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Editorial

Smart and Sustainable Cities

"Smart cities" has been at the center of attention for the past one year and especially after the Modi Government has taken over.

The Ministry of Urban Development (MoUD) has launched a national program for 100 smart cities. According to MoUD, "the key features of a Smart City are at the intersection between Competitiveness, Capital and Sustainability. Smart cities should be able to provide good infrastructure such as water; sanitation; reliable utility services; health care; attract investments; transparent processes that make it easy to run a commercial activities; simple and online processes for obtaining approvals; and various citizen centric services to make citizens feel safe and happy."

Making citizens happy is difficult to achieve as happiness is subjective and therefore difficult to measure. Smart cities should

certainly be livable. The "operational indicators" to define a smart city should therefore cover economic, environmental and social aspirations i.e. address the three pillars of sustainability. Smart city should not be understood as a mere demonstration of information technologies. Development of a smart city action plan should be the result of a consultative process involving stakeholders.

In this issue of SQ we present articles on smart and sustainable (eco) cities in the form of a knowledge article and case studies. The case studies focus on urban sustainability at different scales and describe the processes followed, plans recommended and the projects developed revolving around sustainability. We hope that these articles will provide our readers an insight and inspiration, especially towards working in partnership with urban local bodies.

- Prasad Modak

¹See <http://indiainsmartcities.in/site/index.aspx>



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Knowledge

100 Smart Cities: Is It Possible?

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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 when 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, 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 recently 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 Rs. 70,600 million to help create 100 smart cities (113 billion USD). 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 in recent months:

- 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 (KfW²): 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 m 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). 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

²The KfW, formerly KfWBankengruppe, is a German government-owned development bank, based in Frankfurt.

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.

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.

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 risks³ 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.

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

³ Risks such as: Huge investments (long pay back periods), Operational Risks (cyber-attacks), and Policy Risks (unstable policy framework)

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 42 billion USD 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. At a National Conclave on Smart Cities, Minister of Urban Development and Housing & Urban Poverty Alleviation, Shri. M. Venkaiah Naidu, recently said

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.

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 a sense 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) guidelines 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.

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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Eco-City Action Plan for Sangli-Miraj-Kupwad Municipal Corporation: A Systematic and Participatory Approach

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The Eco-City Action Plan for Sangli – Miraj – Kupwad Municipal Corporation (SMKMC) was an initiative by Hon. Cabinet Minister of Rural Development, Mr. Jayantrao Patil. The main focus of the Project was to achieve sustainable development in Sangli-Miraj-Kupwad (SMK) by integrating environmental, social and economic considerations in planning the new infrastructure or designing initiatives for complementing the existing ones.

The SMK region had prospered economically over the years, but it was experiencing degradation of its natural environment (when Environmental Management Centre (EMC) was approached for the preparation of Eco-City Action Plan). This was on account of untreated sewage discharge, poor solid waste management as well as other issues such as ambient air pollution, inadequate waste management, inadequacy of sewage treatment infrastructure and poor status of water treatment plants (WTPs). These issues resulted in localized environmental health problems and sub-standard quality of life.

Although SMK region showed an impressive range of initiatives and actions towards urban environmental issues, the desired positive impact was observed to be rather low. Hence, the overarching 'Eco-City' framework was prepared to form a comprehensive development plan for SMK.

The Eco-City Program had been envisaged in two distinct phases – 'planning' and 'implementation'. The

present article emphasizes on the approach used for the 'planning phase'.

Participatory Approach

The Eco-City Action Plan for SMK was prepared in consultation with stakeholders through a collaborative process. It evolved as a guiding pilot to establish a systematic and participatory process to develop an Action Plan that can be replicated in different cities.

A four-tiered participatory process was followed while preparing the Plan.

- I. Focused group discussions were carried out with professional experts and NGOs active in the region to identify issues and prioritize actions.
- II. A Core-Committee was formed to review the Plan at every stage and to act as the one-point contact for consultants and stakeholders.

