Looking beyond Buildings: Green guidelines for large developments

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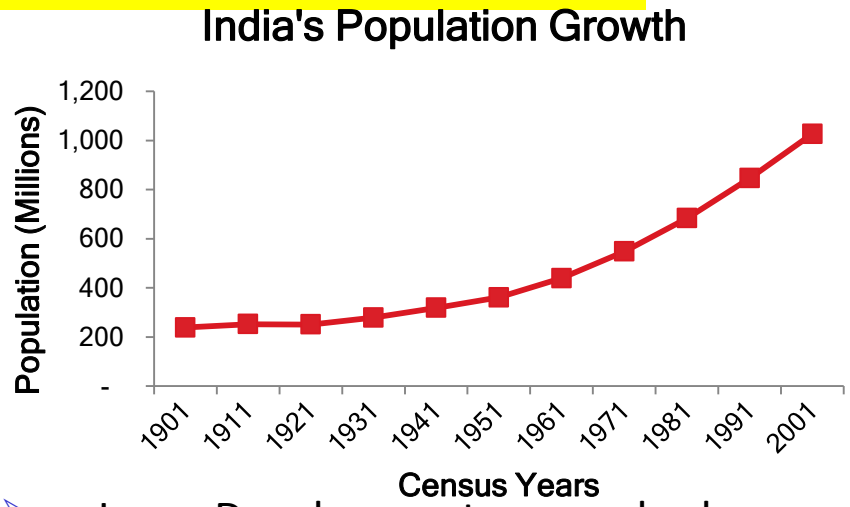
The context

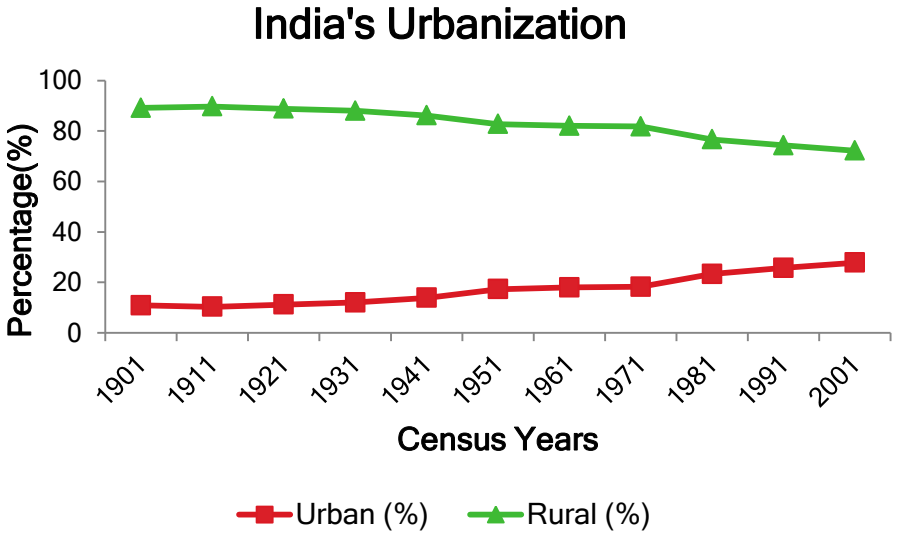
India's Urbanization and large developments

- Population of India will reach from current 1.2bn to **1.4bn by 2025**
- By 2030, 40.8% (600mn) of India's population will be living in urban areas compared to current 28.4%



- Large Developments around urban centres

DMIC Corridor:
24 cities ,7 to come up in phase I



Large Developments in current GRIHA framework

- Number of projects registered : 200
  - Campus Projects: 22
    - IIMs, AIIMS, IISERs, IITs, Central Universities
    - ONGC, CWGV, Infosys, Goverdhan Eco-Village, Educomp
- Built-up area registered: 8.2 Million m^2

Large Developments :Categories

- Educational institutes/ Campuses
  - Engineering college campuses
  - Medical college campuses
  - Universities
  - Corporate campuses
- Neighborhoods- Residential/ institutional complexes
  - Housing societies
  - Complexes of Housing boards
  - Housing complex by Builders
  - Housing complexes by Urban development organizations
- Hotels/ resorts
- Hospital complexes (eg: AIIMS)
- Townships
- Special Economic Zones
- Public Sector Undertaking Townships (designs are controlled and complete in all respects)
- Private developer townships , plotted developments with part construction by the developer

