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# Sustainability Kaleidoscope

***Prepared and Published by***


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Bombay Chamber
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"The Ruby", 4th Floor,
29, Senapati Bapat Marg, Dadar (W),
Mumbai - 400 028. Maharashtra, India.
Phone No. : +91-22 - 61200200 / 61200213
Email : sustainability@bombaychamber.com
Visit www.bombaychamber.com

environmental
management
centre LLP
emc™

504/505, 5th Floor, Balarama Building,
Bandra Kurla Complex, Near MMRDA Office,
Bandra (East), Mumbai – 400 051
Tel: 91-22-62215944, 91-22-62215946
Email: prasad.modak@emcentre.com
Visit www.emcentre.com

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# SQ raising the Sustainability Quotient

## Editorial

"Bombay Chamber of Commerce and Industry and Environment Management Centre had started publishing SQ – raising the Sustainability Quotient in 2011 to bring forth the various dimensions and challenges of Sustainable Development of business organizations. This publication contained knowledge based articles, success stories, best practices, legal & policy updates which were beneficial to business organizations. The select articles from the published SQ have been updated and revised with the guidance of experts; this Sustainability Kaleidoscope will further encourage mainstreaming sustainability into business. This should prove useful to members of the Chamber, Government, Practitioners, Academicians and general readers."

*- Vijay Srirangan*

"Business today is faced with many challenges. The limited resources we have are dwindling and are under threat due to over-extraction and uncontrolled pollution. Further, intense urbanization has led to polarization of population with consumption rising. Due to unevenness in the governance and economies, a skew has emerged in the global material flows. These issues in nexus with climate change call for immediate action from the business for its survival as well as for SUSTAINABLE DEVELOPMENT. This call to action is very relevant to developing country like India. The Indian businesses has not viewed this looming risk of unsustainability with all the seriousness it deserves.

The Sustainability Committee of Bombay Chamber of Commerce and Industries (BCCI), therefore felt a need to generate awareness towards action on SUSTAINABILITY. Since then, BCCI and Environmental Management Centre LLP (EMC), have been bringing out a quarterly Newsletter captioned "Raising the Sustainability Quotient" or "SQ".

Over the past 5 years, through SQ, we have endeavoured to bring forth various perspectives on sustainability. The newsletter includes knowledge based articles, success stories, best practices and policy updates to benefit all member companies on various thematic issues.

## In this issue

## Editorial contd....

Till today 20 issues of SQ have been published with more than 75 articles. Each SQ is based on a Sustainability theme. The themes covered till now are – Sustainable Infrastructure, Sustainable Technologies, Sustainability Appraisals, Waste to Energy, Corporate Social Responsibility, Sustainability Initiatives by Corporates, Environment-Health and Safety, Sustainability Reporting, Sustainable Consumption and Production, Sustainable Supply Chains, Sustainable Transport, Sustainability and Biodiversity, Water, Indoor Air Quality, Waste Management, E-Waste, Climate Change, Sustainable Cities etc. *To read all the issues, please visit http://www.bombaychamber.com/about?sustainabilityQuotient.html*

There is a wealth of information and knowledge in all the issues of SQ. We have found that many articles provide tremendous value to all sizes of Businesses by providing best practices with practical tips. **We therefore thought of curating a special issue with some of the key articles for the benefit for all.**
In order to do so, we invited a panel of jury for the selection of the articles for such a publication. The Jury involved six eminent personalities who work in the 'sustainability arena' representing a Corporate, Academia, Non-Government Organisation and professional services. Evaluation of the articles was done based on the (i) relevance of the article in present times (ii) its informative and innovative content (iii) articulation and guidance.

The Jury members were –

1. **Arvind Sharma**, Partner, PricewaterhouseCoopers (PwC India)
2. **Meena Galliara**, Professor, Narsee Moonji Institute of Management Studies (NMIMS)
3. **Anju Singh**, Professor, National Institute of Industrial Engineering (NITIE)
4. **Yashmi Yadav**, Corporate Communications, Hindustan Unilever Limited
5. **Esther Fernandes**, Godrej Properties Ltd.
6. **Prasad Modak**, Executive President, Environmental Management Centre LLP

Based on this evaluation, 13 articles were selected. These articles represent some of the topical themes such as Sustainable Procurement, Sustainable Technologies, Sustainable Infrastructure, Sustainable Cities, E-waste, business and Biodiversity, Indoor Air Quality and Sustainable Finance.

Today, urbanization has led to the formation of mega-cities that have become engines of economic growth and at the same time guzzlers of our precious resources and spew wastes and emissions. At the same time, cities are repositories of knowledge, show cases of technology, and the culture. We need to be in sync with the global development and manage the metabolism in cities on the principles of sustainability.

'Sustainable and smart cities' can be viewed as one such opportunity. Cities need infrastructure, services, financing, businesses and use of sustainable materials and technologies. This special issue of SQ covers these aspects with the help of a case study. The case study focuses on urban sustainability on different scales and describes

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Email: bcci@bombaychamber.com

Reader's Column

We invite feedback suggestions and articles from our readers, please write to: sustainability@bombaychamber.com

the processes followed, plans and the projects developed revolving around sustainability. Another article touches upon sustainable infrastructure and the townships developed based on the principles of sustainability following the 'green design' and 'healthy living' as the new mantra!

Consideration to the Indoor Air Quality (IAQ) in planning green buildings is of paramount importance. India does not have IAQ standards. Often buildings are poorly designed to ensure adequate ventilation. As a result, micro-pollutants get accumulated – sometimes overshooting the acceptable concentrations. In managing IAQ, it is important to bring together the key stakeholders such as architects, planners, paint manufacturers, furniture makers, HVAC manufacturers, green building rating agencies, medical professionals etc. We have included an article that stresses such a multi-stakeholder approach.

E-waste has become a big challenge in the growing urban centres and will be even a bigger challenge in the smart cities, where both the infrastructure and services will be digital or technology driven. E-waste, can be however considered as an opportunity towards economic gains and sustainable waste management. The article on E-waste provides an overview of E-waste situation in India, case studies, business models and international experiences in this perspective.

The publication also touches upon the subject of Sustainable Consumption and Production(SCP).Indian consumer is now aware and has started showing preference to purchasing of Green Products. Green products in many ways form an important interface between the elements of SCP. The concept of green product promotes life cycle thinking – something very essential in today's context. We need to bring this thinking in environmental education, practice, management and policies. Here all the three key stakeholders and the drivers viz. Government, Business and Communities (consumers in specific) must come together and act. The Ministry of Environment & Forests & Climate Change (MoEFCC), Government of India needs to pay more attention to green products and Sustainable Public Procurement (SPP). We hope that the articles related to SCP and SPP will help readers to understand the importance of this subject as well as the opportunity.

The business has started recognizing the adverse impacts and dependencies of business on biodiversity. Efforts are being made to measure the economic value of natural resources as the 'Natural Capital'. The depletion and degradation of natural capital is a financial risk to the businesses. It is high time, India Inc. took steps to understand the importance of biodiversity. There are articles in this publication that explains about this crucial topic and also suggests how biodiversity offsets can prove to be a good business case.

Environmental and Social Governance in India is driven through enforcement of regulations. Financing institutions in India have always been at the “bay” of Environmental and Social Governance (ESG). The general approach has been to ensure that the borrower or investee is compliant to the law of the land following a “checklist approach”. Lately, Environmental and social considerations have slowly started emerging from the international investor community. India needs to consider establishing a a common code of practice on ESG similar to the one established by the Bangladesh Bankers Association (BBA). A commonly agreed ESG will certainly help in creating a level playing field, make the investments more sustainable and beneficial to the society. A clear directive on sustainable finance for Indian Financing Institutions is needed. This publication has few articles outlining Sustainable finance opportunities in India and case study of ESG practices followed by an infrastructure company.

We hope that this special publication of SQ provides our readers a glimpse of various dimensions of Sustainability to increase their awareness, provide inspiration and guidance towards action.

Happy Reading!

*- Prasad Modak*

# 100 Smart Cities: Is It Possible?

*Surekha Kotla*
*Interim Country Director, India, Institute for Sustainable Communities*
*skotla@india.iscvt.org*

## Context

Globalization has moved us towards global uniformity, and our cities have become centers of economic growth that disseminate knowledge, technology, and culture. In 2008, for the first time in history, half of the world's population was living in urban areas, and it's predicted to reach 70% by 2050. Given that such a huge human population will live in cities by 2050, sustainable urbanization is the need of the present for the future to be possible.

In India at present, 377 million people (31% of India's population) are living in urban areas. In the next 15 years, this will increase by another 157 million and by yet another 500 million by 2050, by then more than half of the country's population will be living in urban areas for the first time. More than 70% of urban people live in 468 cities/towns with more than one lakh population.

The share of GDP from urban areas in India has been growing consistently. The urban population is at 31% of the total population, and it contributes 60% of India's GDP. It is also projected that urban India will contribute 75% of the national GDP in the next 15 years. For this reason the cities are also referred to as the “engines of economic growth.”

## Need for Smart Cities

To be able to manage the increased rate of urbanization, cities need smart infrastructure, smart administration of services, smart businesses and smart citizens with better technological capacity. These values, along with other social values, such as integration, transparency, equal participation, social cohesion and sustainability, will lead to more livable cities.

Today, cities face a long list of challenges: wanting governance, unaffordable housing, long hours of commute to work, burdened suburban transportation systems, encroached footpaths, bad roads, poor quality and supply of water, high electricity prices, and unmanageable waste, continuous influx of population, and upscale residential areas facing poorly administered urban slums.

In India, different cities have different needs. All the major cities have reached a stage of maturity and saturation in which aging infrastructure requires retrofit and upgrades, and where high value-added services need to be provided to residents. Some cities are in a growth phase and require ongoing expansion and new infrastructure. These differences make it important to look at cities in terms of their lifecycles, and to manage urban development appropriately by taking a long-term approach.

## How do we go there?

We know where we are currently, we know where we want to go, but the question we need to collaboratively try and answer is how do we go there?

In this context the Modi-led new Government announced its plan to develop 100 "Smart Cities" across India. The Finance Minister stated in his budget speech of July 2014:

*"As the fruits of development reach an increasingly large number of people, the pace of migration from the rural areas to the cities is increasing. A neo middle class is emerging which has the aspiration of better living standards. Unless new cities are developed to accommodate the burgeoning number of people, the existing cities would soon become unlivable. The Prime Minister has a vision of developing 'one hundred Smart Cities', as satellite towns of larger cities and by modernizing the existing mid-sized cities."*

Some cities will be made smarter, and some new cities will be designed smartly from the beginning. A common goal of smart cities is to provide cost efficient services to their residents. Another goal is to make cities that are attractive, vibrant, and environmentally friendly. As environmental and energy problems grow increasingly severe, and the need for sustainable growth increases, smart cities will have to be designed and developed sustainably.

## Funding of "Smart Cities" Initiative

The Indian Finance Minister announced a funding requirement target of INR 70,600 million to help create 100

smart cities (US$113 billion). It is expected that most of the infrastructure will be taken up either as complete private investment or through Public-Private Partnerships.

Additional incentives may come in the form of a capital expenditure subsidy for projects via a 'Viability Gap Funding' (VGF) mechanism, which involves an up to 90% reduction in project cost for cities in hilly areas and 40% reduction in project cost for cities on the plains. This is a mechanism that has also been used in recent phases of the National Solar Mission.

There have been many announcements of inward investment into India:

- USA: $41 billion Private investment pathways into India; partnership on clean water & solid waste management for 500 cities
- Japan: $35 billion - Mix of Private & Public investment
- China: $20 billion - Mix of Private & Public investment
- Germany (KfW[1]): EU 1 billion on solar capacity for next ten years
- Asian Development Bank (ADB): $2.5 billion to establish 5 Industrial Zones for Andhra Pradesh, $63.3 million for North Karnataka Urban Sector Investment Program

There is a tremendous interest already generated over the project since its announcement and now every Tier I, Tier II, and Tier III cities want to become part of the Smart City project. While the majority of existing cities will be developed as Smart Cities, some new cities will also be carved out of new regions to be part of the project.

## What is a Smart City, and what are its building blocks?

At its fifth meeting in June 2014, the Focus Group on Smart Sustainable Cities (FG-SSC) at International Telecommunication Union (ITU) is the United Nations specialized agency for information and communication technologies - ICTs.

ITU agreed on the definition of Smart Sustainable City which reads as follows:

*"A smart sustainable city is an innovative city that uses information and communication technologies (ICTs) and other means to improve quality of life, efficiency of urban operation and services, and competitiveness, while ensuring that it meets the needs of present and future generations with respect to economic, social and environmental aspects."*

But building a city that fits this definition is no easy task. Cities are complex, interconnected systems of people, transit, buildings, schools, healthcare, energy, water, wastewater, and much more. Inadequate municipal budgets, aging infrastructure, and a lack of vision, planning, and coordination can pose significant challenges. These challenges can be addressed through comprehensive planning and a holistic approach to designing and developing a city. Technology can ensure that systems are interconnected, data is collected and analyzed, and can help assess how resources are being deployed and utilized. In short, steps are taken to make the city operate more efficiently, more intelligently, and more sustainably, while improving the quality of life for its citizens.

Four main building blocks and components of a smart city are listed in Figure 1.

## Smart Economy

In building an ecosystem of a smart city, it's essential to develop a business case. Unless there are opportunities and resources for attracting existing businesses, or setting up new businesses, it'll be a daunting task to mobilize investments for these smart cities to become a reality. No sensible investor invests, no sensible banker finances and no sensible builder constructs an infrastructure that won't fetch decent returns on investment. The other important question to be answered or analyzed is how soon a smart city can mature to start giving returns to its stakeholders.

Firstly, a smart city is possible only if it makes an economic sense. It is important for a city to have business support infrastructure such as special economic zones, industrial parks, and IT parks with access to its supply chain and markets to facilitate its economic development.

[1] *The KfW, formerly KfW Bankengruppe, is a German government-owned development bank, based in Frankfurt.*

| Smart Economy | Smart Infrastructure | Smart Governance | Smart People |
|---|---|---|---|
| • Business case for a smart city<br>• Investments<br>• Public Private Partnerships<br>• Business Incubators<br>• Special economic zones/Industrial parks, Business parks<br>• Skilled Human Capital<br>• Employment<br>• Access to markets (local & global)<br>• ICT in businesses<br>• Support for entrepreneurs | • Green buildings<br>• Smart Mobility<br>• Accessibility<br>• Integrated Systems to manage<br>  • Energy<br>  • Water<br>  • Waste<br>• Healthcare Services<br>• Utility Services | • Policy framework<br>• e-governance<br>• Efficient administration of basic services<br>• Accountable<br>• Transparent<br>• Citizen Centric<br>• Inclusive<br>• Safety & Security of people<br>• Climate Resilient | • Education & Training<br>• Equal Participation<br>• Inclusive Society<br>• Equity & Justice<br>• Responsible towards environment<br>• Culture & Identity |

*Figure 1*

India is one of the most cost-competitive nations as far as production is concerned and is strategically in a better position to realize a large share of global opportunities. What adds to its advantage is availability of cost efficient, educated and skilled manpower. Challenge for the smart city planners would be to motivate and mobilize the human capital to these smart cities. In China some cities that were built on the smart city concept have now become ghost cities. For example, Kangbashi was meant to be the urban center for a wealthy coal-mining community and home to its one million workers, but its roads are eerily empty and the houses stand vacant. Zhengzhou New District is China's biggest ghost city, complete with entire blocks of totally empty accommodation.

In this context, the presence of business incubators would be essential to facilitate innovative thinking, promoting entrepreneurs, and facilitating a conducive environment that'll enable them to enter the local and global markets and stay competitive in the market. All said and done, there are risks[2] involved which should be equally shared by the stakeholders, be it government, businesses, investors, entrepreneurs, and people. Public Private Partnerships are essential to implement successful smart cities projects.

## Smart Infrastructure

A city can be termed smart only if it has smart infrastructure to provide and support basic services for its inhabitants such as transportation, smart grids and smart energy solutions, water management systems, better waste management systems, health care, e-governance, e-education, and utility services. Smart infrastructure will also facilitate transparency and efficiency in the Government processes, online processes for obtaining approvals, and various citizen-centric services to make citizens feel safe and happy as they get value for the taxes paid and the investments made in these projects.

Globally, IT and other technologies are being developed to address a range of issues, including energy management, water management, urban mobility, street lighting, and public safety. For example use of wireless communications, sensor networks, data analytics, and cloud computing is being used to provide better and intelligent services to people. Operational data can be collected, analyzed, and translated to provide smart services. Collected data can also be utilized to assess and forecast demand, and supply patterns of the city. This will help maintain a balance between supply and demand.

[2] *Risk such as: Huge investments (long pay back periods), Operational Risks (cyber-attacks), and Policy Risk (unstable policy framework)*

Mobility from one place to another is at the core of a "Smart City". Seoul, Singapore, Yokohama and Barcelona (all considered Smart Cities) have a sound transport system as the core of their "Smartness". A traffic system supported by ICT to collect data from sensors located at traffic signals could determine traffic conditions, and also collect information on car locations and speeds to better manage the traffic and enforce safe driving practices.

For Indian cities to become engines of economic growth, it is important that goods and services are able to move from factories to its consumers at low cost and high speed. Therefore efficient mobility is the key to a smart city. These approaches are essential from Indian perspective;

- Improvements in public transport - Suburban rail, Metro Rail, BRT, Monorail, Trams etc.
- Improvements in infrastructure of other motor vehicles - ring roads, bypasses, underpasses, elevated roads, improvements in the existing roadways
- Improvements in infrastructure for walking, cycling and waterways

The huge amount of data collected opens up possibilities for innovations and new services to improve the quality of life in a smart city. In addition to commercial innovations, health and welfare services can use the data to better focus their limited resources on those most in need. This open approach to use of data provides both public and personal benefits.