III. Citizen awareness and participation was facilitated through public meetings.

IV. Recommendations from each consultation were incorporated in the Action Plan, which were approved by the Standing Committee of elected representatives.

In addition, a website was created to help promote the Eco-City concept, to share outputs and stimulate networking. On this website, Eco-voices, a visualization tool based on Google Map was created for citizens to post concerns or initiatives in their locality.

Community expectations and concerns identified through the participatory process were incorporated in the overall sustainability vision set for Eco-City Program.

It involved identification of key stakeholders, opening dialogue between



Public meeting



Consultation workshop with Core Committee members

each theme. 4P perspective enables to address each theme comprehensively and ensures that all actions are well-anchored and rounded in order to achieve cost effective and sustainable outcomes. Figure 1 illustrates how the 4P interventions were formulated to fill gaps under 'Water' theme.

Planning for Implementation

Prioritization: It was perceived that all actions cannot be implemented at the same time due to financial, technical and institutional constraints. Hence, prioritization of actions was necessary. The actions were screened based on social, economic and environment criteria and subsequently prioritized as high, medium and low priority actions.

Institutional Arrangement: It was felt that SMKMC may need to improve its professional capacity to undertake

different stakeholders, evolving environmental policy in the form of a Charter for SMKMC, developing concepts for projects and programs, estimating investments and recommending institutional arrangements.

4P Perspective Planning

In order to ensure that the action had the desired impact, 4P perspective (policy, plan, program and project) was considered while determining actions for

Thematic Approach

A thematic approach was followed to ensure that all infrastructure and service sectors are included in the Eco-City Action Plan. Ten themes were selected viz. *Water, Sewerage and Sanitation, Solid Waste, Energy, Biodiversity, Transportation, Health, Land Use, Housing, and Composite*, the latter addressing multiple areas involving the public at large. Situation analysis of key themes was conducted. Each theme was examined in terms of present status, gaps, opportunities and the initiatives undertaken by SMKMC for improvement. This analysis led to the

conceptualization and development of 49 Actions and 52 Awareness Programs for the Action Plan. Each action was categorized as a plan, program, policy or project.

