Challenges, solutions and New Ideas for promoting Environmentally Sustainable Cities : A perspective from India

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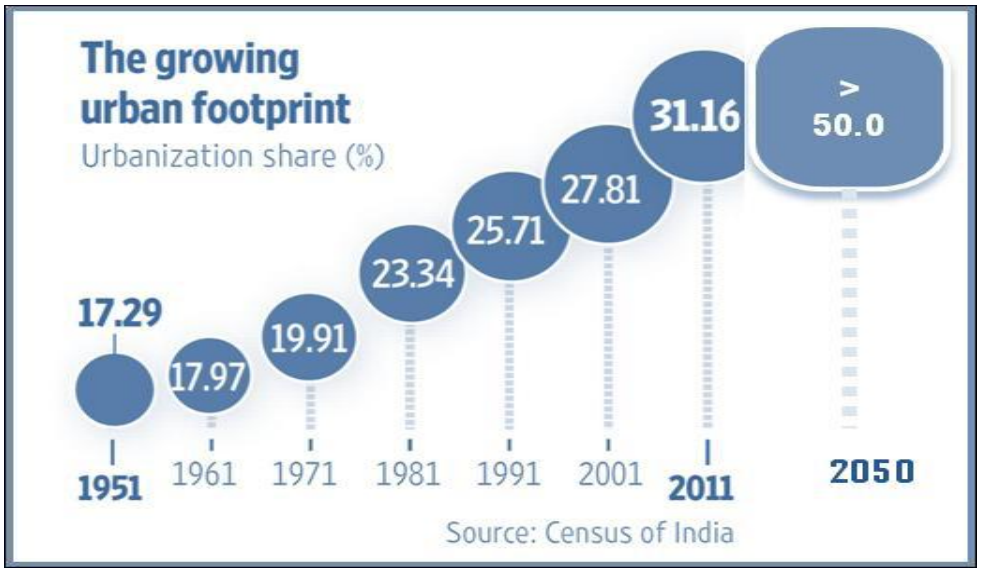
India's Urban Dimensions

As per Census 2011:

- Total population of country: 1210.2 Mn,
- Urban Popn: 377.1 Mn, living in 7933 towns, =31.2% of total popn
- No. of towns: 5161 in 2001; 7933 in 2011, (65% increase)
- 37% lives in 53 'Million plus Metros'
- Decadal growth of urban population is >rural growth

Projections:

Over 50% of India's Population will be Urban by 2050



Environmental challenges in Indian cities

Unplanned Urbanization

Waste Management

Pollution

Clean Energy

Water

Public Transport

Poor service delivery

Building ESCs : Convergence of Policies

Ministry	Initiative
Ministry of Urban Development	National Mission on Sustainable Habitats Jawaharlal Nehru National Urban Renewal Mission (J*n*NURM)- Rajiv Awas Yojana (RAY)-"Slum Free India" National Urban Transport Policy (2006) :modal shift to mass transport National Urban Sanitation Policy :management of solid waste Energy efficiency in buildings
Ministry of Environment & Forests	Environmental Clearance (Mandatory) Resource (energy, water) efficiency integral part of clearance ECBC mandatory
Ministry of Power	Energy Conservation Act , 2001

Building ESCs : Convergence of Policies

Ministry	Initiative
Ministry of New and Renewable Energy	Solar buildings program for energy efficient buildings GRIHA- national building rating system (partly mandatory) Solar cities programme Incentives for integration of renewable energy & GRIHA
Bureau of Energy Efficiency, Ministry of Power	Energy Conservation Building Code (voluntary) Appliance labelling (partly mandatory) Star rating programme for existing buildings (rates commercial buildings on energy performance)

National Urban Transport Policy, 2006 : Focus on Public transport

Key Features :

- Improved public transport,
- Enhancing
- facilities for use of non motorized vehicles,
- Greater involvement of private sector,
- Innovative financing mechanisms,
- Reduced travel demand- better integration of land use and transport planning,
- use of cleaner technology
- Mass Rapid Transit System (MRTS) to be the backbone of Urban transportation

Policy Outcome :

- All 'Million Plus' cities to have MRTS
- Rail Based MRTS in all 'Three Million Plus' cities and in 'Two Million Plus' cities wherever viable
- Metro Rail Projects sanctioned for 8 cities including phase IV of Delhi Metro serving the Delhi NCR region.
- Innovative financing for MRTS

Delhi Metro

Certified by the United Nations as the first metro rail and rail-based system in the world to get "carbon credits for reducing greenhouse gas emissions" and helping in reducing pollution levels in the city by 630,000 tonnes every year

- Project started in 1995, India's first modern public transportation system
- covers a total length of 189.63 kilometres with 142 stations, of which 35 are underground
- Serving 4 cities :Delhi, Gurgaon, Noida and Gaziabad in the National Capital Region of India
- Had an average daily ridership of 2.01 million commuters (July, 2013)
- Second metro in the world, after the New York City Subway, to be ISO 14001 certified for environmentally friendly construction
- Most of the Metro stations on the Blue Line conduct rainwater harvesting
- Has so far earned 400,000 carbon credits by saving energy through the use of regenerative braking systems on its trains
- Plans afoot to harness solar energy and install solar panels at some of the stations.