## Digital Divide

One of the key issues with data driven decision making in cities is that it often leaves out the poor and disproportionately tilts services toward the wealthy. In India a divide between the rich and poor has existed from the ancient times. As information technologies become the primary, sometimes exclusive, means of communication in our society, a massive digital divide is bound to happen unless we plan smart policies for smart cities to promote an inclusive social and economic growth for all. In my opinion, in a smart city, access to information and technology will become necessary for a citizen to exercise basic human rights.

## Green Buildings

Buildings will be a very important component in Smart City infrastructure. According to Centre for Science and Environment,

- Buildings in India consume around 40 percent of total energy generated, and 20 percent of water
- Buildings in India generate 40 percent of the carbon emissions, 30 percent of solid waste, and 20 percent of water effluents
- Buildings in a smart city should be designed and built to green building standards.

The Indian Green Building Council is already doing great work in this direction. Globally there are different standards for green buildings. It is estimated that India can save around US$ 42 billion every year with efficient management of lighting, heating, air-conditioning, etc. (McKinsey & Company). Smart building technologies reduce maintenance costs by 10-30 percent, and enhance the comfort, health and safety of the occupants.

As an illustration, a case study of IBM has been discussed in **Box 1** to explain the role of corporates in making cities smart.

### Box 1 Case Study: IBM and its role in making cities smart

In the utility sector, IBM has "smart grid" programs under way with several governments and companies, using sensors, software and computerized household meters to maintain power lines and reduce energy consumption. In the U.S.A, Brazil, and China, IBM is collaborating with The Nature Conservancy on the Water for Tomorrow project, which is monitoring and creating computer modeling for large river basins to help guide land use and water policies.

At a National Conclave on Smart Cities, Minister of Urban Development and Housing & Urban Poverty Alleviation, Shri. M. Venkaiah Naidu, recently said that effective urban governance should aim at prudent utilization of natural resources, minimum waste generation, recycling, water harvesting and efficient energy use.

Governance has been one of India's biggest challenges to date. The current governance structures do not encourage citizen participation. People do not get the feel of ownership of their city. In this context, smart governance has to start with active Government and Citizen Participation in decision making processes using technology and other social networking platforms. This will enable a new relationship between local

governments and citizens. There has to be a combination of top-down and bottom-up approaches. City officials' engagement and drive of participatory conversations with citizens, and citizen conversations, participation, and feedback to be used by city officials for informed decision making.

Smart governance would also mean smart policies to provide the framework enabling smart cities to come to existence. Existing legal frameworks and policies that regulate the urban sector need to be reviewed by the state and urban local bodies to see what changes, if any, are required. Refer to Box 2.

**Box 2**

Excerpt from the examples of policy revisions recommended in the draft smart city concept note prepared by the Ministry of Urban Development:

- Floor Area Ratio norms need to be rationalized and made more granular rather than city wide, to allow very high densities to be interspersed with adequate green areas;
- The existing Urban & Regional Development Plans Formulation and Implementation Guidelines (URDPFI) need to be updated to reflect the higher standards expected in a smart city;
- The current standards for water supply, sewerage and drainage need to be reviewed to aim at higher standards expected in a smart city;
- Framework related to investment by the private sector need to be reviewed so that a higher level of private investment in urban infrastructure becomes possible;
- Framework for making changes in land use need to be reviewed and procedures simplified, building by-laws need to be citizen friendly.

## Climate Resilience

India's geographic location and its demographics make it vulnerable to various climate change events, natural disasters, and other man-made events. How collective decisions are made, interpreted, implemented, challenged will enable or impede a country's resilience ability. By utilizing technology, the local governments and the citizens can be better informed, connected, and prepared to respond to such extreme events. A smart city has to integrate resilience into its design to be smart.

## Smart People

The differentiating element between a city and a smart city is smart people. "Smart leadership and smart people are essential prerequisites for making cities smart," noted Minister of Urban Development and Housing & Urban Poverty Alleviation Shri. M. Venkaiah Naidu. Prime Minister Narendra Modi's 100 Smart Cities initiative is an example of how smart leadership can make smart ideas possible. It is a daunting task to implement and make the 100 smart cities possible unless we as people decide to be smart to make these smart cities happen.

One of the key issues with data driven decision making in cities is that it often leaves out the poor and disproportionately tilts services toward the wealthy. As information technologies become the primary, sometimes exclusive, means of communication in our society, a massive digital divide is bound to happen unless we plan smart policies for smart cities to promote an inclusive social and economic growth for all. In a smart city, access to information and technology will become necessary for a citizen to exercise basic human rights.

Smart governance and smart people, both play an equally important role. With good leadership and responsible citizens who participate, collaborate and work with the government, 100 smart cities are possible.

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# Sustainable & Smart City: Case of Gujarat International Finance Tec-City (GIFT)

*Prakash Gaur*
*Vice President, IIDC Ltd.*
*prakash.gaur@ilfsindia.com*

## Background

Gujarat International Finance Tec-City (GIFT) is a globally benchmarked International Financial Service Centre (IFSC) developed by Government of Gujarat (GoG) through Gujarat International Finance Tec-City Company Limited (GIFTCL), a joint venture between its undertaking Gujarat Urban Development Company Ltd. (GUDCL) and Infrastructure Leasing & Financial Services Ltd. (IL&FS). GIFT is a global Financial and IT Services Hub, a first of its kind in India, designed to be at or above par with global financial centers.

## Vision and Positioning

GIFT is positioned as a Global Financial Hub and is being characterized to be a Central Business District (CBD) developed on "Smart and Sustainable Development" principles for international and domestic financial services thereby acting as a catalyst for all round development in the entire region and thus holds very high economic and strategic significance.

The vision of GIFT Project is - "To develop a global financial hub for international and domestic financial services which will serve as a paradigm for next class development in terms of quality of life, infrastructure and ambience, utilizing land as a precious resource."

GIFT's vision and its value propositions for development, business and living are the driving factors in defining and implementing Smart City.

## Master Plan for Development

GIFT is a green field development and is located at a distance of about 12 kms from the Ahmedabad International Airport and 8 kms from the State Capital City, Gandhinagar. The site is in close proximity to the National Highway (NH8) and Expressway and connects Ahmedabad and Gandhinagar. The western periphery of the site abuts the Sabarmati River.

The master plan incorporates planning along the Sabarmati River with green belts interspersed between city and neighborhood areas. It incorporates features to achieve a pleasant blend of quality life and business environment.

As an integrated smart city development, it will host facilities for sustainable 'business' and 'living' on 886 acres of land including Multi Services SEZ (Special Economic Zone) of 261 acre and Domestic Tariff Area. GIFT SEZ is the only Multi Service SEZ with International Financial Services Centre (IFSC) status in India.

Commercial development is the primary focus of development with major built up space dedicated to offices for various target business segments of domestic and international financial services, general business and commerce, retail, district center, community center, local shopping, hotels etc. Due emphasis is given towards essential housing facilities, which shall be provided in the form of studios and apartments for employees working in GIFT.

The provisioning of quality infrastructure shall play a pivotal role in supporting the business environment and quality of life in GIFT Area. The highest quality of infrastructure and level of services is being developed and provided for GIFT. The services provided are comprehensive with higher service levels and planned delivery. A judicious combination with the latest technology and global best sustainability practices in infrastructure service delivery are being provided.


GIFT is supported by state-of-the-art internal infrastructure. The infrastructure components include transport infrastructure along with excellent external connectivity by roads and proposed Mass Rapid Transit System (MRTS), Bus Rapid Transit system (BRTS), etc., power receiving station, emergency supply and distribution infrastructure, district cooling system (DCS), water supply and treatment, sewerage collection and treatment, solid waste management by automated waste collection and transportation system with centralized waste handling facility, domestic gas, ICT (Information and Communication Technology) services, utility corridor, fire fighting system, city central command and control center.

The key environmental and social features of the infrastructure components that needs a mention here are the following:

(a) **Transportation:** A transit oriented development is planned that would encourage usage of public transport, which would reduce the greenhouse gas emissions from travel to work in GIFT City. The city would aim at zero fatal accidents.

(b) **Energy efficiency through District Cooling System and Solar PV Plants:** The efficiencies gained by central chilled water facilities result in lower overall energy consumption, increased reliability, increased diversification of cooling load, and reduced environmental impact. The cooling requirement of GIFT would be met by District Cooling System (DCS) that will supply chilled water to the buildings from a centralized chilling plant. A 10 MW solar PV plant has been installed within GIFT City on pilot basis. Similar plants with higher capacities may be installed in future as GIFT City develops.

(c) **Water and wastewater management:** Water and wastewater issues have been addressed by employing various measures such as: (a) Installing SCADA system for improving overall efficiency of utility services including water supply. (b) Recycling and reuse of treated sewage for various purposes such as district cooling, landscaping, flushing etc. The design vision for water infrastructure in GIFT is to provide potable quality water in all taps in the city and being "Water Neutral". All wastewater generated from domestic and commercial use will be collected and sent to a centralized Sewage Treatment Plant (STP) in utility area. The treated sewage is planned to be reused for various purposes such as district cooling, landscaping, flushing etc. aiming GIFT a "Zero Discharge City".

(d) **Solid Waste Management:** The value improvements for the system includes minimizing human intervention in the process, reduce adverse environmental & health impacts, improving the aesthetic value of the project in the long run. The chute system shall be provided in each building for collection of waste to minimize human intervention. Automatic waste collection system (AWCS) is planned to be incorporated in building design. All solid waste collected through AWCS will be collected centrally and treated before disposal.

(e) **Green and safe city:** For reducing urban heat island effect, measures have been undertaken such as contiguous landscape planning (green cover) in preparation of the master plan for GIFT City. Each of the building in GIFT shall be equipped with Intelligent Building Management System (IBMS) and same shall be connected to central control and command center to provide interface between user and utility service providers. The IBMS monitors fire, energy, HVAC, lighting, access, closed circuit television and elevator.

(f) **Disaster management:** Firefighting provisions have been mandated for all buildings which comprise of fire detection, early warning, firefighting equipment and evacuation routes. During preparation of the master plan for GIFT City, the risk has been addressed through design of storm water drainage around and within GIFT City. Central Command Center has been planned to control various services, provide security and assistance in disaster management and emergency situations.

Further, the social infrastructure planned is such that it promotes: wellness for the whole community, recreation, health, education, safety and security for the city.

The General Development Control Rules (GDCR) for GIFT City has incorporated all requirements applicable to buildings for human comfort and safety including mandating LEED certification of all buildings by developers. Refer to Box 1 for some of the urban design objectives achieved at master planning, block and building scales.

As a result of sustained efforts towards creating a smarter environment, GIFT City has been conferred as "Smart City of Future" by Cisco Technology Award 2014. In August 2012, GIFT won the most prestigious award in the category of 'Best Industrial Development & Expansion' at the 'Infrastructure Investment Awards - 2012' organized by World Finance Group based in London. GIFT Project was considered of world class value in terms of its potential for enabling economy growth in the region – through the relocation and centralization of India's financial and IT sectors.

GIFT would have multiplier effect on the Indian economy. It is estimated that GIFT infrastructure (development and operations) would provide 500,000 direct and an equal number of indirect jobs. The demand of various infrastructures (commercial, residential, schools & colleges, medical facilities) in surrounding region of GIFT is envisaged to boom.

### Box 1 Smart and Sustainable Development

**Master planning scale:**

- Due emphasis given on creation of open & green area for public purpose and ensuring hierarchical distribution of open space
- For legible and coherent urban form, master planning included careful distribution of building types according to use, heights and character
- Landscaping has been an integral part of master planning and ample provision of open space has been provided
- Transit oriented development included distribution of overall density by minimizing distances between transport nodes and destinations
- Defined building footprints aided development without boundary walls
- Pedestrian friendly urban space created which are contiguous

**Block planning scale:**

- Provisions were made for tree lined shaded pedestrian walkways, plazas dotted with small scale amenities such as gardens, street lighting, communication network, electric supply etc.
- Large percentage of the block area was dedicated to open and green space
- Guidelines for landscape, illumination and signage were followed for creating a sense of harmony in public space
- Facade guidelines were followed for making facades porous and interactive

**Building planning scale:**

- Responsive built environment achieved through defined extents of building envelopes, defined ingress-egress provisions
- Buildings were made climate responsive through mandatory green certification in addition to prevention of glass facades on south and west directions
- Building, transport and infrastructure were efficiently coordinated
- Open spaces within buildings were encouraged, for example sky gardens

The above list of initiatives continues to get appended and guidelines continue to mature through market response analysis, validation process and technological value addition.

# Creating Sustainable Habitats @ Mahindra Lifespaces

*Amit Pal*
*Sr. General Manager, Quality Assurance & Innovation,*
*Mahindra Lifespaces Developers Limitted*
*pal.amit@mahindralifespaces.com*

Catalytic urbanization coupled with quicksilver infrastructural development, an exodus of populace into metros for better lifestyles and careers - India's growth curve is moving ahead rapidly. Yet, such exponential growth can continue to happen smoothly only when the wealth of natural resources is harnessed, sensibly and carefully. Therefore, it is crucial to maintain a harmonious balance between all round progress and environmental stability. At Mahindra Lifespaces, we understand the need for sustainable economic growth. While participating in India's growth saga, we also want to emerge as the flag bearers for environmental sustainability. With this philosophy ingrained in our conscience, we espoused 'Green Design' and 'Healthy Living' as the foundations for all the projects at Mahindra Lifespaces and Mahindra World City.

'Green Design' is our selfless way of giving back to the environment what we take from it. Splendidly showcased in our residential projects such as Aqualily, Splendour, Royale, Chloris, Eminente, etc., it is also evident in our commercial properties like Great Eastern Plaza, HDFC Bank, Great Eastern Centre and Mahindra Towers. Residential or commercial, all our structures are energy efficient, environment friendly and cost effective. So, while the environment revels in good health, people bask in the glow of healthy lifestyles.

Taking the motto of sustainability a step further Mahindra World City builds communities on the concept of "work, live, learn and play."

Mahindra Lifespaces specializes in real estate development and is an integral part of the Mahindra Group. Mahindra Lifespaces, as the name signifies creates spaces for healthy living, focussing on quality and true value offerings to customers. Mahindra World City spread across 4,600 acres has two Integrated Business Cities with futuristic amenities, facilities and numerous career opportunities that stem from the prestigious Multi-National Companies (MNCs) housed here. By improving lifestyles and work-styles, we strive to bring the best to our discerning customers.

## Green Initiatives

The present article discusses the initiatives that are taken while designing and planning our projects. Some of these initiatives are discussed below -

I **Energy Efficiency:**

Use low emissivity (low-e) glasses for building fenestration (See Figure 1). It has high light transmission ratio with low shading coefficient and hence induces more day light effect than normal glasses. Due to low Solar Heat Gain Coefficient (SHGC), the entire fenestration system reduces the heat ingress thereby reducing the energy requirement for indoor air-conditioning substantially in comparison with normal fenestration.

Designed and developed low energy density Flyash bricks (see Figure 2) for internal as well as external walls of the buildings. The brick has been tested by Indian Institute of Technology (IIT) -Bombay and the average thermal conductivity is 0.19 W/meter Kelvin. These bricks envelope and protect the building from water leakage and act as a better insulator thereby reducing the energy demand for air-conditioning.

Cover the terrace roof with high albedo insulating material having SRI (Solar Reflectance Index) value greater than 78 to reduce the heat absorption and energy demand for air-conditioning.

Other energy efficient products used are -

- Use BEE 3-star rated products for external lighting and sprinklers in gardens to minimise the energy requirement of buildings.
- Use of CFC free refrigerants in air conditioners
- Use timer based sensors for external lights and sprinklers in gardens

All the above initiatives help achieve the energy efficiency in our buildings.

Other than the above we have commissioned a 75 KW rooftop solar plant at Mahindra World City, Chennai, a step towards harnessing green energy resource. This is expected to generate approximately 1,16,000 units (kWh) of clean electrical energy annually and offset emissions of nearly 60 tons of carbon dioxide per year.

**II. Maintaining Healthy Indoor Environmental Quality:**

Initiatives taken to achieve healthy indoor environment quality are -

- Provide more open-able window space to floor ratio than the stipulated norms to improve the ventilation effectiveness.

- Use of low VOC (Volatile Organic Compound) paints, adhesives and insulations inside the flat for improved moisture management. It also helps in increasing the occupants productivity.

- Design in a way that day lighting for at least 75% of the regularly occupied area

- Provide cross ventilation between each dwelling unit

**III. Preservation and Conservation of Soil and Water:**

Some of the initiatives that are observed in all our buildings are -

- We preserve the top soil during and post construction and build innovative erosion and sedimentation control management systems

- Rain water harvesting systems and storm water management to recharge the ground water table

- Reuse of the treated wastewater for flushing and landscaping thereby reducing the municipal water demand

- Low flow water faucets and fixtures in every flat of the residential building

- Use drought tolerant species with xeriscaping in landscaping to reduce water demand in gardening

**IV. Material Management:**

We prefer selecting the manufacturer and supplier from within a 250 km radial distance from the site. We give much emphasis to use of materials with recycled content without compromising on quality.

**V. Waste Management:**

Some of the initiatives under waste management are -

- All sites reutilize more than 75% of construction waste; these are used in building roads & pavements.