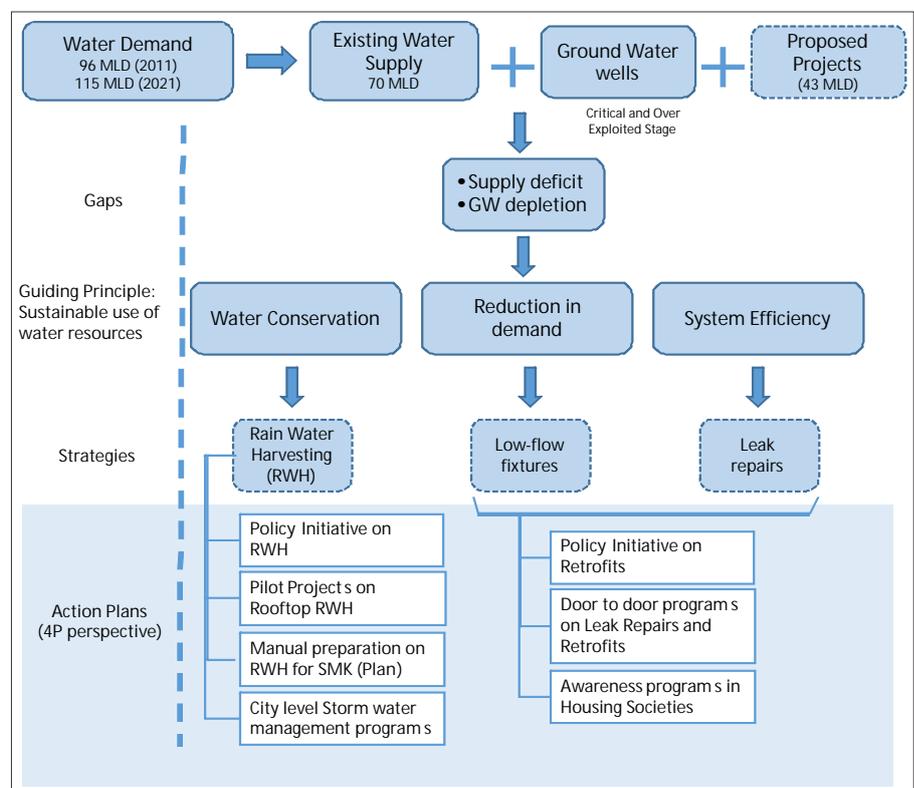


Figure 1: 4P Perspective Planning for 'Water' Theme for SMK Region

activities such as program designing, project structuring, developing proposals for funding, securing finance etc. These activities were essential for implementing and monitoring the Eco-City Action Plan. Hence, a special institutional structure was proposed to implement and execute the Eco-City Action Plan. Formation of a Special Purpose Vehicle (SPV), *Sangli-Miraj-Kupwad Eco-City Private Limited (SEPL)* was proposed. This would be a private limited company with 100 percent ownership of SMKMC. A Project Management Consultant (PMC) will also be required on a full time basis to support SEPL to execute its responsibilities.

Phasing the Plan: Eco-City Action Plan was proposed to span over a period of 7 years. This would help reduce the financial load on SMKMC to implement the Eco-City Action Plan, as the cost for implementation is distributed over 7 years. The program was to be implemented in 3 phases. Phasing of projects provided time to reflect back.

Financial Arrangements: The Plan also included information on various public, private sector and international agencies that may be approached for funding individual or collective actions as proposed in the Eco-City Action Plan. Some of these agencies identified were – Maharashtra Urban Infrastructure Company Limited (MUIINFRA), India Infrastructure Project Development Fund (IIPDF), Housing and Urban Development Corporation Ltd. (HUDCO), Life Insurance Corporation Ltd. (LIC), Infrastructure Leasing and Financial Services Ltd. (IL&FS: PMDO), Swedish Partnership Program, Cities Development Initiatives for Asia (CDIA), World Bank, Asian Development Bank etc.

Economics of Eco-City Action Plan

The total cost for implementing Eco-City Action Plan was estimated to be 15.54 million USD and operating costs as 2.6 million USD. The cost benefit analysis showed that benefits incurred from the realization of proposed actions would not only have environmental and social benefits but would also incur economic benefits.

The economic analysis showed that implementation of the Eco-City Action Plan will lead to tangible as well as intangible benefits. Direct benefits from various actions proposed in the Eco-City Action Plan were calculated. It was found that the overall benefits achieved after the 7 years, will surpass the operation and maintenance costs of the proposed actions.

For example, benefits incurred in 7 years under Solid waste theme were estimated to be between 11.48-18.16 million USD against capital cost of 3.87 million USD and operating cost of 12.03 million USD. The benefits correspond to returns or savings to SMKMC and citizens of SMK on a collective basis.

If the intangible benefits (like improvement in health, resource development, creation of green jobs) would have been monetized, the benefits would have surpassed all costs.

Passing of Government Resolution

A resolution was passed by SMKMC at the General Body meeting held on 7th October 2010 at Sangli, which intended to implement the Eco-City project. The Standing Committee took the following decision:

"This meeting approves the SMKMC Eco-City Action Plan and all its components submitted by the Consultant (EMC). The project should be implemented with immediate effect without any delays. After technical studies related to scope and budget, projects and activities should be sent to relevant committees for approval."

To conclude, experience has shown that a structured, systematic and participatory process enunciated above lead to a robust and sustainable Action Plan balancing ecological and environmental development pursuits. While developing the Eco-City Action Plan, it was realized that such projects and programs lead to development of a city from a long term perspective, while bringing social, environmental and economic benefits to all its stakeholders. Such programs are fundamentally sustainable if conceived and implemented in this perspective.