The approach

Large sites and campus developments

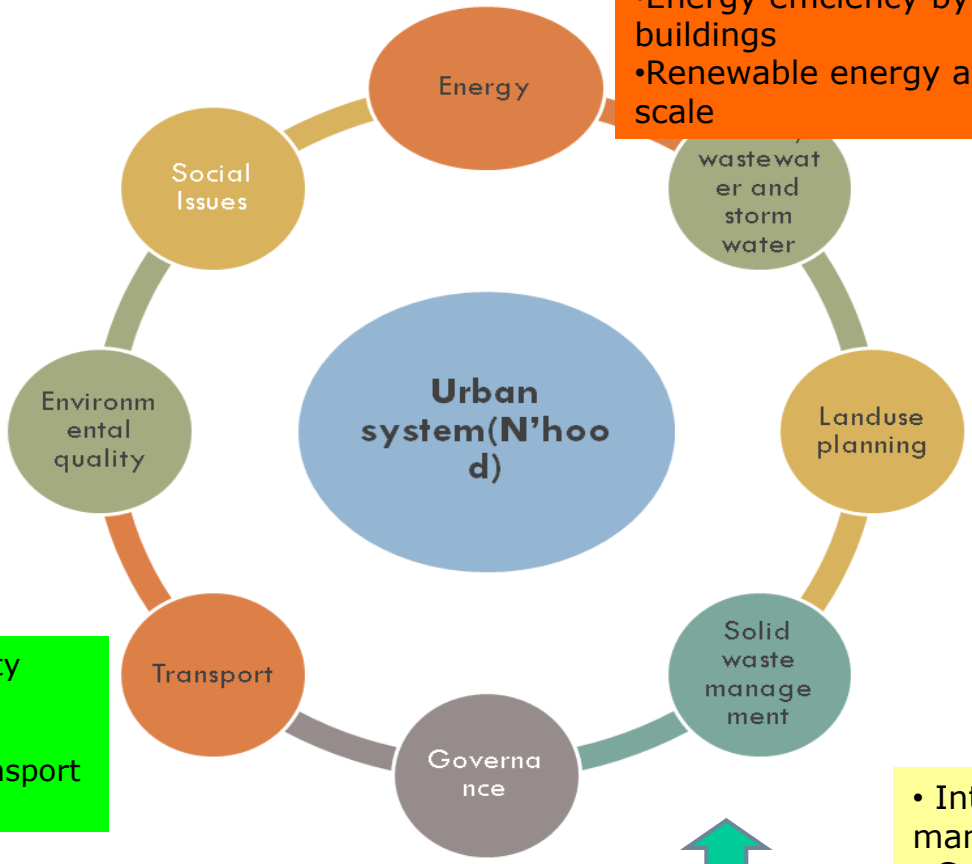
- The approach needs to bear in mind the following aspects :

1. Environmental Context (EIA) (Environmental Planning, Landscape Architecture).
2. Energy supply and demand management (HVAC including co-generation and tri-generation, Renewable and passive energy, Power systems including smart grids)
3. Access and mobility
4. Historic & Social Context
5. Topographic Context
6. Soils / Geological Context
7. Hydrological Context (Water resources, hydrogeology & watershed development, Water including recycling and recharging)
8. Biodiversity Context
9. Development Regulation Context
10. Architectural Context (Structures and construction systems, Planning, Urban Design, Architecture, Environmental design)
11. Utility Context (energy systems)

SITE (Macro)

BUILDING (Micro)

Large Development- Parameters



•Energy efficiency by utilities and buildings
•Renewable energy at macro and micro scale

• Water availability
• Water quality
• Storm water management
• Rainwater harvesting
• Unaccounted for water
• Financial sustainability of various services

•Density of various areas
•FAR
•Open spaces
• Mixed use development

• Integrated solid waste management
• Construction waste management
• e-waste management
• Hazardous waste management

-Walkability
-Cycling
-Access to public transport systems

• pollution levels (NOx, Sox, SPM, noise, etc.)
• Indoor air quality

All of these parameters have macro(neighbourhood) and micro(building) issues

Goals for large developments

Carrying capacity of land with respect to water availability and green cover provision

Setting carbon footprint goals and compare with national benchmarks and plan developments ensuring that carbon footprint not exceeded