- An in-house solid waste management plant is constructed to take care of all the municipal waste. The waste is processed and recycled as manure and used for landscaping purposes.

- An in-house STP (Sewage Treatment Plan) is also constructed for treatment of sewage

**VI. Labour Welfare:**

During the time of construction, we not only provide basic facilities to our labourers but also additional facilities such as -

- Establish informal schools and crèches aimed at providing basic education and a safe environment for children of construction labourers when the parents are at work

- Imparting vocational training to labourers in trades like electrical maintenance, electronic goods repair, computer fundamentals, garment design & stitching, beauty treatment and hair dressing

- Conduct health camps in labour camps (i) vaccination camps for labourers and their family members (ii) Regular health check ups and mobile medical facilities.

## Case Study: 'Mahindra Chloris', Faridabad

We employed most of the above mentioned initiatives in one of our projects 'Mahindra Chloris', Faridabad which is Platinum rated under the CII - IGBC green home rating system (India's second completed residential development to achieve the highest rating in the multi-dwelling units category).

The following impacts have been measured for Mahindra Chloris, Faridabad as per the IGBC Green Homes Rating system during the design phase.

## Environmental Impact:

- Reduction in energy demand upto 144 KW as 80% requirement for hot water is met through solar water heating systems

- Reduction in energy demand upto 11.34 KW through solar street lighting

- Reduction in GHG emissions as more than 90% of the construction material is purchased within a radius of 250 km from the site

- Reduction in water consumption as 100% of the waste water is reused post treatment

- Water conservation due to rain water harvesting systems for 100% of the runoff volume from the roof

- Reduction in fresh water use of more than 30% due to installation of water efficient fixtures

- Reduction in waste as more than 75% is reused within the site

## Economic Impact:

- Savings in energy upto 20% as green homes are more efficient than their conventional counterparts

- The company was able to negotiate Home Loans for its customers from State Bank of India (SBI) at 0.25% less than the prevailing interest rate resulting in an economic benefit to those customers who availed this facility.

## Social Impact:

- Improvement in the quality of living of all contract labourers due to the provision of healthy dwelling facilities in the form of labour camps

- Improvement in health due to regular health checkups and medical camps for labourers

## Concluding Remarks

Developing green buildings for achieving mere 'ratings' is not an end in itself; instead, it is the beginning of the journey towards a higher purpose and a larger end.

It is a myth that 'green necessarily means higher cost'. It was realized that an innovative approach and application of technology coupled with stretched targets and fixed timelines can not only create opportunities for innovations, but also save capital cost as well as life-cycle costs.

The measure of our success is not the 7 million sq. ft. of projects we have completed nor is the ongoing over 8 million sq.ft. of new projects under construction. Instead, it is the smiles we create on every face and the lives we improve.

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# Indoor Environment quality and occupant well-being in India: A paradigm shift

*Priyanka Kulshreshtha and Geetika Mishra*
*Department of Resource Management and Design Application*
*Lady Irwin College, Delhi University, New Delhi*

Just a week back I was asked to review a book for an undergraduate course in environmental science. Since my area of research has been air quality ,I promptly jumped on to the section of air pollution .The author had talked in detail about the treacherous air pollution playing havoc in metro cities of India and provided terrifying data on the mortality rate due to ambient air pollution, which with due respect, I agreed to. However, to my surprise, not a single mention was made about the importance of indoor environmental quality in modern India. This incident is enough to tell us about the level of awareness and status of research on indoor environmental quality in India.

Indoor Environment Quality (IEQ) is one of the important factors for ensuring health, comfort, safety and productivity of the population. It refers to the quality of environment inside the building that is determined by many factors such as indoor air quality (IAQ), thermal comfort, lighting quality, acoustic conditions as well as furniture and space layout. Research has linked the concentration of pollutants indoors with productivity, sense of well being and occupant's health. In the long term, poor IEQ may give rise to a set of symptoms and health problems to the occupants of the building collectively known as Sick Building Syndrome (SBS). The various symptoms associated with SBS are irritation of eyes, nose and throat, headache, cough, wheezing, cognitive disturbances, light sensitivity, gastrointestinal distress and other flu like symptoms. The factors inducing SBS in an enclosed environment could be uncomfortable temperature and humidity, chemical and biological pollution, physical condition, and psycho social status.

The concept of IEQ was born in urban India around the initiation of the term 'green' building brought on by LEED (Leadership in Energy and environmental design) almost a decade ago. Ironically, a study which compared the symptoms of SBS in different categories of LEED certified buildings, concluded that LEED certification had no correlation with the SBS symptoms and making the buildings 'green' did not reduce SBS symptoms(Mohan 2012).

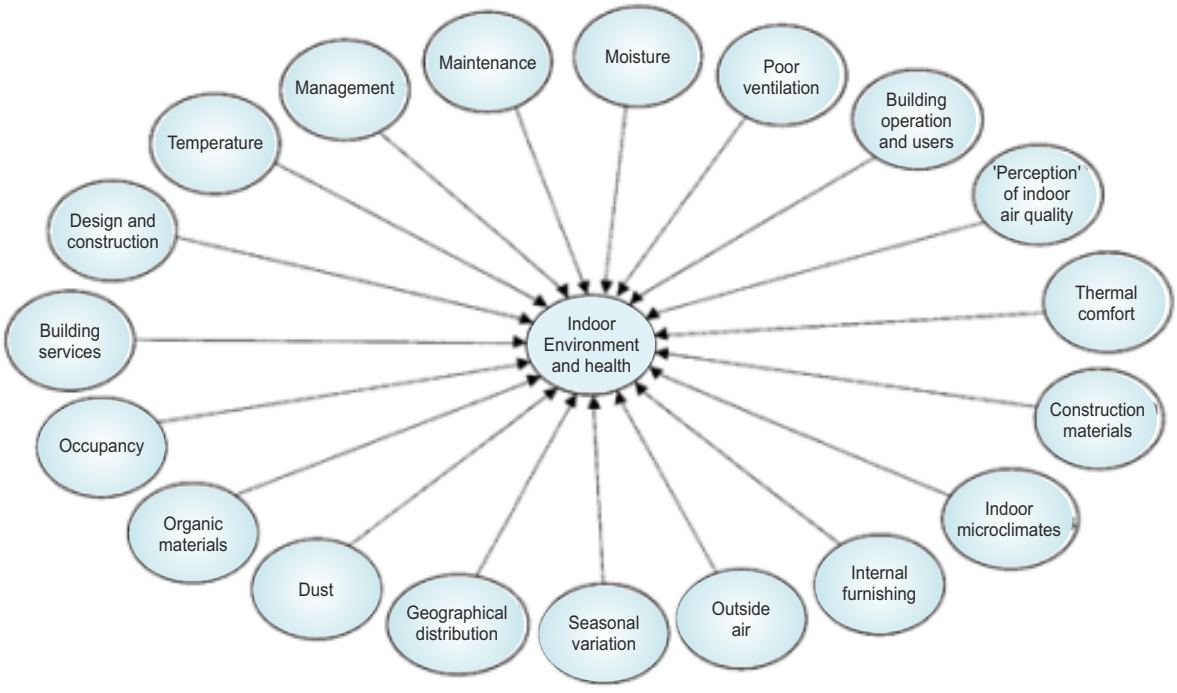


*Fig 1: Factors affecting IEQ and health (Source: Singh J. 1996)*

The thrust areas in IEQ then started concentrating on IAQ, which is a sub-set of IEQ. Some of the pollutants of concern in indoor environment, include respirable suspended particulate matter (RSPM), asbestos, Radon, environmental tobacco smoke (ETS), volatile organic compounds (VOCs) and formaldehyde. It has been proved consistently that children under five years of age in developing countries are at a higher risk of chronic obstructive pulmonary diseases, acute respiratory infections and mortality. In order to ascertain a healthy IAQ, some countries like Canada, Japan, Korea, Singapore, Sweden, UK and USA have established international standards. But, India has no such standards developed for IAQ and sadly, the country's top advisory body, the Planning Commission wants more epidemiological studies to agree on national indoor air pollution norms and are in no hurry to do so despite the fact that about 1.3 million deaths in India are attributed to indoor air pollution. On the other hand, the vulnerability of the population to air pollution related diseases in the Indian sub-continent is very high due to higher exposure to the air pollutants both in the indoors as well as outdoors.

In developing countries like India the major source of energy at the household level is acquired through the burning of coal and biomass in the form of wood, animal dung and crop residues. On a global scale, it is also the largest source of indoor air pollution. In simple cooking stoves, toxic pollutants are emitted in the substantial quantities. Often, the food is cooked in an open combustion scenario and no chimney is used to minimize the indoor suspension of air pollutants. There is no provision of ventilation in the kitchens, especially in the cold climatic conditions. The incomplete combustion of biomass fuels leads to very high levels of indoor air pollution and the most vulnerable are women and children.

Currently India is facing an air quality crisis and research has revealed horrific results that two Indians die every minute due to air pollution. Keeping in mind India's heavy dependence on wood and biomass as domestic fuel, Government of India initiated the National Program on Improved Chulha (NPIC) in 1984-85. It is aimed at popularizing the use of improved cooking devices in rural areas of the country. The secondary objectives of the program involved reducing the drudgery for rural women and to create income-generating opportunities. This has played a role in improving the IAQ of rural households to some extent. In the same way many non-government organizations have worked on the improvement of cook stoves in rural areas. For example, in Bundelkhand 980 improved chimney cook stoves (Sukhad stoves) were distributed resulting in 70% reduction in $CO_2$ concentration and 44% reduction in $PM_{2.5}$ concentration. In urban areas, factors like fuel adulteration, vehicle emission and traffic congestion also contribute to indoor air pollution. As the diffusion is lower, the concentration of pollutants increases and other building factors also add to the ambient pollutants. **In terms of air pollution, India is ranked highest amongst the world's most polluted countries.**

A major intervention that needs to be brought to the forefront to tackle the problem of indoor air pollution is to sensitize the masses regarding its severity and magnitude. This would enable policymakers to recognize its importance in indoctrinating it as a mandate. More cohort studies need to be carried out to understand the epidemiology of indoor air and relevant impacts to human health. Prevention will be the key rid this menace and placing both ambient air and indoor air as high priority research areas would help address the challenge. Smaller steps, but consistent ones, need to be taken for India to have a national set of standards for healthy indoor air quality.

# E-Waste: An Urban Mine and an Untapped Business Opportunity

*Viibhuti Agarwal,*
*Environmental Management Centre LLP*
*vibhuti.ag@gmail.com*

E-waste is discarded, damaged and obsolete electrical and electronic equipment such as mobile phones, IT equipment, household appliances etc. It is one of the fastest growing waste streams in the World. Increase in disposable income, rapid improvements in technology and competitive prices of electronic goods have exponentially boosted the electronics market while consequently generating e-waste at the end of the products' useful life.

In 2014 the total amount E-waste generated globally was 41.8 Million Metric Tonnes per annum (MMTA); forecasted to increase to 50 MMTA by 2018[3] . In India, E-waste is expected to increase at a compound, annual growth rate of 30% between 2016 and 2020[4] . Figure 1 below shows the estimated annual generation by various organizations over the years.

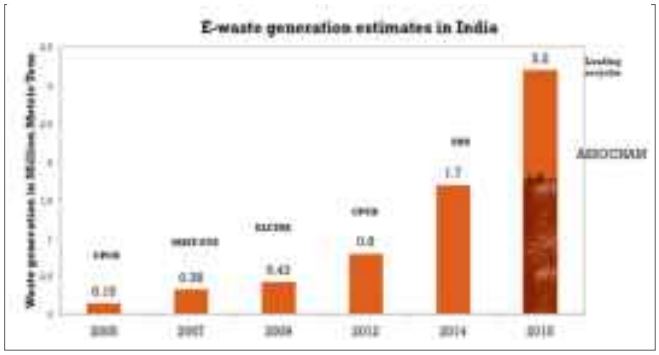


*Figure 1: E-waste generation rates in India* [5, 8, 5, 1,2, 4]

*CPCB – Central Pollution Control Board; MAIT - Manufacturers Association for Information Technology; ELCINA – Electronics Association of India; UNU – United Nations University; ASSOCHAM - Associated Chambers of Commerce and Industry of India*

E-waste contains hazardous substances like lead, mercury, cadmium, arsenic and other metals that are being rapidly depleted and that are environmentally harmful when disposed unscientifically. On the other hand, E-waste contains metals and plastic components that when extracted, have high re-use potential and economic value. This makes the business of E-waste Management a very lucrative proposition.

## E-Waste Management Policy of India

Until 2011, there was no dedicated E-Waste Policy in India. E-waste was covered under the Hazardous Wastes (Management and Handling) Rules, 1989. E-waste is primarily handled by the unorganized (informal) sector or *kabadiwallahs* who follow crude and unsafe methods to dismantle and recover valuable components from e-waste. This has resulted in environmental degradation as well as poor health of the informal sector workers. In addition, there is wastage of precious resources due to inefficient resource recovery techniques being used.

Over the years, collaborative effort and pressure from groups such as MAIT, Greenpeace and Toxic Links culminated in the introduction of E-waste (Management and Handling) Rules, 2011 to channelize E-waste for environmentally sound recycling by the formal sector. The Rules defined key stakeholders like Regulatory Agencies (CPCBs/SPCBs), producers of electrical and electronic equipment (EEE), recyclers and consumers and also their roles and responsibilities. An important strategy introduced was the Extended Producer Responsibility (EPR). EPR was introduced for effective E-waste Management (EWM) and action by EEE producers to establish an operationally and economically viable E-waste management ecosystem. EEE producers are responsible for financing and developing environmentally sound 'end of life' management systems for their products.

The 2011 rules were superseded by the 2016 rules to include more stakeholders (like manufacturers, retailers, refurbishers), strengthen enforcement and monitoring, include penalties for non-compliance and training and safety for E-waste sector workers.

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[3] *Baldé, C.P., Wang, F., Kuehr, R., Huisman, J., (2015), The global e-waste monitor – 2014, United Nations University, IAS – SCYCLE, Bonn, Germany, Page 50*

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## E-Waste: An urban mine and a lucrative business opportunity in India

India is a massive consumer of electronics. In 2014-2015, electronics worth $63.6 billion were consumed in India[5]. These electronics will turn into e-waste at the end of their useful life. E-waste is an *urban mine* that contains iron, steel, copper, aluminum and precious metals like gold, silver, palladium and plastics. See Figure 2 for the extraction potential and value of resources from E-waste on a global scale in 2014[1].

| Material | Weight in Tons | Value in Million USD |
|---|---|---|
| **Precious Metals** | | |
| Gold | 300 | 11,340 |
| Silver | 1,000 | 630 |
| Palladium | 100 | 1,960 |
| **Other Metals** | | |
| Iron, Steel | 1,65,00,000 | 9,810 |
| Copper | 19,00,000 | 11,550 |
| Aluminum | 2,20,000 | 3,490 |
| **Plastics** | | |
| Plastics | 86,00,000 | 13,410 |

*Figure 2: Resource content and monetary value of E-waste generated globally in 2014*

In India, the monetary value of the recovered material from e-waste was $4 billion in 2015 and is expected to increase to $20 billion by 2020.The materials can be recycled or re-used for manufacturing products while providing jobs to a large, otherwise unemployed, workforce in the country.

## Formal vs Informal E-waste Businesses

In India, 95% of the E-waste is handled by the informal sector and only 5% by CPCB registered formal recyclers[2].E-waste rules mandate that all recyclers obtain authorization to recycle E-waste. This resulted in an increase in the CPCB registered (formal) recyclers from 23 units in 2011 of capacity 0.09 MMT to 138 with a capacity of 0.35 MMT . But there is still a very long way to go. The 2016 rules can further boost the valuable formal recycling sector and curb polluting informal sector activities.

The pool of 138 recyclers is a mix of small, medium and large-scale enterprises and includes recyclers that started their business operations well before the E-Waste rules. They realized the economic potential in the E-waste business. It is interesting to note that the 138 recyclers / dismantlers are spread across only 13 States in India which implies that the E-waste generated in other States is collected and transported to these 13 States or is disposed of unscientifically. Some of the successful Indian E-waste Business examples are detailed below:

## E-ParisaraaPvt. Ltd.

In 2005, E-Parisaraa started off as an R&D pilot plant that could process 1 ton per annum of E-waste in Bangalore. E-Parisaraa is one of the first movers in the sector. Its plant capacity has grown from 1 ton to 8,820 tons per annum. As a first mover, it engaged with major IT companies in Bangalore like IBM, Intel etc. well before the E-waste and EPR regulations came into play. The incentive for the IT companies then was to comply with stakeholder demands and to document their social and environmental performance.

The services initially started with collection, dismantling and segregation and have now expanded to material extraction, gold and silver recovery, and lighting fixture component re-use. However, E-Parisaraa continues to export shredded PCBs and copper components to Umicore in Belgium for smelting and extraction. The company that was a pioneer in the industry and undertook R&D and education initiatives now faces stiff competition from other players in the industry.