Building an Eco-City is considered as an economic burden. Experience of developing an Eco-City Action Plan for SMKMC gave a different perspective on the economics of Eco-City. Its economic advantage comforts the investor and the administrator, and its environmental and social dimension enthruse the citizens, professionals and service providers towards active participation.

Sustainable Cities: Case of Gujarat International Finance Tec-City (GIFT)

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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.

It is 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.

Master Plan for Development

GIFT is a green field development and is located at a distance of about 12 km from the Ahmedabad International Airport and 8 km 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.

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



Master Plan for Development

capacities may be installed in future as GIFT City develops.

(c) Water and wastewater management: Depletion of water resources has been addressed by employing various measures such as: (i) Installing SCADA system for improving overall efficiency of utility services including water supply. (ii) 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".

(e) Solid Waste Management: The value improvements for the system includes minimizing human intervention in the process, reduce adverse environmental & health impacts, reduce traffic inconvenience, improving the aesthetic value, economizes the cost 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.

(f) 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.

(g) 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.

Sustainable Cities: Case - Pali Town in Raigad District of Maharashtra

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Throughout the 1980s and early 1990s, the term 'eco-city and eco-village' remained mainly a concept. However, since the mid-2000s, the phenomenon appears to have become increasingly global and mainstream against the background of the international recognition of the scale, severity of climate change and rapid urbanization, particularly in the developing world. International community, governments and authorities all around the globe are taking preventive measures to combat the rising threat to human development and growth, by way of creating sustainable and smart eco-cities and villages.

In India, one such initiative of developing eco-cities was undertaken by CPCB (Central Pollution Control Board) during the 10th Plan 2002-2007. Last year, the Government of India announced the development of 100 cities as 'Smart Cities'.

On state level here in Maharashtra, the Department of Rural Development and Water Conservation, had gone a step ahead to institutionalize an ambitious scheme for transforming villages into "Environmentally Sustainable Village or an Eco-village". The idea behind was to create villages with more than 10,000 population into smaller growth centers so that the dependence on cities and hence the migration from rural to urban areas is reduced considerably. This scheme intended to plan and implement programs and projects that would promote environmentally sustainable village development through people's participation. The development of each village or census town was to be planned giving due consideration to demographic, social, cultural, educational status and

economic, agricultural, industrial, tourism and ecological potentials of respective towns and villages ensuring that the natural resources of the area are not adversely affected.

On similar lines Maharashtra Pollution Control Board (MPCB) had taken up the issue of improving the condition of towns and villages, that have huge influx of floating population due to their religious importance, and initiated the Programme called "Environmental Improvement Programme (EIP) at Religious Places in Maharashtra". In the above context, Pali was found as an apt case for developing an EIP that integrates the concepts & objectives of Eco-City or an Eco Village.

Pali is a census town and is famous for one of the eight Ashtavinayaks in Raigad District of Maharashtra. It consists of 5 villages and is governed by a Group Gram Panchayat, consisting of 17 elected representatives and one person appointed by the state government. The town is spread across 8.94 sq. km. of land area with a population of 10,724 as per 2011 census. However, the floating population goes up to one lakh during festivals like Ganesh Chaturthi.

Local authorities neither have adequate funds to protect the archaeological and heritage importance of such places nor do they have infrastructure that can manage the floating population that converges on the festive days or the religious occasions at such places. This puts a very heavy demand on the available infrastructure and amenities in such towns and creates several environmental problems, such as disposal of solid waste and surface water, high levels of pollution (air, water and noise), constrained water supply,

overcrowding, etc. with rampant deforestation for provision of more amenities and facilities.

EIP plan prepared for Pali had following objectives:

- To come up with a flexible model which can be repeated and serve as a guide for implementing similar scheme in other regions.
- To protect, conserve and enhance available natural resources through people's participation & ensure sustainable development.
- To prepare an action plan for the selected region integrating available/ existing govt. schemes in the development plan and by mainstreaming environmental, social, cultural considerations in economic development.
- To build capacities of Panchayat and local NGOs and professionals to ensure implementation and sustainability of the proposed scheme.
- To develop and promote environment/ recycling industries and create new environmental town at the local level.
- To improve and facilitate tourism to generate economy for the inhabitants & the local authorities.