National Rating and Award Scheme for Sanitation for Indian Cities, Ministry of Urban Development (GOI)

Goal: to rapidly promote sanitation in urban areas of the country (as provided for in the National Urban Sanitation Policy and Goals 2008), and to recognize excellent performance in this area.

The process :

✓The exercise of rating of cities covers all major cities of the country , a total of 423 for the year 2009-2010.

✓19 indicators for rating divided into three categories: Output (50 points), Process (30 points) and Outcome (20 points).

✓Methodology for the exercise incorporated standardized methods for measurement and scoring ,evolved after extensive stakeholder consultations

✓The rating makes use of both primary data collection during field visits and secondary data from published sources such as census.

✓The results were communicated to State Governments as part of consultations and presented to the National Advisory Group on Urban Sanitation

National Rating and Award Scheme for Sanitation for Indian Cities

- **City Color Codes**

No.	Category	Description	Points
1	RED	Cities on the brink of public health and environmental 'emergency' and needing immediate remedial action	<33
2	BLACK	Needing considerable improvements	<34 ≤66
3	BLUE	Recovering but still diseased	<67 ≤90
4	GREEN	Healthy and Clean city	<91 ≤100

- **Key results**
  - ✓ More than half of the cities are in the **Blue** or **Black** categories
  - ✓ 4 cities in the blue category which have scored above 66 but less than 90 marks out of hundred
  - ✓ More than 50 cities report 90 % or above safe collection of human excreta.
  - ✓ 24 cities collect more than 80 % of their solid wastes - another six show an outstanding performance of nearly 100 percent primary collection.
  - ✓ 17 cities have achieved treating at least 60 percent of their wastes
  - ✓ Considerable efforts are required to improve access to community and public toilets for the urban poor and to stop open-defecation.
  - ✓ Wastewater treatment poses considerable challenges - 380 cities collect and treat less than 40% of their human excreta, though there are six cities that treat more than 90% of their human excreta.

Gandhinagar, Gujarat (Solar City)

With over 300 sunny days per year, it is planned to install 500 megawatts (MW) of solar capacity by 2014

- **Launched an innovative 5 MW solar rooftop public-private partnership (PPP) project to develop rooftop-based solar power generation.**

- 170 kW grid-connected Solar Photovolatic Systems installed in 17 government buildings
- 125 Solar-Wind Hybrid Roof Top Systems (capacity: 1 KW) at Government bungalows.
- 250 kW grid-connected Solar PV Power Plant on government land.
- 205 Solar Water Heating Systems (capacity: 250 lpd) on Government residential bungalows
- Solar Water Heating Systems (capacity: 15,000 lpd) installed in government buildings
- 65 Solar Photovoltaic Street Lights in 9 Public Parks.

The energy efficiency initiatives were introduced with an investment cost of Rs 12.8 million. As a result, savings of Rs 4.96 million per year (or 1683 MWh) have already been achieved.

Sustainable Buildings

- **GRIHA**- Green Rating for Integrated Habitat Assessment : Tool to facilitate design, construction, operation of a green building ,and in turn ….measure “greenness” of a building.

  Recognized by many Govt. organizations and ministries (MoEF CPWD, Punjab Govt etc)

- **ECBC**- Energy Conservation Building Code of **BEE**

  for enforcing minimum bench marks of energy efficiency in Building Envelope Design and Electrical & Mechanical Systems

- **BEE** energy star rating for Electrical &Mech Equipment

Delhi :Indira Paryavaran Bhavan : Net Zero Energy Building with 100% onsite power generation

Indira Paryavaran Bhavan : Net Zero Energy Building with 100% onsite power generation

- 1.4 M KWh Annual Solar Energy Generation for equal amount of annual energy requirement for the Building
- Solar Passive Architecture, Insulated outer walls and roof, Windows with special glass transmitting more light and less heat
- Chilled beam system for air conditioning, geothermal heat exchange system, energy efficient equipment
- Recycling of waste water after treatment, low flow fixtures, low water consuming plants
- Thereby 40% savings in Electricity and 55% Saving in Water with Zero Discharge

GRIHA parameter	Building performance
GRIHA Rating	5 Star
EPI kWh/sqm/annum	24.13
Reduction in energy consumption Below GRIHA benchmark	67.3 %
Reduction in water consumption Below GRIHA benchmark	64%
Renewable energy installed on site	930kW

Thank You