## Ecoreco, Eco Recycling Ltd.

Established in 2007, Ecoreco is one of more successful businesses in the sector. Its recycling facility is the first to be registered by CPCB. Ecoreco invited 100 corporates to their facility to showcase and encourage environmentally sound recycling. Ecoreco **partnered with a logistics company** to support their recycling and refurbishing business. Ecoreco

[3] *National Institution for Transforming India (NITI) Aayog, (2016), Make in India Strategy for Electronic Products, India, Page 2, Online Source: http://niti.gov.in/writereaddata/files/document_publication/ Electronics%20Policy%20Final%20Circulation.pdf; Accessed on October 21st 2016*

[4] *Ecoreco's CSR Plans & Partnership, (2016), Online Source: http://ecoreco.com/aboutus-csr.aspx; Accessed on Oct 25th 2016*

[5] *Rajya Sabha Research Unit (LARRDIS),(2011), E-waste in India, New Delhi, Page 5 & 99 Online Source: http://rajyasabha.nic.in/rsnew/publication_electronic/E-waste_in_india.pdf; Accessed on Oct 22nd 2016*

[6] *Central Pollution Control Board, (2014), List of Registered E-waste Dismantler / Recycler in the country, India Online Source: http://cpcb.nic.in/Ewaste_Registration_List.pdf; Accessed on Oct 22nd Oct 2016*

provides its clients with onsite and offsite lighting recycling services. It supports manufacturers' with their EPR responsibilities via its take-back and recycling services.

E-waste Mukta Bharat (E-waste free India) Program - One of the key businesses challenges any recycler faces is collection of E-waste from the source of generation. Ecoreco recognizes that collection is the most crucial step of the E-waste management business strategy. To tackle this issue, Ecoreco launched a social program to set-up accessible E-waste collection centers for the masses. Ecoreco targets to install 100,000 bins and 5,000 Take Back Points (collection centers) across India by 2020 to help collect E-waste from corporates and the masses. In addition to the corporates, Ecoreco will install bins in strategic locations such as educational institutes and places of worship to reach out to the masses.

Ecoreco's Franchise model: Ecoreco is inviting NGOs, recyclers, dismantlers, collectors, informal sector workers and young entrepreneurs to partner with them in the 'Ecoreco Take Back Point' initiative as a franchise. Every franchise should set-up its own Take Back Point, a facility of minimum 1,000 sqft, which will require an investment of $8,200 or INR 550,000.

## AtteroRecycling Pvt. Ltd.

Founded in 2008, Attero's**revenue increased 8 times from $1 million in 2009-2010 to $8 million in 2011-2012**. 85% of their revenue comes from sale of re-usable precious metals from E-waste. Attero has a wide collection network across the country with over 25 warehouses and collection centers across 21 states.

With low-cost high efficiency technology that is relatively nascent in India, they recycle mobile phones, CRT and flat panel display units, batteries, PCBs and IT equipment. They refurbish mobiles and IT equipment and sell them under their brand**, Gobol**. To enhance their collection rates, Attero launched **Atterobay,** their e-commerce platform where consumers can sell their gadgets like smart phones with free shipping that are refurbished or recycled by Attero.

## Operations and Business model

They collect 35% of their raw material from **manufacturers or directly from their consumers**, 35% from **500 large corporates** who prefer Attero due to their nation-wide collection network and the remaining 30% from household or individual consumers **via the informal sector**. In order to streamline the informal sector, Attero educates them and incentivizes them by offering one and half times more value of E-waste than what they would otherwise make.[9]

## GreenDust

Founded in 2008, GreenDust is a reverse logistics company that collects and refurbishes electronics that are returned due to damage or defect by customers to their manufacturers or are collecting dust in warehouses. GreenDust had the first mover advantage since few companies had heard of or practiced reserve logistics. With a return rate of 4-6% in India, electronics worth $12-$15 billion are returned every year. GreenDust conducted a study that helped companies realize that the cost to get back a returned product was higher than its original value and demonstrated the value in tying up with a reverse logistics firm. [10]All the collected products undergo a 50-point quality check before being put up for re-sale with a GreenDust certification.

GreenDust has partnered with brands like Apple, Samsung, Dell, Philips, Whirlpool and retailers like Croma, Homehop18 to refurbish rejected or damaged electronics and re-sell them at a 30% lower cost than the market price. GreenDust's main customer base is Tier II and Tier III cities where people are vying for brands. In three years, the company set-up 200 stores and 14 warehouses and repair units across the country and boasts of a customer base worth 25 crores.

## Business Challenges

Inventorization, collection, channelization and efficient extraction of E-waste are some of the key challenges faced in the handling and management of E-waste. Let's briefly look at them:

[9] *Online Source: http://attero.in/latest_news.php?link=%20115 ; Accessed on October 28th 2016*

[10] *Online Source: http://attero.in/latest_news.php?link=%20115 ; Accessed on October 28th 2016*

*Inventorization* - There is no established and agreed upon methodology to conduct e-waste inventory on a national or state level. Various public and private organizations provide significantly varying annual volumes of generation. Issues like outflow to the informal sector, varying product obsolescence rates, lack of adequate data on product sales, storage and disposal makes inventorization an even bigger challenge. This issue is particularly challenging for E-waste businesses as unpredictable supply can lead to underutilized or insufficient recycling plant capacities; *Collection & Channelization* - Recyclers say that collection of E-waste is their primary business challenge. A mere 1.5% of the e-waste gets recycled due to poor collection efficiency[2]. E-waste is land filled, illegally burnt or handled by informal recyclers or stored for prolonged periods and does not get channelized for recycling affecting profit margins; *High Efficiency Technology Availability* - Manual extraction or burning of e-waste by the informal sector, technologies with poor resource extraction efficiencies lead to reduced profit. Many recyclers use inefficient technologies or export complex e-waste components. Some have developed their own technologies in-house. Importing high efficiency technology is a risk because of high capital costs and unreliable material supply.

## Future Potential of E-waste businesses

Given the rapid growth of E-waste generation in the country, penetration of the electronics market in rural areas, the evolution of E-waste rules, increased stakeholder responsibilities and local technology development there is immense potential to set-up E-waste businesses all across the country. The challenges mentioned above have to be addressed in order to make a business economically viable and sustainable. Box 1 includes examples of potential E-waste business models that can be successful in the current E-waste sector landscape:

### Box 1 – E-waste Business Models

**Model 1 - Business tied with Producers Practicing EPR and Business with Bulk Consumers**

A company can be set-up to provide EPR management services to EEE Producers that need to comply with EPR mandates such as Dell, HP, and Apple. They can start by helping the Producers develop an EPR management plan and assist in implementation. The company can use operational and financial instruments to incentivize bulk consumers and individual consumers and set-up a reverse logistics ecosystem. Contractual agreements with bulk consumers and economic incentives for individual consumers can abate the risk of unreliable material supply.

**Model 2 - Business tied with Software Technology Parks of India (STPI) and Industrial parks (IP)**

STPI and IP are bulk generators of E-waste. Companies can set-up shop in an STPI (53 locations across India) or Industrial Parks in cities like Pune, Bangalore, and Hyderabad where they collect and process all the E-waste generated by the organizations in the STPI or IP.

**Model 3 - Business focusing on PRO that operates Collection Centres with Producers, Recyclers/Refurbishers**

A Producer Responsibility Organization (PRO) can be set-up as a co-operative of Producers who are obliged to meet their EPR. Companies that provide collection, dismantling, recycling and/or refurbishing services can operate the PRO. Producers can pool in funds to kick-start the process until the business becomes self-sustainable. Producers can benefit from this model by sharing their legislative, operational and financial responsibilities amongst all PRO members.

**Model 4 - Business involving Informal Sector, their role & contribution in the value chain**

One of the focuses of the E-waste sector stakeholders like government, recyclers, NGOs is the integration of the informal sector into the formal sector. This strategy has the potential to arrest outflow of E-waste to the informal sector and also to improve the working conditions and health of the informal sector employees. Companies can be set-up to focus on the business of training and building capacity of the unskilled labor so they can become part of the formal workforce.

The above business examples and illustrations of potential business models demonstrate the high growth potential, economic potential and attractive profit margins in the E-waste management sector. Like in other sectors, E-waste businesses have their own set of challenges and business risks that need to be assessed and overcome to achieve success.

# Sustainability Priorities of the Cement Industry in India

*Philippe Fonta,*
*Managing Director, Cement Sustainability Initiative, WBCSD*
*fonta@wbcsd.org*[11]

India is one of the most important regions for the cement industry around the world, second only to China in terms of installed capacity. At the same time, the country is enhancing continuously its sustainability performance.

The World Business Council for Sustainable Development's (WBCSD) Cement Sustainability Initiative (CSI)[12] is working actively in various fronts of sustainable development for the Indian cement industry. 10 cement producers, including 3 India based companies and 7 subsidiaries of international groups, contribute to the encouraging results delivered by the CSI's regional work programme in India.

Being one of the most energy efficient performers amongst cement producers in the world, Indian cement producers are building new plants with latest technologies and there is a zeal to create the most efficient plants in the world. This is an industry which does not believe in resting on its laurels, but rather continues to relentlessly seek out newer, better and breakthrough technologies to further improve their performance. The Indian cement industry has successfully reduced total $CO_2$ emissions from a substantially higher level of 1.12 $tCO_2$/t cement in 1996 to an industrial average of 0.719 tonnes (t) of $CO_2$/t cement in 2010 (latest publicly available data)[13].

CSI India plans to focus on managing safety and climate change issues initially, being consistent with the overall work program developed at CSI worldwide. It will progressively cover the other issues, henceforth.

## Safety is the number one priority for CSI member companies

A key priority area for CSI work globally and in India is Safety. Through the years, CSI members have made notable progress in improving safety and reducing fatalities amongst their employees. Having said that, companies around the world and in India agreed that more work is required to improve contractor and logistics safety.

Ensuring safety of drivers and vehicles on roads continues to be a challenge for India as a country. India is one of the most densely populated nations in the world; its roads are often choked with traffic and have become increasingly perilous. In addition, roughly 60 to 70% of road crashes in India are related to commercial vehicles and hence improving fleet safety management can contribute significantly to overall road safety[14]. CSI members in India are working collaboratively to put in place the highest standards of safety not only within their plant boundaries but also along their logistics chain, while dealing with various local challenges.

One of the high risk factors identified is fatigue and tiredness around driving. Unfortunately many drivers, particularly commercial drivers do not adequately realize the importance of this, or for various reasons do not take into consideration the impact of fatigue and tiredness during driving, and sometimes push themselves to the limit. To address this issue, the CSI India working group on safety has developed a document to highlight good practices for fatigue management.

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[11] *Readers may contact Esha Sar, Coordinator (India operations), CSI at sar@wbcsd.org*
[12] *CSI is an initiative of the World Business Council for Sustainable Development (WBCSD). CSI is a global effort by 24 leading cement producers, with operations in more than 100 countries. Collectively these companies account for around 30% of the world's cement production (in India, CSI members represent around 60% of the national production) and range in size from very large multinationals to smaller local producers. All CSI members have integrated sustainable development into their business strategies and operations, as they seek strong financial performance with an equally strong commitment to social and environmental responsibility.*
[13] *Global Cement Technology Roadmap: Low Carbon Technology for the Indian Cement Industry, WBCSD-CSI, IEA*
[14] *Source: Global Road Safety Partnership website : http://www.grsproadsafety.org/*

The safety working group is also collaborating with transporters, drivers and companies of other industrial sectors to enhance safety awareness through training and motivation, to ensure better working conditions for drivers, better enforcement of regulations, and to improve the safety and quality of vehicles. A culture of knowledge sharing is promoted within the group, on both success stories and pitfalls, to help members learn from the good practices and mistakes of peers so to improve the overall safety performance.

In addition, CSI India is collaborating with Global Road Safety Partnership (GRSP), which is working under the umbrella of the Red Cross and Red Crescent. Some local projects and initiatives are currently being taken with GSRP which will benefit CSI India and add to their knowledge experience. One such successful initiative is forming of a multi-sectoral discussions platform bringing together actors from the private sector, civil societies and governments, focusing particularly on reducing road crash injury and death.

## Low-Carbon Technology for the Indian Cement Industry

Following the Global Cement Technology Roadmap[15] developed in 2009 through a partnership between the CSI and the International Energy Agency (IEA), CSI members in India joined hands with IEA in early 2013 to develop a 'Low-Carbon Technology for the Indian Cement Industry'[16]. The country specific adaptation was required to better address the local issues and develop targeted actions. The initiative in India is supported by the International Finance Corporation (IFC), a member of the World Bank Group.

The Roadmap outlines existing and potential technologies, and how they may help the industry support a halving of global $CO_2$ emissions across all areas of business and society. It aims to help policy-makers and financial institutions work with the cement industry to adapt for a carbon-constrained world.

The India roadmap outlines a low-carbon growth pathway for the Indian cement industry that could lead to carbon intensity reductions of 45% by 2050, from the 2010 level. It proposes that these reductions could come from increased clinker substitution and alternative fuel use; further improvements to energy efficiency, and the development and widespread implementation of newer technologies.

The roadmap is based on a set of technical papers entitled 'Existing and potential technologies for carbon emissions reductions in the Indian cement industry'[17], developed by the Confederation of Indian Industry (CII) Green Business Centre and National Council for Cement and Building Materials (NCB). The modelled results projected in the roadmap are a combination of information from these papers, and emissions data from about 65% of the India cement industry, gathered through the CSI "Getting the Numbers Right" (GNR) database[18].

Partners supporting this project brought different kinds of expertise and contributions to the table: IEA brought expertise in data analysis and modelling capabilities and roadmap development; technical consultancy was provided by the CII and NCB; IFC supported the development financially; and the CSI provided a platform to solicit participation of key India cement producers.

The Roadmap lays out the way forward for the industry along a low carbon trajectory, it identifies key levers for reducing emissions, outlines technologies, policy frameworks and investment needs to reduce $CO_2$ intensity in the Indian cement industry. Through wide consultation amongst different players, roadmaps allow for greater buy-in amongst

[15] *Refer the link for the Global Cement Technology Roadmap : http://www.wbcsdcement.org/pdf/technology/WBCSD-IEA_Cement%20Roadmap_centre_spread_actual_size.pdf*

[16] *Refer the link for Low Carbon Technology for the Indian Cement industry: http://www.wbcsdcement.org/index.php/technology/india-roadmap*

[17] *To read the technical papers, visit the link: http://www.wbcsdcement.org/index.php?option=com_chronocontact&chronoformname=ExistingandPotentialTechnologiesforCarbonEmissionsReductionsintheIndianCementIndustry*

[18] To see the GNR database, visit the link: http://www.wbcsdcement.org/index.php/key-issues/climate-protection/gnr-database

stakeholders on the actions needed to achieve a given goal. The Roadmap has provided the industry with a tool to identify its future pathway.



Waste heat recovery (WHR) is one of the key levers identified in the technology roadmap – WHR boiler

A number of CSI member companies in India have commissioned studies to assess the potential and feasibility of implementing the technologies outlined in the technical papers. There are plans to disseminate the knowledge captured in the technical papers to a wider audience spanning the entire cement industry in India in order to scale up actions.

Learnings from the feasibility studies would also be shared with the industry to enable greater replication and reduce time spent by other companies on the learning curve. Non-CSI member companies have also approached IFC to explore the possibility of conducting feasibility studies in their plants, a development that is fully encouraged by the CEOs of the CSI members in India and bears testament to the utility and importance of the work undertaken by the Roadmap project.

## Venturing into new work areas to address emerging sustainability issues in India

CSI members in India are also exploring newer areas for collaborative action viz. biodiversity management, water management and emissions control. With support from the International Union for Conservation of Nature (IUCN), a first workshop in India on WBCSD Business Ecosystems Training (BET) will take place in early May 2014. Similar activities for other areas will be organized in coordination with the CSI global task forces.

The work programme for CSI in India has been growing continuously to respond to the needs of an expanding membership and enlarged work scope and to match the overall CSI work program. Companies acknowledge the fact that our societies expect business not only to manage its own sustainability issues, but to help society manage wider issues. Members of the CSI are committed to their stakeholders by becoming part of the solution through driving progress and sustainability of the cement industry in India.

# Greening your Procurement

*Dr. Prasad Modak,*
*Chairman, Green Purchasing Network of India, Mumbai,*
*info@gpnindia.org, prasad.modak@emcentre.com*

Green Procurement (GP) is one of the key strategies towards Sustainable Consumption & Production (SCP).

Many countries have recognized the importance of GP and have formulated policies, regulations and guidance for its promotion. Examples of countries leading in GP include China, the European Union, Korea, Japan, Taiwan and Thailand. Movement to GP in Asia is picking up, especially under support from UNEP and EU supported SPIN-Asia program and initiatives such as International Green Purchasing Network (IGPN). However, where there are no national policies on GP, there is not much impetus as well as guidance to the corporations, either in the form of recognition or financial incentives. Having a national framework on GP in place, is therefore important to trigger and sustain green procurement. In the absence of such policy frameworks, green procurement is often adopted by businesses due to pressures from the supply chain.

Introducing and practicing GP is however a long process and requires a strategic approach. Ad-hoc approaches can pose risks, especially if the launch is ambitious. There are concerns whether change in the procurement will work at all on the account of quality and whether there will be availability in quantities and in time. Vendor capacity to ensure green supplies is also a concern. Definition of green itself has been a nebulous area. In its absence, especially at the operational level, skeptics often call green procurement as green washing.

A rounded approach is needed supported by top management and that includes building of vendor understanding and capacities with deliberate efforts of influencing the market. This article presents a 16 step process for greening of procurement. Each of these 16 steps is described below:

1. **Get management buy-in:** Such initiatives are successful if the organisation's top management believes in it.

2. **Reflect the spirit of GP in Vision/Mission and Principles:** It is important that the spirit of GP, especially of SCP, is well reflected in vision/mission of the organization.

3. **Find a leader:** In order to succeed, organization needs to appoint a leader who will take on responsibility of introducing GP.

4. **Establish a Multi-Disciplinary and Multi-Departmental Team:** Given the wide canvas of GP that encompasses environmental, social and economic dimensions, a team that brings together core understanding of these dimensions needs to be built within the organisation. In addition, representatives of key departments such as accounts, finance, human resources, public relations and legal apart from procurement and environment divisions are also required.