The methodology adopted to undertake this project is illustrated in Figure 1.

Reconnaissance survey and initial data collection was conducted to determine growth patterns of the village, main occupations of villagers, characteristics of the slums and environmentally sensitive areas etc.

Primary data collection was undertaken through household questionnaire surveys and stakeholder consultation.

Secondary data was procured from various government departments in the form of maps, reports etc.

Based on the data collected and surveys undertaken along with population projections, analysis was done for the demand supply scenario and gaps in existing services; infrastructure and future needs were identified.

Further meetings were conducted with stakeholders to identify their needs, aspirations and expected improvements in the urban infrastructure & services. Existing and proposed government schemes on village development were also identified for integrating in the proposed plan & policies.

Sector wise analysis and SWOT Analysis was undertaken which led to the development of the Action Plan leading to the Draft Environment Improvement Plan.

Action Plans were prepared in response to the gaps identified with regards to the urban infrastructure, social amenities, facilities for the tourists, financial health of the Gram Panchayat etc. The Action Plans so prepared were based on the principles of 'Social, Environmental and Economic' development. One of the major intervention was to prepare an Asset Management Plan (AMP) for the neglected and underutilized natural assets. The AMP attempted to capitalize on the natural assets of the town like the Amba river for recreational facilities, Sarasgad Fort for trekking and the Reserve Forest for nature's trail to further boost the tourism sector of the town. The Group Gram Panchayat was suggested to be upgraded to a Municipal Council since it was eligible for the same and therefore could make its own development control rules and have special regulation for modification to historical & religious building like Ashtavinayaka. Other interventions included project such as:

- water conservation & protection
- rain water harvesting
- waste water management
- improvement of public health
- eradication of open defecation
- management of public sanitation facilities
- management & handling of solid waste (Reduce, Reuse, Recycle)
- green cover development
- afforestation programs
- use of renewable energy resources for energy requirements
- promotion of eco housing, promotion of organic farming
- reduction of use of water
- reduction in use of chemical fertilizers & pesticides in agriculture etc.