Land suitability with respect to planned development

Key highlights

- Safe and walkable neighborhoods should be planned
- Integrated resource planning (energy, water, waste management) is preferred over piecemeal approach
- Use of RE should be explored to maximum
- Socio economic issues should be adequately addressed
- Use of environment friendly materials should be promoted
- Buildings should be designed as per green parameters

Guidelines for Green Large Area Developments (31 guidelines subdivided in 7 categories)

Section A: Sustainable site selection and planning

Section B: Socio-economics

Section C: Mobility systems

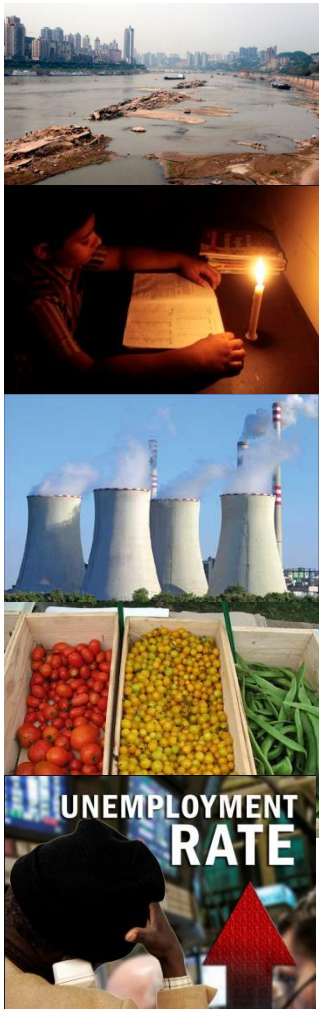
Section D: Energy efficiency and renewable energy

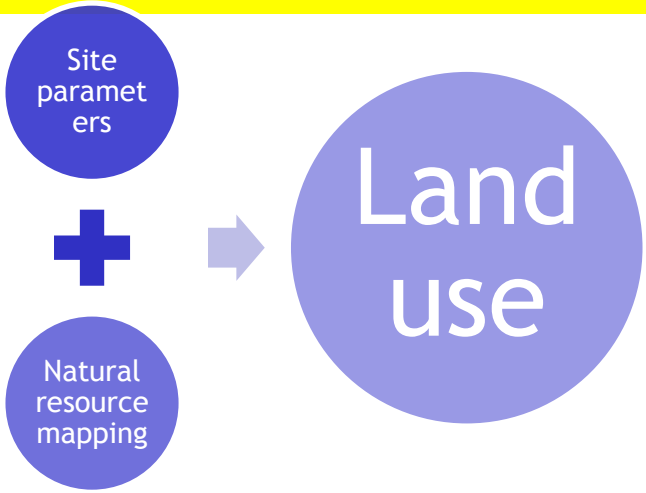
Section E: Water and wastewater management

Section F: Solid waste management

Section G: Risk mitigation/adaptation and Climate Change

Site selection and land use planning





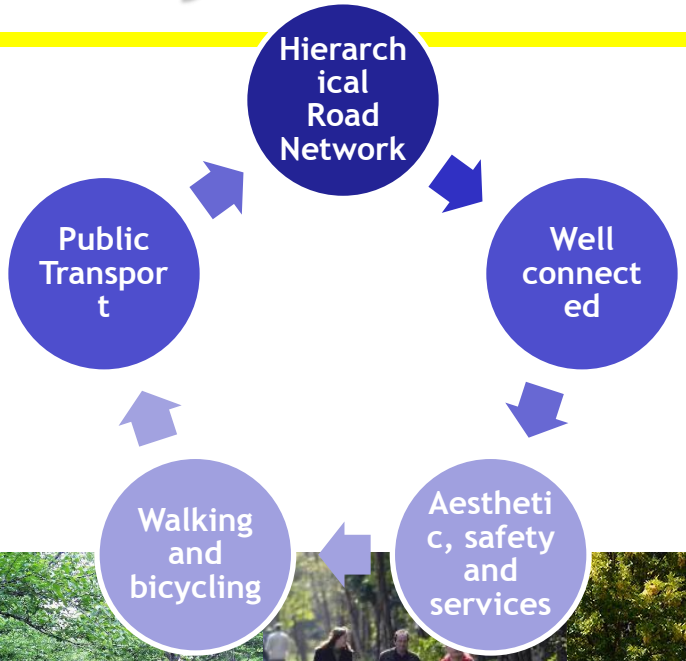
SUSTAINABLE SITE

- Select a suitable site for the proposed large development
- To avoid development of ecologically sensitive areas and to reduce the impact of development on surroundings
- The proposed mater plan should comply with the natural resource mapping of the large development
- To protect and preserve most sensitive part of site and to reduce the impact of development on the environment