5. **Formulate GP Policy**: Develop GP policy based on organisation's vision/mission statement. This policy should be signed up by organisation's CEO.

6. **Define what is green?** : Greenness of a product or a service is hard to define given the broad canvas of sustainability. Green Purchasing Network of India (GPNI) under a project "Harmonization of Criteria for Eco-labels" reviewed 143 eco-labels across the world and came up with 8 common core criteria (See Figure 1). Table 1 presents the criteria and their relevance to GP.

7. **Assess current purchases**: Establish a baseline of the existing situation before starting the process. Compile information on procurement statistics (items, quantities, quality/standards, timing, vendor details, client feedback, past experience etc.)

8. **Start small**: It is important not to embark into an ambitious plan at the start. Based on assessment done, scope and prioritize the products/components that need to be greened in a phased approach.

9. **Consider a thematic for a Product**: Choose green themes across products or product categories. For example, GP may be introduced by focusing on purchasing *recycled content products*. Such products include office papers and envelopes, packaging, plastic lumber, traffic cones, re-refined motor oil, antifreeze, and toner cartridges, just to name a few. Another possibility could be to focus first on *energy efficient products*. Such products could be labelled (e.g. Energy Star) and help reduce operational costs through reduced electricity consumption and decrease the Greenhouse Gas (GHG) emissions. Here, greening the procurement helps save monies. Other possibilities include focusing

*Table 1: List of 8 Common Core Criteria for Green Product and their Relevance to GP*

| S.N. | Criteria | Relevance to GP |
|---|---|---|
| 1. | Compliance to environmental regulations and pollution control standards | Products should be sourced only when they meet compliance requirement across the life cycle. Life cycle consideration of compliance is the key here. |
| 2. | Exclusions and Preferences based on Life Cycle Assessment | Example here could be opting for less or no recalcitrant materials or avoid materials with high embodied energy |
| 3. | Resource Conservation and Efficiency | Asking for minimum Energy Star rating, ensuring that water consumption is close to benchmarks and waste/emissions per unit production are low |
| 4. | Conservation of Biodiversity and Overall Environmental Protection | Ensuring that depletion / degradation of forest resources is avoided through sustainable forestry |
| 5. | Reporting and Responsible Disclosure of Product Information | Creation of datasheet based on green criteria and making it mandatory for labelling / websites etc. |
| 6. | Biodegradability and Recyclability | Use of biodegradable materials, factoring Design for Sustainability (D4S), take back policy for recycling |
| 7. | Implementation of Environmental Management Systems (EMS) | Made compulsive for large scale vendors or component suppliers having high impacting goods / services |
| 8. | Social Inclusion | Ensuring that labour is managed on fair basis, with elements of benefit sharing |

on *green cleaning products* to improve health & safety of staff and consumers.

10. **Strategize procurement**: Once product focus and phasing is decided, various strategies on procurement need to be aligned with the organisation's procurement guidelines or corporate procurement systems or the national procurement framework. Broadly, for mainstreaming, a special approach needs to be adopted where green procurement is treated as a category. In mainstreaming, elements of resource efficiency, exclusions, biodegradability, and recyclability need to be included in the product specification itself. In a special approach, one can introduce 'Green tenders' as a category. Green tenders become in a way "pilots" to understand and learn about operationalizing the concept of "greening". Green tenders help build a targeted vendor database around certain priority products and services, build internal processes and staff capacities, send signals of phase wise greening to the market. Again, both these strategies cited above should not be looked at as "silos". In practice a hybrid solution that is scaled up in phases, is recommended.

11. **Involve stakeholders**: It is very important that stakeholders are consulted in deciding the implementation strategies. Stakeholders could involve internal team members of various departments, existing vendors, buyers, environmental NGOs, green specialists, eco-label representatives and certifiers, regulators etc. Involvement could be sought through discussion meetings and bi-lateral consultations etc.

12. **Choose Right Vendors**: Organisations may have to approach new vendors or build capacities of the existing vendors. Vendor selection criteria could include - consistent record of meeting environmental and social compliance, a certain degree of commitment to proactive environmental management e.g. asking for EMS ISO 14001 certification etc.

13. **Build Vendor Capacities**: Building of vendor capacity to respond to the newly set green requirements is very important. This should ideally be preferred instead of working with entirely new set of vendors. Building capacity could involve vendor audits, technical assistance (training, piloting, knowledge dissemination), organizing visits etc.

14. **Track progress to learn, assess the benefits of greening and make a business case**: Allocating time and effort for measuring and tracking the changes the changes taking place, will keep the project implementation on track and help in identifying possible issues. Tracking data will also provide a basis for assessing the overall cost savings, health and environmental benefits of greening on a life cycle basis. The progress status must be put forth for Management Review.

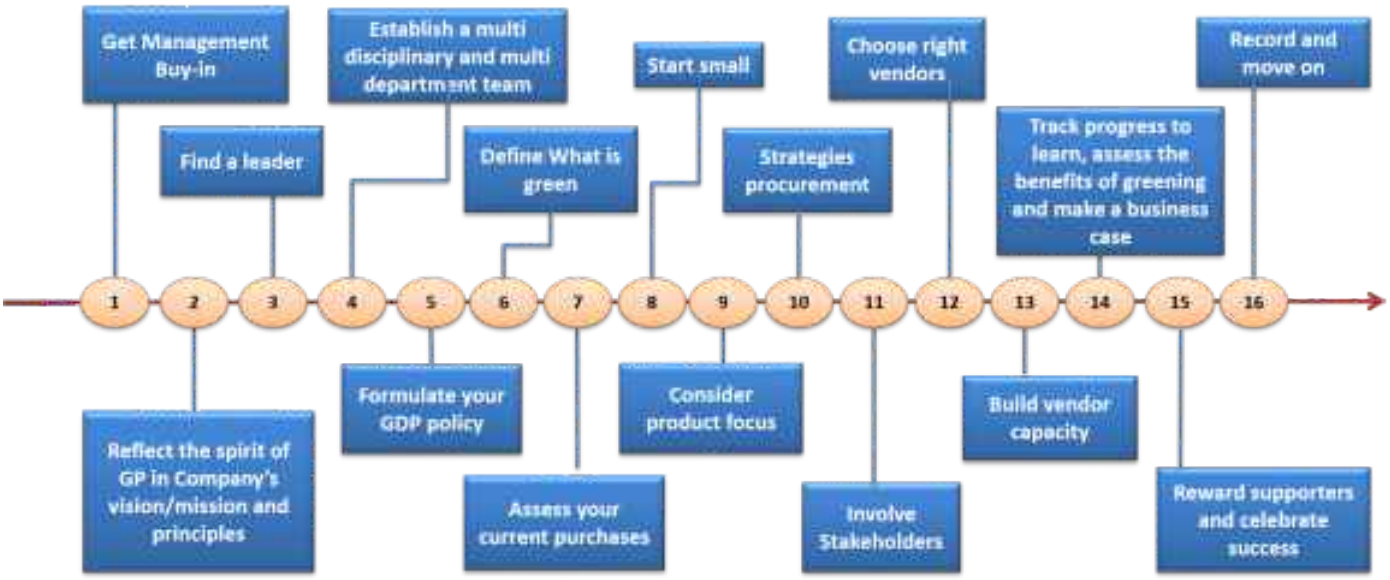
15. **Reward supporter and Celebrate Success**: Once a phase of greening is complete, be generous in sharing the results and the credit for its success. Recognize and reward the Team, supporters, even if their contribution was small. Such recognition, whether it is done through a personal thank-you letter, company award or additional "brownie" points to the employee in promotions, will help build support for future greening efforts.

16. **Record and Move on**: Record the GP journey in various forms, through newsletters that are easy to understand, through technical reports containing metrics that technical staff will appreciate and one or two specific pagers that apprise management about the triple bottom line benefits of GP. Move on with the next phase of GP armed with learnings from the first phase.

Figure 2 shows schematic of the above 16 steps. These steps are however more of guideline and may need to be adapted to an organizational context and needs.

Most corporates today want to go green in their procurement. The hesitation comes in as they many believe that green procurement will cost more. This is understandable because examples where green procurement has been competitive or has added to benefits in material terms or a brand image are not many.

In the next few years, however GP may perhaps not be optional anymore. It will be asked for or demanded and may become an integral element of the business strategy and operations.



# The Transparency Curve: Understanding 'Green' Communication Needs

*Scot Case*[19]
*Market Development Director for UL Environment*
*scot.case@ul.com, Twitter: @scotcase*

Consumers around the world are increasingly recognizing that every purchase has hidden human health, environmental, and social impacts. Every purchase has potential impacts on our health or the health of the broader environment. The goods and services we buy all contribute in some way to issues like climate change, air and water pollution, toxins in the environment, and resource depletion. Consumers are also recognizing that the companies and suppliers making the products exert control over many of these human health and environmental impacts along with social impacts such as labour standards and practices.

As this understanding has grown and expanded from one consumer to another, from one industry to another, and from one region of the world to another, a variety of **transparency tools** has emerged[20]. The tools make it easier for individual consumers, large government or institutional purchasers, retailers, and manufacturers to better understand the individual and collective impacts of their purchasing decisions. They make it easier to identify and buy "greener," more sustainable products and services.

The transparency tools range from declarations of a specific environmental attribute like 'recycled content' or 'energy efficiency' to more complex standard-based assessments of multiple environmental indicators. They also include standardized reporting of environmental data and the collection of massive amounts of environmental, human health, and social data in searchable databases. All the tools are designed to communicate sustainability information about a product or service and enable better decision making.

For 35 years, ever since the German government launched the German Blue Angel environmental label in 1978, various transparency tools competed with one another to provide "the" product transparency solution. Multi-attribute, standard-based environmental labels and certification programs like Blue Angel, Nordic Swan, UL ECOLOGO, and Green Seal claimed to provide a better solution than 'simple' labels that identified a specific human health or environmental benefit, such as UL GREENGUARD's focus on indoor air quality, or the Energy Star program's focus on energy efficiency.

Advocates for the 'simple' labels claimed they provided more specific or more relevant and, therefore, more useful information than the multi-attribute labels. More recent approaches such as lifecycle assessments (LCAs) and the associated Environmental Product Declarations (EPDs) claim to be better than the earlier approaches because they provide even more information, while proponents of the more traditional environmental labels claim LCAs and EPDs are too complex to be useful when making purchasing decisions.

Historically, each of the product transparency tools was provided and promoted by a government agency, non-profit organization, or company that only offered one of the tools. Each promoted the approach it offered as "the" solution, whether it was a recycled content label, a fair trade label, a multi-attribute label, EPDs, or other similar approach.

UL Environment, a part of the 120 year old UL global safety certification company, approaches transparency at the product, company, and supplier levels from a different perspective. Rather than adopting any single approach, UL Environment recognizes that each of the transparency tools is useful for communicating sustainability information to a specific audience.

Different audiences have different understandings of sustainability issues and, therefore, have different desires and needs for sustainability information. The transparency tools

[19] ***Scot Case*** *has been researching and promoting responsible purchasing since 1993. This article represents the views of the author only and do not necessarily reflect the views of UL Environment or its affiliates or subsidiaries.*

[20] ***Note:*** *The meaning of transparency has evolved over the last two decades. In the early 1990s, a time in which there was very little public information about the environmental impacts of products, the U.S. Environmental Protection Agency and others believed providing information on attributes such as the recycled content of a product made purchasing impacts "more transparent." They believed this increased transparency made it possible for consumers to make better purchasing decisions. Transparency proponents today expect much greater information disclosure to be considered transparent. For purposes of this article, the author views all of these efforts as steps towards greater and greater transparency.*

appropriate for one audience might differ from the needs of other audiences. The needs might also differ from industry to industry.

To help clients determine which transparency tool is most appropriate to reach their customers, UL Environment has adopted the Transparency Curve.

## The Transparency Curve

The Transparency Curve, depicted in Figure 1, illustrates how different groups of customers desire different levels of transparency. It shows that a customer's desire for additional sustainability information about products and services increases with an increase in the customer's knowledge of sustainability issues.

The more a consumer, purchaser, retailer, manufacturer, or industry learns about the connection between global sustainability issues and their purchase decisions, the more product-specific or company-specific sustainability information they want to review. Greater sustainability knowledge drives a need for increasing levels of transparency about products, services, companies, and supply chains.

The Transparency Curve highlights five customer segments, each of which has different needs and expectations for the type of sustainability information a company should provide about itself and its products or services.

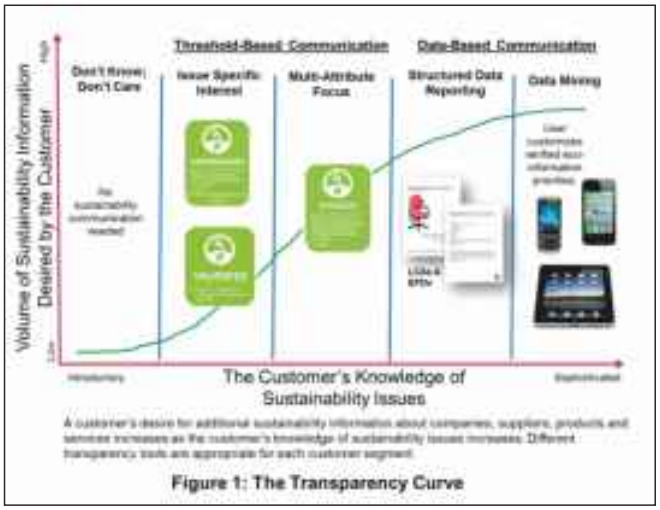


Figure 1: The Transparency Curve

- **Segment One: "Don't Know; Don't Care"**
  Some customers do not know much about sustainability issues and, as a result, they do not want or need any sustainability information. Providing sustainability information is not likely to help sales and might even have a negative impact on sales if customers assume that "greener" products perform poorly.

- **Segment Two: Issue Specific Interest**
  Customers with limited knowledge of sustainability issues or deep knowledge or interest in a particular issue want sustainability claims with clear, specific connections to human health or environmental concerns. Transparency tools for this customer segment focus on single attribute claims like indoor air quality (UL GREENGUARD), energy efficiency (Energy Star), water efficiency (Water Sense), recycled content, and fair trade, among others. Most claims are based on meeting a clearly defined threshold. Products meeting the established threshold earn a mark or badge that can be displayed on the product.

- **Segment Three: Multi-Attribute Focus**
  As a customer's interest broadens, they recognize that every purchase has multiple sustainability impacts and that a focus on any single attribute might obscure other important sustainability attributes. At this point along the Transparency Curve, multi-attribute sustainability labels like Blue Angel, Nordic Swan, UL ECOLOGO, and Green Seal become a more appropriate transparency tool to communicate sustainability information to customers. These tools balance multiple environmental and social issues in publicly available, consensus-based environmental standards that establish clear thresholds for each of the attributes addressed by the standard. Products or services meeting the standards earn the relevant certification mark.

- **Segment Four: Structured Data Reporting**
  As customers migrate towards the next segment, there is an important change in their expectations. Rather than looking for others to establish sustainability thresholds, these customers want to see the sustainability data reported in a structured format. They want more detailed information about multiple sustainability indicators. Rather than relying on an environmental label to identify "greener," more sustainable products, services, or companies, they want access to specific indicators that they can use to make their own judgments based on the attributes they think are most important.

There are several existing and emerging transparency tools to facilitate this need. Environmental Product Declarations (EPDs), based on Lifecycle Assessments

(LCAs) that follow approved Product Category Rules (PCRs), and the emerging use of Health Product Declarations (HPDs) do not make value judgments about whether a product or service is "greener" or more sustainable than competing products or services. Instead, they provide information in a standardized reporting format, analogous to the nutrition information found on food packaging. Customers then make their own determinations about which products, services, or companies are best.

EPDs are growing in popularity in Japan and Europe. In France, the government-backed Environment Round Table (*Le Grenelle Environnement*) has proposed that all high volume consumer products imported to France have an EPD. They are also gaining traction in the United States, particularly in the green building sector.

- **Segment Five: Data Mining**

  The final segment includes even more sophisticated customers who want access to significant volumes of sustainability information in formats that permit them to determine which attributes are most important to them, combine them with other attributes, and create their own framework for determining which products or services are most sustainable. This part of the Transparency Curve currently includes a handful of retailers and large manufacturers with sophisticated supply chains. They have the ability to ask customized sustainability-related questions to their suppliers, combine it with existing information, and use the resulting information to make better decisions.

## Value of the Transparency Curve

The Transparency Curve helps companies sell more products and services by identifying which transparency tools best meet the sustainability information needs of their customers. All customers can be located on the Transparency Curve. At any point in time for any company within any industry, there are customers with varying understandings of sustainability issues who desire varying degrees of transparency about the human health, environmental, and social impacts of a product, service, or company.

This makes communicating environmental information very challenging because different customers want different information. Communicating too simply using simple transparency tools puts a company at risk by alienating its more sophisticated customers. Communicating too much information with more complex transparency tools puts a company at risk of confusing its customers.

The Transparency Curve helps companies match their customers' sustainability information needs with the appropriate communication tool. It also helps companies understand how their customers' sustainability information needs will change as those customers increase their understanding of sustainability issues.

It also makes it more clear that all the transparency tools are actually interdependent. The sustainability information contained in the more sophisticated data-based transparency tools support the sustainability information contained in the threshold-based transparency tools.