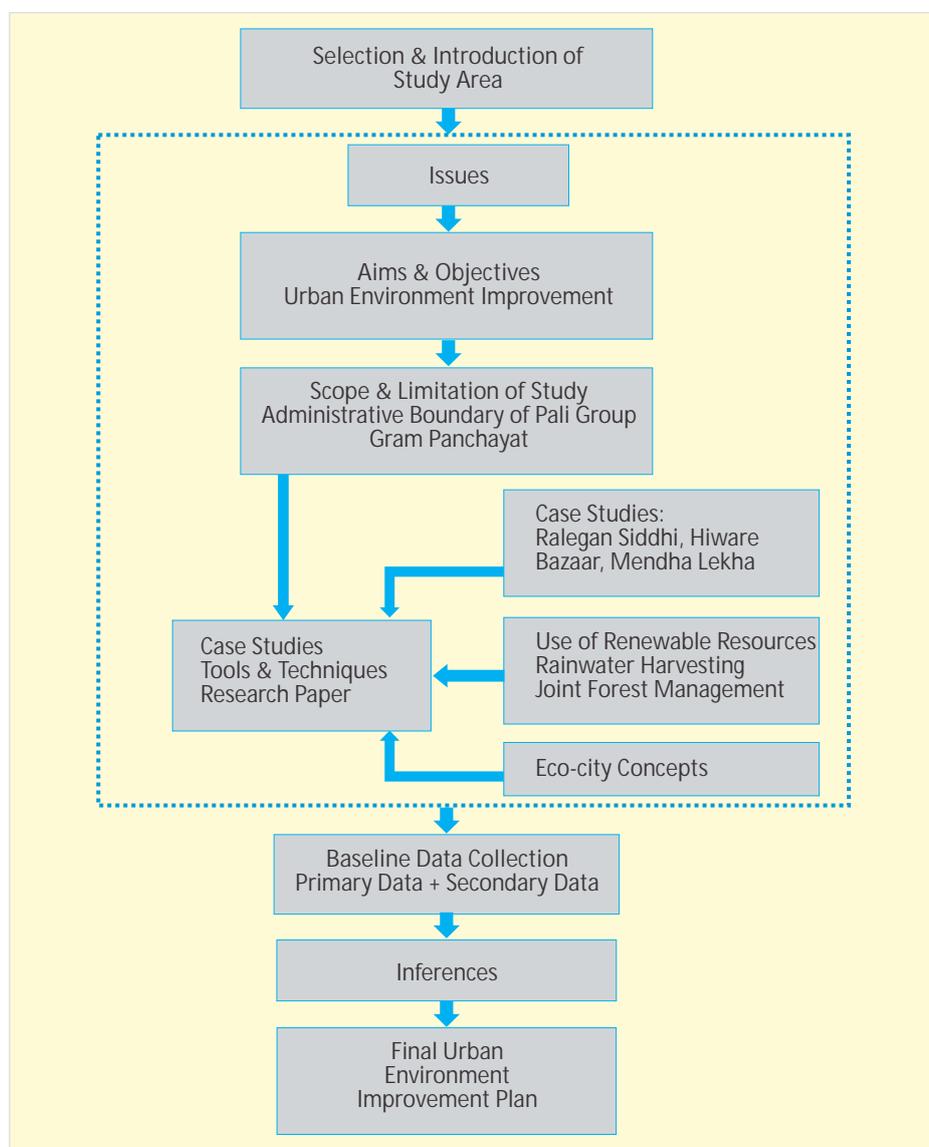


Figure 1

This was followed by preparing Village Capacity Building Plan.

Co-operation and support of the citizens to the proposed plan and policies was extremely critical to the project. Hence, emphasis and separate funds were allocated in the proposed plan for IEC (Information, Education & Communication) under various sectors for generating awareness amongst the citizen.

The draft EIP thus prepared was presented to the Gram Panchayat, Zilla Parishad and MPCB for comments and

further suggestions. The suggestions and comments received were then incorporated in the Final EIP and submitted to the Pali Gram Panchayat and MPCB. Refer to Figure 2 to see the proposed plan for Pali.

Having worked on EIP and Environment Developments Plans for various villages and towns in Maharashtra, it is felt that such plans are a positive step in the right direction. However, it may be difficult to develop ideal Sustainable Cities or Towns or Villages in seclusion. We must adopt a holistic and inclusive approach towards

planning in our country. As per the latest statistics, more than 50% of the population in India is below 25 years of age and is either looking or will soon be looking for jobs. If we are not able to provide jobs to people close to the place of their residence, this would put undue pressure on the cities and its infrastructure that we are trying making smart. RBI Governor, Mr. Raghuram Rajan concurs that India will have to fuel infrastructure investment and rethink on economic-policy approach.

