbon emissions. A switch to renewable energy sources adds economic robustness and long-term profitability for telecom companies.

Programmes such as the Jawaharlal Nehru National Solar Mission, under which the government is planning to support renewable-based electricity for off-grid network towers, are a small step in the right direction. Fundamentally, however, the government should incentivise telecom companies towards initiatives in which they significantly shift their business and operation model from one based on diesel, to one based on renewable sources of energy.

Simultaneously, it is imperative that the government expedites this process by establishing stringent regulatory frameworks that hold the telecom industry accountable to carbon emission targets and efficiency standards.

This report highlights the immense cost and energy savings that companies and the sector on the whole could benefit from, by enabling a shift towards renewable sources to power their network operations.

In the fight against climate change, the telecom sector in India holds one of the keys to reaching our climate goals. It is clear that as the energy demand of the telecom sector grows, the supply of renewable energy must also keep pace. Additionally, the sector as a whole should be advocating for strong policies that result in economy-wide emissions reductions.

With its immense contribution to India's growth over the last two decades, the telecommunication sector is well placed to move to a business model that relies on energy efficiency measures in combination with resourcing its energy needs primarily and predominantly through renewable sources.

Against this background, Greenpeace is demanding that the telecom industry in India should:

- Publicly disclose their carbon emissions and set progressive emission reduction targets.
- Commit to shifting the sourcing of their energy requirements significantly towards renewable sources.
- Make clear investment plans for the co-development of renewable energy based generating capacity sources along with development of new telecom infrastructure.
- Enable a low-carbon economy by playing a significant role in advocating strong climate and energy policy changes in favour of renewable energy sources and technologies at national and international levels.

Image: A mobile tower powered by grid with back-up from diesel generator.

Annexures

Annexure 1
Telecom growth Snapshot

	Total	Wireless	Wireline
Subscribers	723.38 Million	687,71 Million	35.57 Million
	Total	Wireless	Wireline
Growth % from previous quarter	7.68%	8.21%	-1.70%
	Total	Wireless	Wireline
Urban Subscribers	487.07 Million (67.34%)	460.63 Million (66.98%)	26.44 Million (74.34%)
	Total	Wireless	Wireline
Rural Subscribers	236.21 Million (32.66%)	227.08 Million (33.02%)	9.13 Million (25.66 %)
	Total	Wireless	Wireline
Teledensity	60.99	57.99	3.01
	Total	Wireless	Wireline
Urban Teledensity	137.25	129.81	7.45
	Total	Wireless	Wireline
Rural Teledensity	28.42	27.31	1.11

Source: Telecom Regulatory Authority of India – as of February 28th, 2011

Annexure 2
Telecom subscribers and teledensity by state

State	Subscribers (Millions)	Teledensity (%)
Jammu & Kashmir	4.68	42
Punjab	85.57	69.82
Haryana	16.6	68.66
Himachal Pradesh	5.86	91.81
Rajasthan	36.92	57.03
Gujarat	37.64	67.02
Uttar Pradesh	87.83	42.23
Madhya Pradesh	36.35	39.54
Bihar	43.29	34.82
West Bengal	30.21	41.28
Assam	10.03	34.01
North East	6.01	48.14
Orissa	18.13	46.11
Maharashtra	49.54	56.41
Karnataka	42.52	76.57
Kerala	27.21	88.54
Tamilnadu	49.01	85.2
Andhra Pradesh	51.62	64.04

Source: Indian Telecom Services Performance Indicator Report:
Telecom Regulatory Authority of India

Annexure 3
Market share of service providers

Service Provider	Market Share
Bharti	20.09%
Stel	0.34%
Loop	0.39%
Eti salat	0.08%
Vodafone	16.54%
HFCL	0.18%
Videcon	0.83%
Uninor	2.73%
Aircel	6.76%
Tata	11.08%
Idea	10.97%
Reliance	16.70%
BSNL	11.41%
MTNL	0.69%
Sistema	1.21%

Source: Telecom Regulatory Authority of India – as on February 28th, 2011

Annexure 4
Teledensity quarter endings

Quarter Ending	Subscriber Base (Millions)	Teledensity
September 2009	509.03	43.50
December 2009	562.16	47.88
March 2010	621.28	52.74
June 2010	671.69	56.83
September 2010	723.28	60.99

Source: Telecom Regulatory Authority of India – as on February 28th, 2011

Annexure 5
Market revenue by sector

	2009	2014
Enterprise Networking and Communications	2%	3%
Mobile Services	45%	45%
Fixed Services	36%	31%
Mobile Devices	11%	15%
TOMS	2%	2%
Carrier Network Infrastructure	4%	4%

Source: Indian Telecom Services Performance Indicator Report - Telecom Regulatory Authority of India

Annexure 6
Distribution of tower infrastructure

Company	Share
Reliance Infratel	17%
Indus Towers	32%
Essar Telecom Infrastructure	2%
WTTIL + Quippo	7%
Bharti Infratel	10%
GTL Infrastructure	4%
Others	29%

Annexure 7
Total disbursement of USO subsidies

Year	Subsidies (INR Crores)
2002 to 2003	300.00
2003 to 2004	200.00
2004 to 2005	1,314.59
2005 to 2006	1,766.85
2006 to 2007	1,500.00
2007 to 2008	1,290.00
2008 to 2009	1600.00
2009 to 2010	2,400.00

Source: Universal Service Obligation (USO) Fund, Department of Telecom, Ministry of Information and Technology,Government of India. http://usof.gov.in/usof-cms/home.jsp

Image: Mobile tower powered by solar photo-voltaic cells. The mobile tower is run by Vihaan Network Limited (VNL). Solar energy is economically feasible and technologically viable clean option for energy need of mobile tower.

Greenpeace is a global organisation that uses non-violent direct action to tackle the most crucial threats to our planet's biodiversity and environment. Greenpeace is a non-profit organisation, present in 40 countries across Europe, The Americas, Asia and the Pacific.
It speaks for 2.8 million supporters worldwide, and inspires many millions more to take action every day. To maintain its independence, Greenpeace does not accept donations from governments or corporations but relies on contributions from individual supporters and foundation grants.

Greenpeace has been campaigning against environmental degradation since 1971 when a small boat of volunteers and journalists sailed into Amchitka, an area north of Alaska, where the US Government was conducting underground nuclear tests.This tradition of 'bearing witness' in a nonviolent manner continues today, and ships are an important part of all its campaign work.

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