UL Environment can manage all the product- and company-level sustainability information and help companies share relevant information with relevant customer segments in a format that meets the sophistication and needs of those customers. By combining all the approaches within a single set of offerings under a single brand, UL Environment has made it possible for companies and their customers to easily transition from one point on the Transparency Curve to the next without having to hop from one brand or service provider to the next.

## Concluding Thoughts

Consumers around the world are learning that their purchases have impacts on their health and the health of communities and the broader environment. They are learning that it is possible to buy affordable paint or furniture products without the harsh smells and chemical emissions associated with some products, appliances that are more energy efficient, electronic products that are more durable with fewer hazardous materials, and buildings that are more resource efficient and more pleasant places to live and work. The demand for greener products continues to grow.

As consumers continue climbing the Transparency Curve, they will want and expect better information about the sustainability performance of the products they buy. Companies that understand the Transparency Curve and that know where their customers and competitors are along the curve have an advantage in today's market. They will have an even greater advantage in the future.

# Promoting Environmentally Sound Technologies: UNEP's International Environmental Technology Centre

*Surendra Shreshtha,*
*Director, UNEP-IETC* [21]
*Surendra.Shrestha@unep.org*
*and*
*Mushtag Ahmed Memon, Programme Officer, UNEP IETC*
*Mushtaq.Memon@unep.org*

At the Earth Summit in Rio de Janeiro, Brazil, in 1992, governments agreed on Agenda 21, an action plan to promote sustainable development. Central to Agenda 21 is the promotion of environmentally sound technologies (ESTs). As defined in Agenda 21, ESTs protect the environment, are less polluting, use less resources in a more sustainable manner, recycle more of their wastes and products, and handle residual wastes in a more efficient manner than the technologies for which they were substitutes.

In 2004, the Bali Strategic Plan for Technology Support and Capacity-building[22] reinforced the need for the provision of technology support and capacity-building to developing countries as well as to countries with economies in transition. In 2012, the UN Conference on Sustainable Development (UNCSD), or Rio+20, in its outcome document "The Future We Want", again emphasized the importance of technology transfer to developing countries.

Technology transfer remains one of the important topics in the international arena as it is seen as playing a critical role in the global response to the challenges in sustainable development. It is important to remember that achieving this goal will not just be a matter of bringing new tools to a new location, but will also bring in suitable policy environment, unobstructed markets, adequate financing, and capacity building.

For more than 20 years, UNEP's International Environmental Technology Centre (IETC) has had a comprehensive and leading involvement in promoting the development, transfer, uptake and use of environmentally sound technologies (ESTs). This involves data gathering and information management in relation to ESTs, as well as the development of decision support tools to assess life cycle performance and the environmental benefits of ESTs. It also facilitates technology transfer and supports capacity building initiatives to assist in the development, demonstration and dissemination of ESTs.

## IETC's role in the transfer of ESTs

Inaugurated in 1992, IETC's mandate is the transfer of environmentally sound technologies (ESTs) to developing countries and countries with economies in transition. Over the course of time, IETC has worked on urban development, including disaster management and water and sanitation. In recent years, IETC has focused on waste management. IETC is committed to further work on this area to become a global centre of excellence on waste management in the future. The holistic definition of waste defines waste as the unwanted by-product of human activities in solid, liquid and gaseous form. IETC is promoting this holistic approach to waste, considering waste as a resource and supporting proactive prevention policies.

## Why waste?

The world is going through an unprecedented transition setting new trends for the 21st century. With the global population increasing from currently around 7.3 billion to 9 billion by 2050 and 11 billion by the end of the 21st century, the urbanization trend is expected to continue with more than 80 per cent of humanity living in cities by 2050. Most of these people will live in African and Asian cities where city growth rates are the highest, followed by Latin America and the Caribbean.

The industrial revolution has pursued a linear path of extracting natural resources, putting it through an industrial process for goods and services with the end product as waste. Waste is generated at all stages of the production and consumption chain. With increasing income levels, there will be 3 billion new middle class consumers in the coming decades. The demand for goods and services and consequently the waste generation will grow exponentially. The World Bank estimates that the 1.3 billion tonnes (2012) of municipal solid waste (MSW) will increase to approximately 2.2 billion tonnes per year by 2025. Waste characteristics are

[21] *United Nations Environment Programme (UNEP), International Environmental Technology Centre (IETC)*
[22] *To know about the Bali Strategic Plan for Technology Support and Capacity building, visit the page - http://www.unep.org/GC/GC23/documents/GC23-6-add-1.pdf*

also changing from mainly organic to containing more hazardous substances having a negative impact on human health and environment.

*Photo: Open burning of waste*

Waste management poses an important challenge for governments and the cost of inaction is high. Improper waste management impedes the provision of basic necessities for public health such as clean water, clean air and safe food. Untreated waste contaminates soil and water through leachate. Burning of waste significantly increases the air pollution having adverse impacts to human health. Like most environmental hazards, deficiencies in waste management also disproportionately affect poorer communities more as wastes are often dumped in land adjacent to slums and waste pickers are exposed to hazardous substances.

## Opportunities: resources, growth, jobs

The emerging problem of waste is an opportunity making a contribution for growth and jobs. If waste is considered a resource, it acquires a value to be used. With a preventive and precautionary approach and the application of new environmentally sound technologies, it is possible to manage waste in a sustainable way.

The opportunities and benefits of sustainable waste management include: less environmental pollution, reduced costs in managing waste, reduced greenhouse gas emissions, contributions to equity and poverty alleviation. Improved health, health costs that are avoided, water contamination that is prevented, and the ensuing cost of alternative water supply are also important benefits.

In addition to environmental benefits, sustainable waste management can also facilitate economic opportunities and growth. Economic benefits of proper waste management will mainly come from considering waste as a resource, that is, by reusing products, recycling waste and recovering materials and energy including converting waste to biogas. Converting waste into energy can assist countries in meeting their energy needs and thus has significant benefits for energy security.

The benefits of sustainable waste management for job creation can also be significant. UNEP's Green Economy Report shows that recycling creates more jobs than it replaces. Sorting and processing recyclables alone sustain ten times more jobs than land filling or incineration on a per ton basis.

## IETC's experience

Over the past couple of years, IETC has assisted countries in transitioning to sustainable waste management through technical assistance, guidance, and pilot projects. IETC has advised around a dozen cities in Asia, Africa and Latin America in devising integrated waste management plans. In this context, IETC developed guidelines, built the capacity of local authorities in developing the plans and carrying out demonstration projects. In India, IETC assisted the City of Pune in developing its integrated waste management plan, in cooperation with the Pune Municipal Corporation and the Environmental Management Centre (EMC), Mumbai.

IETC has been working on converting agricultural waste (biomass) into energy. Converting agricultural waste into energy can provide a decentralized energy source in rural areas while simultaneously achieving a cost effective solution to waste disposal, and a reduction in greenhouse gas emissions.

One of the examples, IETC built the local capacity in six Asian countries to identify and implement environmentally sound technologies (ESTs) for waste agricultural biomass and assess their potential for resource conservation and greenhouse gas emission reduction. A compendium of sustainable technologies was developed that demonstrated these technologies as pilot projects. Sub-regional workshops were organized to share and exchange experience on the projects. In India, IETC worked with the Birla Institute of Management Technology (BIMTECH). In the replication of the project in Costa Rica, IETC facilitated the dissemination of Indian technologies.

*Project on converting waste agricultural biomass into energy*

In its endeavor to assist countries in assessing and choosing environmentally sound technologies that match their needs, IETC has developed a methodology, the Sustainability Assessment of Technologies (SAT), as well as a number of reports on waste management technologies, a compendia of technologies. These are intended to provide information on technology options as well as to assist the policymakers and technology decision makers in the identification of appropriate technologies with respect to local economic, environmental, social and technical characteristics. See Box 1 an illustration of one of the ESTs that IETC is working on in Penang, Malaysia.

In response to an increasing need to manage growing amounts of e-waste, IETC also prepared a series of user-friendly manuals, to assist developing countries in developing e-waste management systems, including assessing e-waste and its risks, evaluating current e-waste management practices, and designing environmentally sound e-waste policy frameworks.

Most recently, in collaboration with the United Nations Institute for Training and Research (UNITAR), IETC developed "**Guidelines for the development, review and updating of national waste management strategies**". These guidelines provide a conceptual and methodological framework for national planning that countries may adapt to their particular circumstances. It also establishes a clear rationale for making waste management a national priority. The guidelines are currently being pilot tested in 6 Asian countries. The objective

*Workshop on national waste management strategies*

of this project is to assist countries in developing national and city-level waste management strategies. Once the initial piloting has taken place, lessons will be collected for replication and up-scaling in a next phase. In India, IETC is working with the City of Kota, Rajasthan, to support the development of a city-level waste management strategy.

On the global level, IETC, in collaboration with the International Solid Waste Association (ISWA), is developing a **Global Waste Management Outlook**. The Outlook will provide an overview, analysis and recommendations for action of policy instruments and financing models for waste management.

## Concluding Remarks

IETC's experience shows that its approach to technology transfer is holistic, including capacity building, knowledge and organizational development as well as developing an enabling environment for the uptake of technologies. To be successful, transfer of technology requires more than just the moving of equipment from point A to point B. Other requirements include enhanced knowledge, management skills and technical and maintenance capabilities of those receiving the technology. Integrating human skills, organisational development and information networks is also essential for effective technology transfer. Thus technology transfer is a broad and complex process if it is to contribute to sustainable and equitable development.

With the experience of working with government and private sector from many different countries, IETC will be a good partner for the Indian private sector to facilitate knowledge exchange, business partnerships and to provide a platform for cooperation with other Asian countries.

India, one of the biggest countries in the world, is at a very important crossroads. The country faces a dual challenge: rapid urbanization and economic growth on the one hand; and enormous pressure on natural resources to keep up with demand for production and consumption on the other hand. To create a win-win situation for economic growth and natural resources, ESTs can play a vital role. India can capitalize on ESTs to reduce waste during the production process. Based on its vast engineering base, India can also innovate and produce ESTs for local and overseas markets to further boost economic and job growth.

The waste sector has huge potential for adoption of ESTs to promote sustainable development as ESTs reduce waste and improve the production efficiency. ESTs can also convert waste into a resource to further boost economic activities and living standards. To materialize these ideas, policy makers, scientists and engineers, private sector and investors, and citizens' representatives may form a team to assess the current and future needs for ESTs for local and international markets and then to draw up a roadmap to produce and implement ESTs.

# How Natural Capital Risks are Increasingly Relevant for Financial Institutions

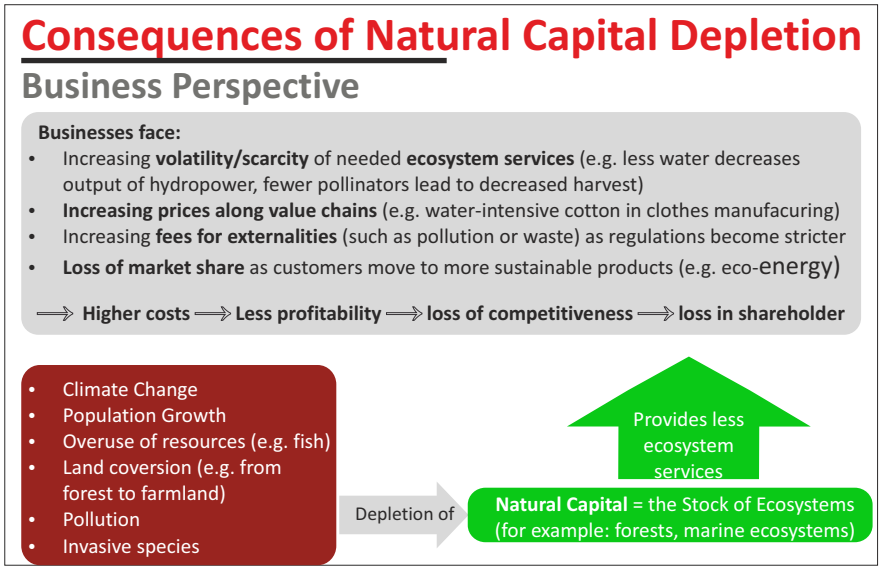
*Simone Dettling,*
*Advisor at GIZ, Emerging Markets Dialogue Programme*
*simone.dettling@giz.de*

## Dependence of our Economy on Natural Capital

Our economies are dependent on inputs provided by nature - on Natural Capital. From soil, nutrient cycling and pollination needed for agriculture to water usage in thermal power plants, pulp & paper production or manufacturing of semi-conductors for electronic devices, Natural Capital forms the basis for any economic activity - either as a direct input for a business or through its value chains. In 2010, the UN Environmental Programme (UNEP) estimated the annual value of nature's inputs for the global economy at USD 45 trillion, approximately 80% of global GDP.[23]

## Consequences of Natural Capital Depletion for Businesses

To date, however, markets neither capture nor adequately measure the value created by Natural Capital in terms comparable to economic services or manufactured goods. This neglect in valuing Natural Capital has contributed to over-exploitation of, for example, fresh-water sources and forests. Climate change, population growth, continuous resource-intensive economic growth, land conversion, pollution and over-exploitation of natural resources all contribute to a rapid degradation of ecosystems worldwide and hence the continuous depletion of the Natural Capital our economies depend on. The result is that businesses face an increased volatility or scarcity in the supply of needed Natural Capital, rising prices along their value chains, additional fees or penalties for environmental externalities they create, and a potential loss of market share, as customers opt for more sustainable products.



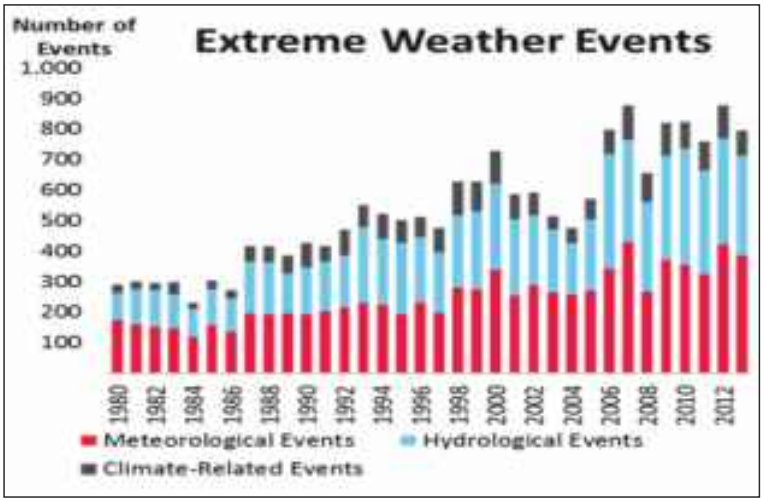

## Water Risks as an Example for Natural Capital Risks

One striking example of increasing risks from Natural Capital depletion for businesses is water, which strongly affected by both regional over-exploitation and global climate change. At the beginning of 2014, the South of Brazil experienced a drought – an extreme weather event that has been occurring in the region with increasing frequency and severity over the last 15 years. Both Bloomberg and Reuters covered the consequences this drought had for businesses in the region quite extensively, reporting on production interruptions in the beverage, pulp&paper, and the petrochemical industries. Not only regional businesses were affected, but also the world market for crops like coffee, of which Brazil is the largest producer. Prices for Arabica coffee rose by 40% as a result of this drought, leading Bloomberg to speculate on the consequences these rising input costs will have for businesses like Starbucks.[24] Extreme weather events, such as droughts, are becoming more frequent and severe worldwide (see graph) and generally, changes in rainfall patterns and temperatures are already and will increasingly lead to water supply volatility and scarcity in many regions around the world. In India, for example, many areas already experience water stress, and an increase in the variability of monsoon rainfall due to climate change is expected to exacerbate these water shortages significantly.[25]

## Relevance for Financial Institutions

As one example of Natural Capital dependencies, this increasing water stress has proven to be a significant operational risk for companies in sectors for which it is a key input, such as power plants, utilities, mining, pulp & paper, petro-chemicals, or food and beverage. Supply

[23] *UNEP 2010: Dead Planet – Living Planet, http://www.unep.org/pdf/RRAecosystems_screen.pdf*
[24] *Bloomberg, 19.02.2014, "Coffee to Soybeans Surge as Brazil Drought Damages Crops", http://www.bloomberg.com/news/2014-02-18/starbucks-favored-coffee-jumps-most-since-2004-on-weather.html.*
[25] *The World Bank, http://www.worldbank.org/en/news/featyre/2013/06/19/india-climate-change-impacts.*




*Source: Munich RE*

volatility and scarcity of this key input lead not only to operational risk, as production inputs are not secure, but also to business risk, as overall production costs increase once regulators put a higher price on scarce water resources or capital expenditures need to be made for securing alternative water sources. Both lead to a decline in profitability and competitiveness and a reduction of free cash-flows, increasing the risk faced by banks and investors providing finance for the company. Water risk is already considered by rating agencies as a factor impacting the creditworthiness of companies, as illustrated by the downgrade of the energy producer AES by Fitch in April, for which hydrological risk was given as one of the main reasons.[26]

## The Financial Sector as a Lever

While Natural Capital risks can be a material factor for financial institutions to consider and to price into their lending and investment decisions, a financial sector that integrates Natural Capital risks can be an important lever to increase resource efficiency and sustainable production methods throughout the economy. Once Natural Capital risks become a factor that influences, for example, the interest rate for a business loan and businesses more heavily exposed to Natural Capital risks than their peers face a higher cost of capital, there is a strong incentive to invest in resource efficiency and more sustainable production methods.

## The Gap

However, at present few financial institutions are aware of and understand material Natural Capital risks in their portfolios. Those who understand these risks lack the data, methodologies and tools to estimate impacts from Natural Capital risks on the cash flows and profitability of companies and on probability of default.