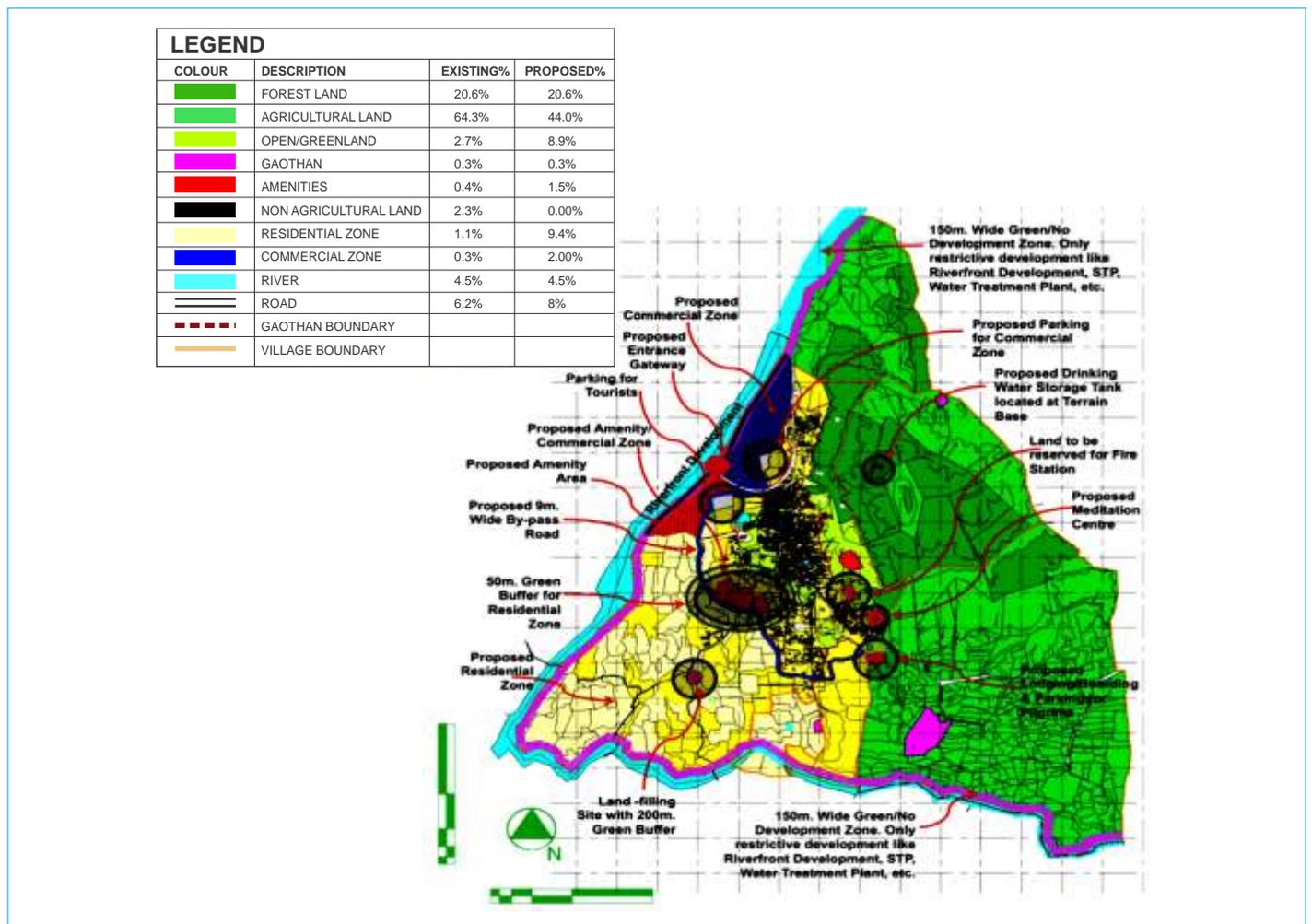


Figure 2 Proposed Plan for Pali

Sustainable Cities Around the World

Country	Green Initiatives
 Abu Dhabi, UAE	Development of Masdar green city, implements Estidama Pearl Rating System. Masdar City in Abu Dhabi's is an \$18 billion sustainable desert city experiment in the making. It is a conceptualized to be the world's first large-scale carbon-neutral city.
 Adelaide, Australia	Hosts 29 parks and green hotels, popular as cycling city, recycles 85% of its waste, offers the first solar powered bus in the world
 Austin, Texas	Successful for 9 years straight - enables Austin residents to pay more of their electric bills in exchange for energy from green sources, over 19,000 acres of parkland
 Cape Town, South Africa	International sustainability centre, effective energy efficiency program
 Copenhagen, Denmark	1/3 of the city's residents use bicycles for work and school, hygienic, global leader in climate change combat, largest wind turbine industry in the world, instituted a mandatory green roof policy, "pocket parks" (half the size of a soccer field) are being installed around Copenhagen
 Curitiba, Brazil	52 meter of green space per person, 1.5 million trees in a network of 28 parks, recycles 2/3 rd of its garbage daily
 Dallas, Texas	Mandatorily implemented the Green Building Standards
 Eugene, Oregon	88% of its energy comes from renewable sources, operated the first diesel-electric hybrid systems in the U.S
 Freiburg, Germany	Car free, rebuilt as a sustainable city after World War II
 Minneapolis, Minnesota	Over 160 miles of bikeways, tap water promotion
 New York City, New York	Ensures that all New Yorkers live within a ten-minute walk of a park, diverted 75 percent of solid waste from landfills, reduced GHG emissions by 30%
 Oslo, Norway	By 2012, heating oil was replaced by renewable energy, use of biofuels for all buses, 94% of household waste is recycled, more than 2/3 rd of the municipality covered with forest; waterways; and agricultural land, intelligent lighting depending on traffic conditions and weather, biogas to power mass transit and heating (80% of heating powered by renewable sources), "eco-certification" for all 43,000 employees, 400 charging stations installed for electric vehicles
 Portland, Oregon	Half of its energy comes from renewable energy, 1 st US city to ban plastic bags, recycles waste, keeps water clean, and has around 250 miles of bike lanes, paths and trails, gives homeowners free energy assessments and provides \$2,000 rebates and loans for home retrofitting, curbside composting program that reduced waste generation by 38%.