Socio-Economics

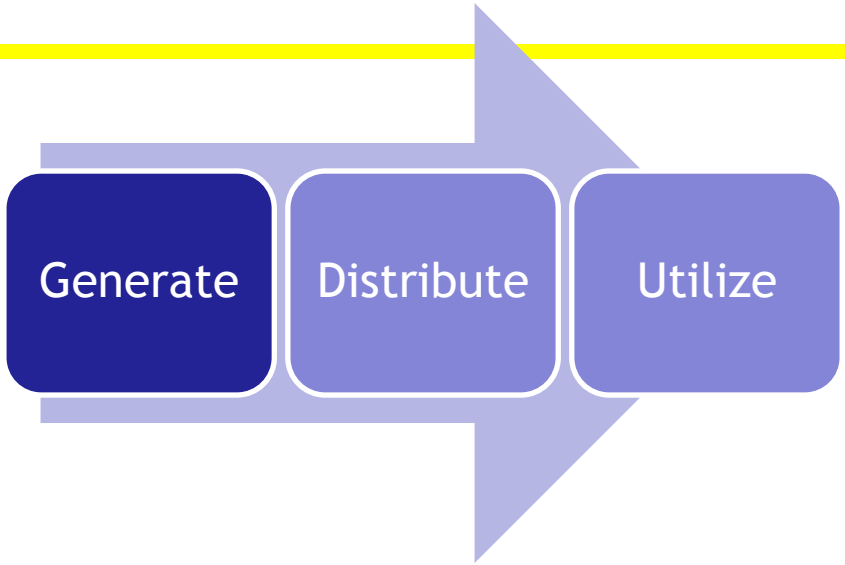
- Measures to be undertaken on site and within site design to bring in equity and social well being
  - » Preconstruction
  - » During Construction
  - » Post construction

Mobility



- Develop a **hierarchical road network** within the development
- To offer **different levels of mobility, safety and environmental quality**
- **Street networks** to be developed in a manner so as to promote safety, efficiency, community living, environmental and aesthetic quality and cycling and walking
- Promote **safety, efficiency, community living, cycling and walking**
- Encourage walking and cycling within the development
- Promote use of **mass transportation**
- To reduce vehicle ownership, reduce GHG Emissions, Reduce consumption of fuels
- Use of ICT for transportation and use of environment friendly materials for road construction

Energy



- **Large developments have multiple users of electricity**
- **Technical loss** (Electrical systems, transformers, electrical motors, cables, switch gears, power factor, current, voltage drop)
- **Street lighting**
- Energy resource planning and use of RE sources: foster demand side management and response, reduce power outages, increase reliability, efficiency and safety of the grid, reduce carbon footprint and minimize fossil fuel consumption

