“GREEN URBANISM”
– WAY TO FUTURE

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“Era of Scarcity”

- Drink Pure Water
- Breathe Clean Air
- Live in Hygiene Place
- Eat Good Fresh Vegetables/Greens, etc
TRADITIONAL WALKING CITY
Up To 1850 In Europe
- High Density
- Mixed Use
- Organic Structure

TRANSIT CITY
1850 - 1940 dominant city form in industrial world
- Medium Density
- Mixed Use
- Grid Based
- Centralised
The Indian City: 18th - 21st Century

- Present city
- Indian high density city – pre 1850
- Colonial city 1850-1950
<table>
<thead>
<tr>
<th>Mature European Cities (19th and mid 20th century)</th>
<th>Post colonial Indian City (Late 20th – 21st Century)</th>
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<tbody>
<tr>
<td>Central business district critical</td>
<td>Multiple business districts, cities within cities</td>
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<tr>
<td>Public transport (mainly rail) before cars</td>
<td>Motorcycles, inexpensive comfortable cars challenge role of public transport</td>
</tr>
<tr>
<td>Manual labour in factories</td>
<td>Service and informal sector</td>
</tr>
<tr>
<td>Car movement &amp; speed concerns dominate</td>
<td>Safety, climate change &amp; pollution</td>
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<tr>
<td>Management by mechanical systems</td>
<td>Internet &amp; ITS</td>
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**Rapidly Urbanizing INDIA**

- Growth
- Increased Pollution
- Population Increase
- Urban Sprawl/ or Splatter
- Increasing Traffic Demand
- Increasing Income and Rising Comfort

**GLOBALIZATION**

**TRADE REVOLUTION**

**ICT REVOLUTION**
### Bangalore: Urban Sprawl

1973-2009:
- Increase in built-up area: 632%
- Decrease in water bodies: 79%
- Increasing temperatures and urban heat island effect

- **1980-2006**: vehicles increased 15-fold
  - Total road network: 4000 kms
  - Most major roads, V/C ratio > 1
  - Increased Infrastructure Costs – for laying and maintenance!
  - Cost of transportation of municipal waste - 270 Crores
Bangalore at a glance…..

- Population – 9.5 million
- Area – 742 sq.km.
- GDP – $83 billion (Rs 448200 cr)
- Wards – 198
- Households - 22,77,056
- Education – 89% literacy rate with 20 lac college degree holders
- Per Capita Income – Rs. 14,000 pm

Bangalore’s ambient air quality is under threat

Uncontrolled Development is a Death Trap for Cities
Threatens cities and regions

Ephesus, 2nd biggest city in Roman empire, abandoned in 1000AD..
Babylon the greatest city of the ancient world for 2300 years – collapsed in 140 BC.

Vision of the last century
- Heavy infrastructure
  - Fly overs
  - Under passes
  - Wide roads
- Drawbacks
  - Resource wastage
  - NO feed back
  - Costly
  - Unsustainable
  - Car centered

Vision of the next century
- Soft infrastructure
  - Public transport – more buses, surface trains, metro, LRT
  - Bicycle sharing, pedestrian facilities
  - Car Sharing
  - Intelligent Transport systems
- Advantages
  - Uses mobile technology
  - Resource optimization
  - Resource tracking
  - Resource utilization estimate
  - Intelligent and feedback based
Sustainability is the next big economic opportunity...

Need of the Hour is Sustainable City Thinking

Through a Green Innovation Titled

GREEN URBANISM
What is GREEN URBANISM

DEscribes Habitats that are Smart, Secure, and Sustainable

- Smart
  - Adopting Technologies

- Secure
  - Having Built in Systems to respond & Resilient factor included

- Sustainable
  - Climate Change
  - Peak Oil
  - Bio Diversity

Ten Principles – a holistic approach to sustainability

Zero Carbon * (construction practices)
Zero Waste * (construction waste segregation)
Sustainable Transport
Local & Sustainable Materials * (selection of materials)
Local & Sustainable Food
Local & Sustainable Water * (minimising use)
Natural Habitats & Wildlife * (protecting environment)
Culture & Heritage * (respecting local design)
Equity & Fair Trade * (treatment of workers)
Health & Happiness * (finished building)
Features of GREEN URBANISM

1. The Renewable Energy City
2. The Bio-Regional Carbon Neutral City
3. The Biophilic City
4. The Distributed City
5. The Eco-Efficient City
6. The Place Based City
7. The Sustainable Transport City

Source: Peter & Annie, CUSP 2012

All 7 of them overlap and compliment each other. No single city achieved it all but few cities made advance progress: Singapore/Europe/Australia/US/Canada/ of late China & UAE

1. Renewable Energy City

Organic Farming

Sun

Wind

Bio-Fuel

Geo-Thermal
Singapore Ubin – solar island?