 San Francisco, California	80% of the city's waste goes to recycling and composting facilities, has about 700 LEED-certified building projects, 160 charging stations installed for electric vehicles
 Vancouver, Canada	Innovative Bikeway and the 28 km long Seaside Greenway projects, Greenest City 2020 Action Plan, 90% of energy sourced from hydropower
 Zermatt, Switzerland	Green transport: pedestrians, bicycles, horse carts, hand carts and a few electric cars (emergency vehicles)

Source : <http://www.ecomagination.com/top-five-most-sustainable-cities-in-the-world>
<http://www.greenuptown.com/get-to-know-the-top-ten-greenest-cities-in-the-world-for-2014/>
<http://billmoyers.com/content/12-cities-leading-the-way-in-sustainability/>

The Update section has been compiled by Emon Dastidar, Environmental Planner, Environmental Management Centre LLP, Mumbai and Anuja Sawant, Associate, Prasad Modak & Associates, Mumbai.

Sustainability Committee Activities

Bombay Chamber in collaboration with USAID is working on the LEAD Program. The Chamber has signed an MOU for the tenure of 2 years with USAID. Under this initiative, The Sustainability Committee jointly with USAID has organized the following programmes:

1. Two Days Certified Course on [Greenhouse Gas Protocol- A GHG Management tool for Corporate and its supply chain](#) at the Conference Room of Bombay Chamber of Commerce and Industry at Ballard Estate on March 12 -13, 2015.

Learning Objectives:

- Understand and prepare a GHG inventory that captures the emissions of their facility in true sense
- Assess their entire value chain emissions impact and identify the most effective ways to reduce emissions
- Simplify and reduce the costs of compiling a GHG inventory
- Provide business with information that can be used to build an effective strategy to manage and reduce GHG emissions
- Increase consistency and transparency in GHG accounting and reporting among various companies and GHG programs

2. Workshop on [Legal Framework, Mechanisms, Regulations and Compliance tools for Industrial Green Growth](#) on April 16, 2015 at the Board Room of Bombay Chamber of Commerce and Industry at the Ruby, Dadar Office, Mumbai 400 028.

Training Objectives

- The legal framework pertaining to green growth in India;
- Applicable policies and compliance aspects related to climate change;
- Central and state pollution Control Board compliance norms for different industries;
- Policies and mandates to promote energy efficiency and renewable energy in India;
- Mandatory reporting for industries regarding environmental parameters
- Using greenhouse gas management tools as a means to comply with environmental regulations

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