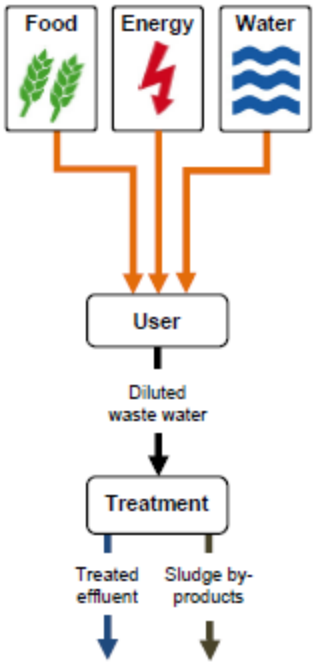
Energy

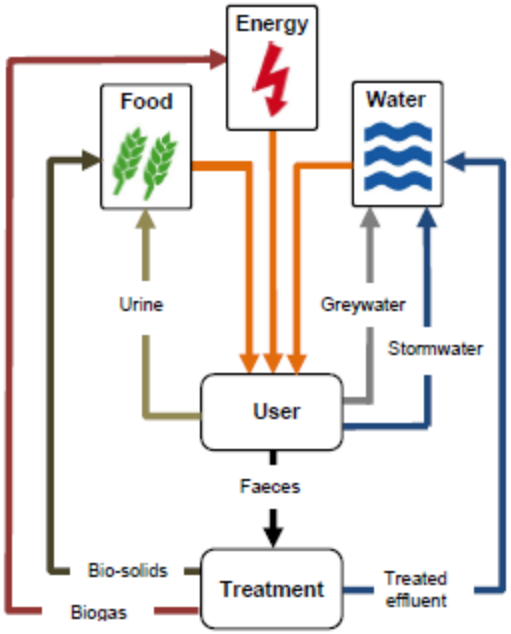
- Energy efficient electrical systems for large development
  - To optimize the technical loss associated with these systems, and ensure efficiency of all electrical systems
- Energy efficient street lighting
  - To ensure energy efficiency and safe circulation in large developments
- Energy efficient pumping
  - Selection of efficient pumping systems and design of efficient pumping
- Energy resource planning and use of RE sources for meeting energy demand/use of CHP/tri generation systems
  - Demand optimisation, resource optimization and planning, selection of RE sources and potential estimation, use of RE for various applications
- Climate responsive planning for layout in large developments and energy efficiency parameters for specific building typologies
  - Ensure appropriate architectural control to minimise demand and ensure proper passive architectural planning
- Sustainable construction processes, commissioning, monitoring, operation and maintenance

WATER & WASTE

ISSUES

- Dilution of flows
- High water use
- Pollution risks
- Cost
- High energy demand
- Waste of valuable resource
- Nutrient overload –surface water qlty depletion(algal bloom)
- Non-flexible





Nutrients, water and energy removed from the local area

LINEAR APPROACH

Sustainable Habitats
Water Resources
Bio-Technology & Bio-Resources
Resources Regulation & Global Security
Modeling & Economic Analysis

Sustainable

Industrial Energy Eff
Sustainable Develop
Social Transformatio

Nutrients, water and energy returned to the local area for reuse

CYCLIC APPROACH

Aspect of urban water management	Conventional approach	Integrated approach
Overall approach	Integration is by accident. Water supply, wastewater and stormwater may be managed by the same agency as a matter of historical happenstance but physically the three systems are separated.	Physical and institutional integration is by design. Linkages are made between water supply, wastewater and stormwater, as well as other areas of urban development, through highly coordinated management.
Choice of infrastructure	Infrastructure is made of concrete, metal or plastic.	Infrastructure can also be green including soils, vegetation and other natural systems.
Management of stormwater	Stormwater is a constraint that is conveyed away from urban areas as rapidly as possible.	Stormwater is a resource that can be harvested for water supply and retained to support aquifers, waterways and biodiversity.
Management of human waste	Human waste is collected, treated and disposed of to the environment.	Human waste is a resource and can be used productively for energy generation and nutrient recycling.
Management of water Demand	Increased water demand is met through investment in new supply sources and infrastructure.	Options to reduce demand, harvest rainwater and reclaim wastewater are given priority over developing new resources.
Choice of technological solutions	Complexity is neglected and standard engineering solutions are employed to individual components of the water cycle.	Diverse solutions (technological and ecological) and new management strategies are explored that encourage coordinated decisions between water management, urban design and landscape architecture.

Water

Sustainable water management

Sustainable water management at campus level to reduce site water demand

Provision for adequate quality of water for potable & non-potable applications. To ensure the above, a stringent monitoring plan should be adopted through periodic audits

To ensure adequate water monitoring and leak detection plan at community level, occasional water audits or preferably regular monitoring through SCADA system is recommended

Sustainable waste water management

Provision of the dual plumbing / Dual water distribution system to recycle and reuse the treated waste water

Ensure operation and maintenance (O&M) of Decentralized waste water systems and safe disposal of generated sludge in all large development

Water reuse and recycling (including rain water harvesting) for large developments

Water

Sustainable storm water management

Large development should adhere to natural site contours and reduce hard paving

Large development should provide for an efficient storm water management system

Adequate provisions for storm water management in basements

Water Shed Management

Ensure that the entire rainwater falling on the site (excluding the rain water being stored) is recharged through adequate measures

Ensure a monitoring plan to maintain the level of ground water (pre and post monsoon)

Solid Waste

Organic / Biodegradable and Recyclable waste management

E-Waste management in large development

Hospital / Healthcare unit waste management

Construction and demolition waste management

Thank you for your attention