## The Emerging Markets Dialogue Programme on Green Finance

The Emerging Markets Dialogue Programme on Green Finance (EMD) is commissioned by the German Ministry for Economic Cooperation and Development and implemented by the Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ). The purpose of the EMD is to work with financial institutions from G20 Emerging Markets as well as developed countries on market-based mechanisms to increase investment in resource-efficient and sustainable business practices.

Currently, the EMD works with financial institutions from Brazil, India, Germany, Switzerland and the US to address the gap in awareness as well as methodologies and tools to integrate Natural Capital risks, such as water risks, into lending and investment decisions and valuation procedures. Specifically,

- together with the Natural Capital Declaration (represented by UNEP-FI and the Global Canopy Programme), the German Association for Environmental Management and Sustainability in Financial Institutions (VfU) and several financial institutions, EMD has set up a pilot project on quantifying water risks and developing and testing a tool to integrate them into corporate bond valuation. The Project will start in mid-August and the finalized tool is planned to be published in summer 2015.

- the Sustainable Finance Working Group of CEBDS (the Brazilian chapter of the World Sustainable Business Council) and EMD are jointly organizing a series of three workshops on Natural Capital and its Relevance for Financial Institutions in Brazil and will launch two studies on "Quantifying the Natural Capital Risk Exposure of Financial Institutions in Brazil" and "Seizing Business Opportunities: Investing in Eco-friendly Markets and Sustainable Business Models" during these workshops. The first workshop will take place on September 23rd 2014 in Sao Paulo.

- together with several Indian financial institutions, the EMD is planning a series of workshops on Natural Capital Risks and Opportunities in Finance in India.

Should you be interested in finding out more about participating in EMD activities or have any further questions, please do not hesitate to contact: simone.dettling@giz.de. This article reflects the personal opinion of the author, Simone Dettling. Simone Dettling works on the Emerging Markets Dialogue Programme in her role as an advisor at GIZ.

[26] http://www.businesswire.com/news/home/20140430007017/en/Fitch-Downgrades-AES-Panama-BB-Outlook-Revised

# What is the business case for biodiversity offsets?

*Marianne Darbi,*
*Researcher at Leibniz Institute of Ecological Urban and Regional Development,*
*m.darbi@ioer.de*

A broad consensus exists among scientists, politicians, businesses and civil society that biodiversity loss is one of the biggest challenges that we are facing. Therefore, actions need to be taken to halt this global loss urgently and immediately. In this regard the use of new and innovative instruments and strategies to achieve 'no net loss' of biodiversity and ecosystem services is being explored. One such tool, Biodiversity Offsets - a mechanism that allows for compensation of impact on biodiversity - is gaining wide acceptance around the world (Darbi, 2014).

Biodiversity offsets are defined as:

> *"measurable conservation outcomes resulting from actions designed to compensate for significant residual adverse biodiversity impacts arising from project development after appropriate prevention and mitigation measures have been taken. The goal of biodiversity offsets is to achieve no net loss and preferably a net gain of biodiversity on the ground with respect to species composition, habitat structure, ecosystem function and people's use and cultural values associated with biodiversity" (BBOP, 2009)."*

To put it simply, the negative impacts of business operations on biological diversity need to be compensated or counterbalanced by conservation or restoration measures in order to ensure there is 'No Net Loss' of biodiversity. ('No Net Loss' has become internationally-accepted as a principle of biodiversity impact mitigation).

Biodiversity Offsets were promoted for the first time on a global scale by the Business and Biodiversity Offset Program (BBOP) of the international non-profit Forest Trends Association. The BBOP platform has been in place since 2004 and it has engaged business, NGOs, administration and academia, through its community of practice, for evolving a standard and implementation toolkit for biodiversity offsets - these are being tested through biodiversity offset pilots with business partners around the world. Some of BBOP's pilot offset projects include Ambatovy Project (nickel mine) in Madagascar, Newmont Ghana (gold mine) in Ghana, and Anglo American (platinum mine) in South Africa.

An important question that has become a cornerstone of the discourse on biodiversity offsets is - Is there a business case for biodiversity offsets i.e. does it make good business sense for companies to offset their biodiversity impact, does it boost their bottomlines? When looking at the 'business case' for biodiversity offsets, BBOP asks:

> *"Why should businesses voluntarily 'go the extra mile' and take on biodiversity offsets? What's in it for them?" (BBOP, 2015)"*

A study by PricewaterhouseCoopers LLP notes a gradual increase in the number of organizations and initiatives that are beginning to recognize the business benefits of biodiversity offsets, i.e. understanding potential advantages for companies, and working to integrate biodiversity considerations into business and commercial activities (PricewaterhouseCoopers, L. L. P., 2010).

ten Kate, Bishop & Bayon, 2004 cite a number of opportunities offered by voluntary biodiversity offsets for companies and developers. Businesses can benefit from the implementation of compensation measures e.g. in terms of reputation and better acceptance of their projects. Figure 1 shows benefits that make biodiversity offsets worthwhile from the business perspective.

| The Business Case for Biodiversity Offsets | |
|---|---|
| **License to operate** | access to land and resources, speeding up approval processes and avoiding costly delays, political Influence |
| **Reputation** | good PR, improved relationship with the local population and decision-makers, status of a "preferred partner" |
| **Access to capital** | Increased demands and standards of international financial institutions and donors Efficience Management of risks and liability obligations |
| **Efficiency** | Management of risks and liability obligations |
| **New markets** | First Mover advantage |

*Figure 1: Benefits of biodiversity offsets for business (after ten Kate, 2005 and Howard 2007)*

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In general terms, there are two types of motivations for business to adopt biodiversity offsets, which align with the values assigned to biodiversity by humans:

1. **Ethical value:** altruistic motivation for the implementation of biodiversity offsets.

2. **Value of benefit:** improvement in business and enhancement of profit

The most obvious case for such benefit is when biodiversity is the prerequisite for the business activities (e.g. tourism).

> *"The business case for biodiversity conservation is most easily made when the business in question depends directly on biodiversity to operate and survive […]For many other businesses the case for investing in biodiversity conservation is less clear. Understanding what biodiversity means and how it affects business value is not always straightforward."* (Bishop, 2006)

In the public, however, a rather negative view of biodiversity offsets (and in particular of related business activities initiatives) dominates, with businesses being accused of

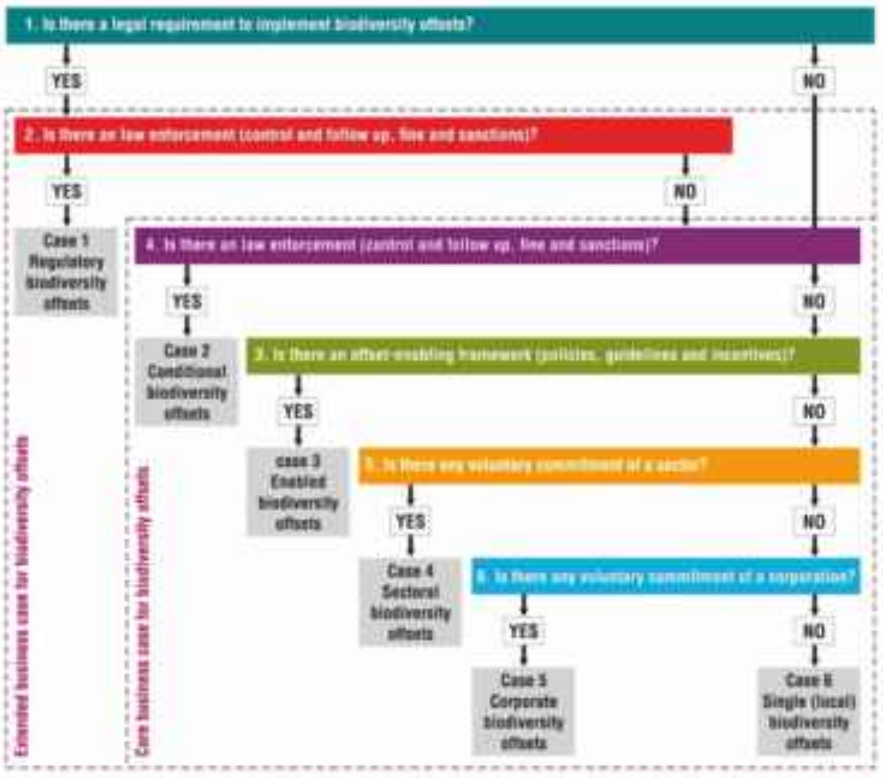


*Figure 2: Cascade of biodiversity offsets (author's own)*

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# Deciphering Sustainable Finance in India

*Lucille Andrade,*
*Asst. Vice President, Environmental Management Centre LLP*
*Lucille.andrade@encentre.com*

***Sustainable finance can be defined as, 'the practice of creating economic and social value through financial models, products and markets that are sustainable over time'.***

*Definition by - Centre for Responsible Finance, Haas School of Business, University of California (Berkeley)*

Investments in various sectors, instruments, products that create environmental and/or social value could be construed as sustainable finance. Financial Inclusion initiatives undertaken by Reserve Bank of India (RBI); rural finance; and extending finance to Micro, Small and Medium Enterprises by banks in the public and private sector constitute sustainable finance. Similarly, reserving a portion of funds for investment in particular sectors construed as environmentally friendly such as renewable energy is also sustainable finance. Weather based insurance schemes; impact funds investing in social enterprises; institutional financing for particular sectors; green bonds; and the most recent modality of finance under Corporate Social Responsibility are various forms of sustainable finance.

Sustainable finance also incorporates the mechanisms and systems adopted by financial institutions to ensure sustainability of their investments. A few important forms of sustainable finance operational in India have been described in brief in this article.

## Sustainable Finance through Financial Inclusion

Financial Inclusion is defined as '***the process of ensuring access to financial services and timely and adequate credit where needed by vulnerable groups such as weaker sections and low income groups at an affordable cost***' (The Committee on Financial Inclusion, Chairman: Dr. C. Rangarajan). The RBI adopted a bank-led model for achieving financial inclusion in India while permitting non-bank entities to partner banks in their financial inclusion initiatives. Since January 2006 various policy measures have been undertaken by the RBI for creating conducive regulatory environment and providing institutional support for banks in accelerating the process of financial inclusion.

### RBI's Policy Initiatives to foster Financial Inclusion

**(a) Reach**

Branch expansion in rural areas - Branch authorization has been relaxed such that banks do not require prior permission to open branches in centres with population less than 1 lakh, subject to reporting. Banks have been mandated to open at least 25 % of their new branches in unbanked rural centres.

Agent Banking - Business Correspondent/ Business Facilitator Model - In January 2006, RBI permitted banks to utilize the services of intermediaries in providing banking services through the use of business facilitators and business correspondents (BC). This model allows banks to do 'cash in - cash out' transactions at a location much closer to the rural population.

Combination of Branch and BC Structure to deliver Financial Inclusion - To ensure increased banking penetration and control over operations of BCs, banks have been advised to establish low cost branches in the form of intermediate brick and mortar structures in rural centres between the present base branch and BC locations, so as to provide support to a cluster of BCs (about 8-10 BCs) at a reasonable distance of about 3-4 kilometers.

**(b) Access**

Relaxed KYC norms - Know Your Customer (KYC) requirements have been simplified such that small accounts can be opened with self-certification in the presence of bank officials and 'Aadhaar' cards have been allowed as one of the eligible documents.

Contd.....

## RBI's Policy Initiatives to foster Financial Inclusion Contd.....

Roadmap for Banking Services in unbanked Villages - In the first phase, banks were advised to draw up a roadmap for providing banking services in every village having a population of over 2,000 by March 2010. In the second phase, roadmap has been prepared for covering remaining unbanked villages i.e. with population less than 2000 in a time bound manner.

**(C) Products**

In order to ensure that all the financial needs of the customers are met, RBI has advised banks to offer a minimum of four basic products – (i) a savings cum overdraft account; (ii) a pure savings account, ideally a recurring or variable recurring deposit; (iii) a remittance product to facilitate EBT and other remittances; and (iv) entrepreneurial credit products like a General Purpose Credit Card (GCC) or a Kisan Credit Card (KCC)

**(d) Transactions**

The introduction of direct benefit transfer will leverage the Aadhaar platform and help facilitate delivery of social welfare benefits by direct credit to the bank accounts of beneficiaries.

*Source: Keynote address delivered by Dr. K.C. Chakrabarty, Deputy Governor, Reserve Bank of India at the Finance Inclusion Conclave organized by CNBC TV 18 at New Delhi on September 6, 2013*

## Impact Investing

The Global Impact Investing Network defines Impact investing as '***investments made into companies, organizations, and funds with the intention to generate social and environmental impact alongside a financial return***'.

**Core characteristics of Impact Investing are:**

- **Intentionality –** The intent of the investor to generate social and/or environmental value. These investments are made into enterprises and funds that expand access to critical goods and services, and/or generate positive impact through their operations.
- **Investment with return expectations** – Impact investments are expected to generate a financial return on capital and, at a minimum, a return of capital. While grants are not themselves impact investments, they can play an important role in enabling impact investing – for instance, through incubating early-stage business models, providing certain forms of credit enhancement, providing technical assistance, or funding needed research and development.
- **Range of return expectations and asset classes –** Impact investments generate returns that range from below market to risk-adjusted market rate. Impact investments can be made across asset classes, including but not limited to cash equivalents, fixed income, venture capital and private equity. Impact investors may also earn fees through the provision of catalytic instruments such as guarantees.
- **Impact measurement –** A hallmark of impact investing is the commitment of the investor to measure and report the social and environmental performance and progress of underlying investments.

Impact investors encompass a wide range of players in the investing space – Angel investors, Family Offices, Venture Capital funds, private equity funds, Development Finance Institutions, and Foundations. The Government of India, through the Department of Science and Technology, also directly funds entrepreneurs as well as through incubators at various educational institutions.

## Weather Based Insurance

Agriculture is the backbone of Indian economy and is significantly impacted due to droughts in one region and floods in another at the same time. The erratic pattern of rainfall destroys the harvest with a severe impact on farmer's livelihoods. Insurance is the tool for farmers to hedge risks of crop and yield losses.

Weather based crop insurance scheme has been piloted by Agriculture Insurance Company of India Ltd. (AIC) in India since 2003 to mitigate the hardship of the insured farmers against the likelihood of financial loss on account of anticipated crop loss resulting from incidence of adverse conditions of weather parameters like rainfall, temperature, frost, humidity etc. While Crop Insurance specifically indemnifies the cultivator against shortfall in crop yield, **Weather based Crop Insurance is based on the fact that weather conditions affect crop production even when a cultivator has taken all the care to ensure good harvest**[27]**.** Weather based schemes have also been introduced by private insurance companies like ICICI Lombard and HDFC ERGO.

[27] *Refer the WBCIS, Frequently Asked Questions page for further details at http://www.aicofindia.com/AICEng/General_Documents/Product_Profiles/WBCIS_FAQ.pdf*

## Case Study – HDFC ERGO Weather Insurance Policy

HDFC ERGO offers a comprehensive Weather Insurance Policy to deal with adversely changing climatic trends. It is an index based product that covers the losses to the crop occurring due to varying weather conditions such as temperature, wind speed, rainfall, humidity etc.

The insurance policy is available to farmers; banks; and financial institutions / companies extending credit facility for agricultural/ non-agricultural seasonal operations.

The Policy covers:

(a) Cost of input - Covers the diminished agricultural output/yield resulting due to deviation from optimum weather requirement of a crop within a specific geo graphical location and specified time period; and

(b) Increased operational costs of agricultural or non-agricultural economic activity resulting from deviation of Observed Weather index from Strike index.

*Source: HDFC ERGO website* http://www.hdfcergo.com/rural-insurance/weather-insurance.html*, accessed in August 2014.*

## Corporate Social Responsibility (CSR)

The CSR Rules 2014 drafted under Section 135 of the Companies Act 2013 requires large and medium sized companies to spend every financial year 2% of their average net profits during the three immediately preceding financial years on activities that create environmental and social value. Schedule VII of the Companies Act, 2013 lists a number of activities that could be included under CSR.

It is perceived that, investing in these activities would lead to social welfare and overall sustainable development thus forming a part of sustainable finance.

## Case Study – Acumen Fund

Acumen, founded in 2001, was the first foreign social venture fund to invest in India. They raised funds from US based investors through the venture philanthropy route. Acumen made its first impact investment in 2004 and opened its local office in India around 2005. A snapshot of the criteria, process and principles of Acumen's investment model in India is given below.

**Investment Criteria**

- Sectors: Operate in one of our investment sectors of Agriculture, Education, Energy, Health, Housing, or Water.
- Stage: Be an early-mid stage company that is in the process of scaling.
- Investment Size: Be seeking investment capital in the range of $0.25M-$3M, structured as either debt or equity.
- Strong Management Team: Have a strong and experienced management team with the skills, will, and vision to execute the business plan, an unwavering commitment to serve the poor, and unyielding ethics.
- Potential for Significant Social Impact: Make a product or deliver a service that addresses a critical need for the poor in our sectors and geographic focus. These products or services must be economically better or create greater social impact than what is available currently through the market, aid, or charitable distribution.

**Investment Process**

- Potential for Financial Sustainability: Have a clear business model that demonstrates the potential for financial sustainability within a five to seven year period; including the ability to cover operating expenses with operating revenues.
- Potential to Achieve Scale: Be able to demonstrate a clear path to scale for the number of end users over the period of our investment, and be positioned as one of the leading service providers in the market.

*Source: Acumen Fund website http://acumen.org/investments/investment-model-2/, accessed in August 2014*


*Figure 1: Activities under CSR*

## Frameworks by Development Finance Institutions and Foreign Banks[28]

Multilateral, regional and bilateral Development Finance Institutions (DFIs) work across various regions of the world fostering economic growth and sustainable development. They provide a broad range of financial services such as loans or guarantees to investors and entrepreneurs, taking equity participation in firms or setting investment funds for financing public infrastructure projects.

As part of their mandate, DFIs require that their financing activities are conducted in conformance to their environmental and social safeguards. When DFIs initiate a dialogue with government institutions, private entrepreneurs or financial intermediaries, an Environmental and Social Management System (ESMS) is stipulated. The system is so designed that the host country environmental and social regulations as well as lending agency's environmental and social safeguards are addressed in parallel. A monitoring and reporting mechanism is established to review the conformance to the ESMS. For situations where the financial institution enters the project cycle at a later stage such as refinancing transactions, and environmental and social due diligence is conducted by an Independent Reviewer to establish conformance of the borrower to the lending agency's environmental and social safeguards. The disbursement conditions to be implemented during the life of the projects are drawn based on the level of conformance. Majority of the bilateral DFIs subscribe to IFC Performance Standards for the implementation of their environmental and social safeguards. Almost all DFIs refer to World Bank Group's Environmental, Health& Safety Guidelines for general application as well as sector specific for implementation in the borrower's projects.

Similar procedures are implemented by Equator Principles Financial Institutions (EPFIs)[29] investing in India. The objective is to provide a minimum standard for due diligence to support responsible risk decision-making. The Principles are based on the IFC Performance Standards and World Bank Group's EHS Guidelines. These apply globally, to all industry sectors and to four financial products 1) Project Finance Advisory Services 2) Project Finance 3) Project-Related Corporate Loans and 4) Bridge Loans based on thresholds and specific criteria. A number of foreign and Indian Private Equity funds also follow suit.

## Other Modes of Sustainable Finance

The subsidies and discounts available to entrepreneurs and companies by the National Solar Mission under the aegis of Ministry of New and Renewable Energy; financing available to renewable energy and energy efficiency projects by Indian Renewable Energy Development Agency Ltd; financing activities undertaken by National Bank for Agriculture and Rural Development; finance extended to micro, small and medium enterprises by public and private sector banks; investments made through ***green bonds*** to finance environment-friendly projects by IFC in renewable energy sector in India, all constitute sustainable finance.

[28] Text adopted from the Paper 'Can we have a Global Standard on Environmental, Social and Governance?', Prasad Modak, Rahul Datar, Lucille Andrade; presented in IAIA 2013

[29] Visit http://www.equator-principles.com/ for further details regarding Equator Principles Financial Institutions.

# Environmental and Social Risk Management at IDFC

*Alok Dayal,*
*Senior Director, Credit & Environment Risk, IDFC*
*Alok.dayal@idfc.com*

## Background

IDFC Ltd is one of India's leading project financiers. It was formed in 1997 for leading private capital to infrastructure sectors in India. Project Finance is a method of funding in which the lender looks primarily to the revenues generated by a single project, both as the source of repayment and as security for the exposure. Project financiers are therefore concerned with minimizing the dangers of any events which could have an adverse impact on the financial performance of the project, in particular, events which could result in:

(1) the project not being completed on time and within budget,

(2) the project not operating at its full capacity,

(3) the project failing to generate sufficient revenue to service the debt

The performance of a project is intrinsically linked to its environmental and social contours and associated risks. Environmental and Social (E&S) risks in a project play a major role in determining its timely completion and satisfactory operations. Early engagement with project proponents on identifying potential environment and social issues and mechanisms to address and mitigate the same is important for ensuring effective project development. Project financiers therefore need to ensure effective environment risk mitigation by building requisite environmental and social covenants as part of their loan agreements and implementing the E&S mitigation measures for projects funded by them. The key to timely and cost effective project implementation is mainstreaming E&S Risk due diligence and monitoring in the project appraisal and post sanction monitoring process by project lenders.

Since its inception IDFC has been a pioneer in integrating environmental and social risk management and good governance into its business operations. The Environment, Social and Governance (ESG) agenda of IDFC has been built on an edifice of a sound risk culture that includes a comprehensive E&S risk management framework and an inclusive approach of working with project promoters in adopting "best in class" sustainability practices. This includes encouraging our borrowers to adopt good practices on governance, environment and social safeguards in their projects. IDFC has successfully mainstreamed environmental and social risk management into its business operations and instituted a dedicated environment risk group (ERG) to conduct E&S due diligence for projects financed by it. ERG is part of the risk team at IDFC Ltd and incorporates best in class Environment & Social Due Diligence and monitoring mechanisms for IDFC's lending operations.

IDFC adopted the Equator Principles (EP) on 3rd June 2013. It was the first and till date the only Indian financial institution to do so. The Equator Principles are a credit risk management framework for identifying, assessing, and managing environmental and social risk in project finance. IDFC has since then re-aligned its E&S systems and procedures to the principles as espoused by the Equator Principles Association.

## IDFC's E&S Policy

IDFC's rigorous E&S policy along with its commitment to the Equator Principles (EP) is reflected in its environment and social policy. IDFC's E&S policy ensures that its lending is made to environmentally sustainable, socially acceptable and economically viable projects. IDFC suitably addresses a project's environmental and social risks throughout its investment tenure as described in the following paragraphs.

## Managing Environmental and Social Risk at IDFC

The ERG group is responsible for managing E&S risk in IDFC's lending business. ERG identifies the environmental risk depending on the projec stage at which it is considered at IDFC.

**I) Environment categorisation**

The first step in IDFC's E&S due diligence begins with the environment categorisation. IDFC categorizes all projects funded by it as either Category A or B or C. This categorization is based entirely on the extent of impacts and not on type of the sector or project and is in accordance with the environmental and social screening criteria of the International Finance Corporation (IFC). The following criteria are used at IDFC to classify projects as either Category A or B or C:

- Category A – Use of proceeds is expected to have significant adverse environmental and social risks and/or impacts that are diverse, irreversible or unprecedented;


- Category B – Use of proceeds is expected to have limited adverse environmental and social risks and/or impacts that are few in number, generally site-specific, largely reversible and readily addressed through mitigation measures; and

- Category C – Use of proceeds is expected to have minimal or no adverse environmental and social risks and/or impacts.

IDFC has devised an in –house toolkit which can be used by its business executives in categorizing projects at the initial stages of the due diligence process.

**ii) Environment and social due diligence and Monitoring of Projects**

The ERG conducts environment risk assessment of all category A and category B projects at two stages as described below:

a) Appraisal / Sanction stage: ERG works closely with the borrower, project finance, legal and credit teams to comprehensively evaluate the environmental and social risks of projects as per the Environment and Social due diligence (ESDD) process developed by IDFC. The ESDD and monitoring process in IDFC is depicted in following flowchart.

ESDD covers the followings aspects of a project:

- Whether the project meets the extant requirements of Indian Environmental Legislations and EP in its design and the likely scenario in the operational phase.

- List of significant environmental and social impacts that include involuntary resettlement, loss of biodiversity, impacts on indigenous and / or local communities, worker safety, pollution, contamination, and others.

- Public disputes of the project, if any

- Health & Safety issues associated with the project and an assessment of the borrower's managerial capacity to handle the same.

- Grievance redressal Mechanism for the project

- Stakeholder Engagement mechanism

- Identifying the requirement of additional E&S studies and mitigation measures for the project

- Potential for Green House Gas emissions and reductions, if applicable and available information on the same.

Suitable E&S related loan covenants arising out of the ESDD process are stipulated and incorporated in loan agreements with clients which are then closely monitored at time of loan disbursements and during the life of the loan.

b) Post sanction stage: ERG undertakes Environment and Social Monitoring & Review (ESMR) of portfolio projects after sanction to monitor and ensure compliances to the requirements of applicable Indian Environmental Legislations, Equator Principles and E&S related loan covenants on an ongoing basis.

ESMR covers the followings aspects of a project:

- Compliance to E&S conditions stipulated in the loan agreement

- On-going compliance with statutory requirements

- Status of any new/emerging Environment, Health, Safety and Social (EHSS) development involving the project and consequent risks associated with it.

- Status of implementation of Environmental Management Plan (EMP) and Resettlement Action Plan (RAP)
- Information on expansion plans etc, if any

This entire process is documented in an ESMR report prepared as part of our annual review of porfolio projects in IDFC Ltd. The Projects not confirming to E&S covenants are reviewed and depending upon the significance of environment risk, such cases are included in the E&S watch list and discussed with senior management at IDFC Ltd. Regular follow up with client is carried out to ensure that the non-compliances are rectified and corrective measures are implemented.

## Sustainability Driven Infrastructure Development

IDFC's environment & social management system which has been refined over the years has ensured that the environmental and social risks associated with the projects are identified at the project appraisal stage itself. This enables IDFC to constructively engage with the project proponents and address and mitigate identified E&S risks through appropriate action plan and measures. This approach has been productive in promoting a culture of E&S risk redressal at the project level and also ensuring that our lending is directed towards sustainability driven infrastructure development.

IDFC's sustainability focus has led it to identify low-carbon infrastructure businesses as an area of strategic focus. IDFC has funded close to Rs. **4200 crore** as on March 2014 in renewable energy projects in India. IDFC's focus on renewable energy has enabled it to reach out to new committed project promoters in the Renewable Energy (RE) space and influence them to adopt good construction and labour practices and initiate community welfare activities in their project areas. IDFC is today preferred by most of the development banks and multilateral institutions as a strategic partner for their lines of credit in the renewable energy and low carbon economy space. These institutions include and are not limited to International Finance Corporation (IFC), Asian Development Bank (ADB), Overseas Private Investment Corporation (OPIC), DEG (KfWBankengruppe) and DFID, UK.

## Benefits experienced by IDFC through ESG integration

There are various examples that could be quoted bringing out the benefits accruing to IDFC as a result of the commitment to E&S issues. There have been cases where IDFC has been able to bring to light E&S risks due to presence of sensitive receptors in close vicinity to the project area which was not very evident to the project promoters. These sensitive receptors are overlooked during execution of the project through several layers of contractors and sub-contractors. Timely identification by IDFC has helped in avoiding unnecessary delays in project design and implementation. There has been a marked improvement in the labour practices and amenities that are provided by project developers in projects financed by IDFC, mainly as a result of IDFC's monitoring and due diligence process. IDFC has been able to identify and flag social issues relating to land acquisition and rehabilitation process that have been factored in the assessment of the project's execution. This has enabled IDFC to predict project cashflows more accurately and suitable structure the lending. The E&S risk appraisal in IDFC has been of immense help in identifying E&S issues related to associated facilities that impact the timely completion of the main project. This includes associated facilities like access road to project site, transmission corridors of power lines, water supply, issues relating to fuel availability and transportation, land availability for ash handling, regulatory permissions for land diversion and transfer, and social and livelihood issues connected with land acquisition. IDFC's experience demonstrates that a lack of proper E&S management system and process in projects is a strong indicator of a deeper malaise affecting the projects execution. It is the proverbial canary in the cage which is a red flag for IDFC in any project.

Summarizing in a nutshell, a strong environment and social management system has enabled IDFC to better understand the various E&S risks that impact a project's execution and cash flows and take suitable mitigative measures as a result of the same. This in turn has helped IDFC in developing a more robust lending portfolio.

## The Road Ahead

IDFC continues to lead from the front as far as ESG issues are concerned. IDFC Ltd truly believes that development and environment are two sides of the same coin and need not be in conflict with each other. Adoption of EP and its implementation has strengthened IDFC's belief that the ESG agenda can be balanced with the development agenda. IDFC is fully committed to ensuring a more sustainable framework for developing and executing projects in India. IDFC strongly feels that this not only benefits the local community and the environment at large but is also beneficial for the long term sustainability of the projects that are financed. A focused engagement with clients not only ensures effective progress in meeting IDFC's sustainability goals but also those of the clients. The strong track record demonstrated by IDFC in this matter is a testimony to the commitment to this cause. IDFC is hopeful that other banks and financial institutions will also realize the benefits of sustainable financing and take immediate measures to mainstream it in their lending operations.

## Forthcoming Activities

1. Certificate Training in Electrical Safety: "Learn the Theory, Master the Practice" Batch 3 - November 23 & 24, 2017
2. Practical session on Fire Safety & First Aid - November 2017
3. Art of Persuasion - November 2017
4. Site Visit at Godrej – December 8, 2017
5. Session on Integrated Reporting in Indian Perceptive - December 2017
6. Round Table Conference : Compliance Advocacy - December 2017
7. Site Visit at Siemens - January 2018
8. Interactive Session on Effective Functioning of ICC (Internal Complaints Committee) - January 2018
9. Futuristic Leadership in Digital World - January 2018

## Past Workshops / Seminars / Trainigs

1. Legal Compliance, Framework and Regulations for Green Growth
2. Environment Management in Pharma and Agro Chemical Industries
3. Continuous Emission Monitoring Systems in Industries
4. How to Make Sea Transport Clean and Green
5. Environment Management in Food and Agro Processing Industries
6. Technical Assistance- Continuous Emission Monitoring Systems for Industries
7. Industrial Site Visit for Demonstration of CEMS
8. Round Table Meeting on Road Safety
9. Session on Women Safety and Self- Defence
10. Consultation on Private Sector Partnerships for Climate Change Adaptation in India
11. Conference on Safety Excellence in City Offices and Transport on Road
12. Session on Women Safety & Self Defence
13. Symposium on E-Waste to No-Waste
14. Workshop on CSR: Policy to Practice; Building a Bridge from Planning to Implementation
15. Session on Looking Beyond Basics: Creating a Safe Work Environment
16. A Site Visit to Afforestration Project at Sandoz
17. Workshop on Wear it Right- the Power of Dressing & Deportment
18. Workshop on the Art & Science of Persuasion
19. Workshop on Impact Assessment of CSR Interventions
20. Seminar on Office Safety
21. Site Visit to Native Biodiversity Garden at Teenvira, Alibaug
22. Session on Sustainable Development Goals - How engaged is India Inc?
23. Practical Session on Fire Safety
24. Interactive Session on Effective Functioning of ICC (Internal Complaints Committee)
25. High Level Conference on "Business Integrity Into Business Practice: Approaches & Ways"
26. Seminar on Workplace Wellness
27. Panel Discussion on Disaster Recovery and Business Continuity
28. Site Visit at Mahindra & Mahindra- Igatpuri Plant
29. Certificate Training in Electrical Safety: "Learn the Theory, Master the Practice" Batch 1 & 2
30. Symposium on Business and Human Rights
31. Decoding Leadership Conclave

## Bombay Chamber & its Role in the Commercial History of India

The Chamber provides a forum for interaction of its members and formation of considered industry opinions and viewpoints. The Chamber provides services to its members through dissemination of information, publications, special studies and through activities like organizing business delegations, seminars and training programmes. The Chamber also provides labour advisory and mediation services for its members. Other services include visa facilitation services to its members and issue of non-preferential certificates of origin.

The role of the Chamber in the development of the city and the region is of particular significance. It was largely responsible for the first railway built in India-The Bombay-Thana railway completed in 1853. The Chamber has been represented on the Port Trust and intimately connected with it since its inauguration in 1873. The Chamber initiated a scheme for collecting port statistics and in 1860 and was placed in sole charge of all returns concerning external trade of the Bombay Port, such as import-export manifests and daily arrival returns. The Chamber was also instrumental in obtaining Government sanction for the construction of wind and current charts of Indian seas.

The Chamber's relentless advocacy of an efficient nationwide postal system and standardized postal rates led to the passing of the India Postage Act of 1854. The Chamber opened a weighment and measurement department in 1870. The Chamber advocated and petitioned the government relentlessly for standardization of weights and measures, until in 1932, the Bombay Weights and Measures Act was passed. It set up machinery for arbitration of commercial disputes in 1880, established customs of trade and gave decisions regarding weather-working days at the Bombay Port, a function that it carries out even to this day.

The Chamber's internal governance practices have always been open and inclusive. The practice of making a detailed Presidential address at annual meetings was introduced in the Bombay Chamber in October 1870. The presentation of Accounts in a published form was also done first by the Bombay Chamber in 1860-61 and the Bombay Chamber was the first organization in the country to have its annual accounts audited by a professional firm of auditors in 1881-82.

The Bombay Chamber of Commerce & Industry was established in 1836 and has achieved the distinction of being India's oldest Chamber of Commerce to serve its members without a break for 182 years.

The Chamber can boast not only of its longevity but also of its impeccable lineage. With more than 3500 prime companies as its members, the Chamber represents the cream of Indian Industry, Commerce and Services. The Chamber uniquely represents large and medium sized corporations, banking and financial institutions, professional consulting companies and a large number of multinationals. While the name `Bombay Chamber' conjures images of an organization representing exclusively a city-based membership, in reality it represents a wide spectrum of highly reputed and professionally run companies which are based in the city of Mumbai, but whose manufacturing facilities and commercial influence spread not only all over India but also internationally.

## About EMC LLP

Environmental Management Centre LLP is a strategic environmental management consultancy established in 1996. EMC LLP is the only Indian consultancy with a wide International client base. EMC's mission is "Practicing Sustainability to the Advantage for All"

EMC LLP services are strategic, knowledge driven and supported through research and training. All assignments benefit from our expertise in harmonizing economic, environmental and social considerations into business logic, development plans and policy frameworks.

Over the past decades, we have conceived, developed and executed a number of national, regional and international assignments that have set several "firsts". Many have stimulated action leading to policy reforms, sustainable investments and long-term capacity building.