Gujarat Solar Power Initiative, another good example
Masdar City

World’s first zero-carbon & zero waste city
6 square km walled plan
17km E/SE Abu Dhabi in UAE
Initiated 2006, will take 8 years to build, Phase 1 ready by April 2010
Cost US$22 billion
Population when completed: 50,000
1500 Businesses in eco tech
World class research environment focused on alternative energy, sustainability, and the environment in partnership with MIT (MIST)
Energy

Step 1: 40-60MW Solar PV plant to power all construction
Eventually 130MW Solar
20MW Wind
Geothermal heat pumps for cooling
Smart Grid

Solar Desalination Plant

80% of water recycled
Greywater used for irrigation

Green Building designs

Zero waste
Biological ➔
soil and fertilizer
Plastics and Metals ➔
recycled
Car free
Personal Rapid Transit

Traditional narrow streets for shade
2. The CARBON NEUTRAL CITY

Buildings & Transport

Reduce, renew and offset
Carbon neutral businesses...
Bioregional offsets a chance to regenerate bioregion
Existing Building practices generally ignore the finely grained concerns of a carbon footprint, even if they have addressed “green” elements or environmental permitting.

24 June 2009

Bed Zed – first carbon neutral development in UK. All urban development must be C-neutral by 2016.
Singapore?

Greening city... how much carbon is being offset?
Bioregional opportunities to regenerate rain forest with offsets – leadership needed, especially on accreditation and management.
Singapore Port – world’s first carbon neutral port?
Singapore tourism – carbon neutral?
300 green roofs in Chicago to reduce urban heat island effect, reduce energy and recycle water...

Carbon in Buildings

50% of global emissions

Operational Carbon Energy Systems
  Heating, refrigeration, lighting, ventilation, etc..

Embodied Energy Building Materials in Supply Chain
  Raw materials, manufacture, transport to site, maintenance, end of use

24 June 2009
Low Carbon Mobility Strategy

Comparison between CMP and LCMP aims

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<th>LCMP</th>
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<td>Projects to meet present and future mobility demand</td>
<td>Strategies to reduce emissions from transport without compromising the mobility needs</td>
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<td>Achieve desirable development goal depends on the objectives set by the responsible authority</td>
<td>Desirable development goal is to reduce travel demand by motorized transport</td>
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⑥-1 Cheonggyecheon Area before Restoration

⑥-1 Cheonggyecheon Area after Restoration
Dubai Metro

First Metro in the Middle East region and largest driverless train in the world
75 km along the linear city (in 2 parts, Red and Green Lines) – aim to eventually link in to Abu Dhabi
US$11 billion
Carrying 50,000 per day in first few months
47 stations. Only 1/3rd opened
New green line almost completed
LRT being built also to link
Dubai Metro

Fully air conditioned in carriages, stations and footbridges
Stations have food outlets, ATMs, dry cleaning services and other retail outlets
Wireless internet in stations and trains
Smart card ticketing - multi-modal.
Three class carriages – gold, women and children and silver.
Mitsubishi trains and Serco operator.
3. Biophillic City – biodiversity and local food *in* the city and bioregion
GREEN ROOFS & GREEN WALLS
Singapore is a Biophilic City
A City in Garden and Water Bodies

greening the city of singapore began with former prime minister lee kuan yew nearly 50 years ago with his concept of a 'garden city'
he identified a green singapore as a key competitive factor in attracting foreign investment to the country

between 1986 and 2007 singapore's vegetation cover dramatically increased
between 1986 and 2007 Singapore's vegetation cover dramatically increased

the skyrise greenery incentive scheme reimburses half the cost of green wall and green roof installation
150 kilometres of park connectors

3 'healing power of greenery'
4 'loving plants'

mohan krishnamoorthy
primary school teacher
What about food?

4. Distributed City – local water, energy and waste systems

Sydney Green Transformers
FUTURE CITY
- NODAL/INFORMATION CITY

  Medium - 800m around transit stops. Low - DRT or cycle distance to transit.
- Integrated - residential, commercial, small scale industry.
- Sub-centralised - link by transit and telecommunications.
Singapore?

Basic form of Singapore is polycentric so it is easily built using distributed technology. Requires a change in approach to enable it to be mainstreamed and governance to be worked out...

Singapore the Distributed City of Asia?

5. Eco Efficient City

Factor 4 – 10 efficiencies...

Industrial ecology
6. Place Based Cities

Place stories bring the people dimension alive. Layered memories
Place stories are a major contribution to sustainability as they integrate the social to the environmental and the economic.
A sacred site for two cultures...

Telling a story of place...
Identity Plan for cultural, natural, built heritage

Natural heritage and park connector network
Sustainable Transport

Car Ownership is here to stay as a Social Status
7. Sustainable transport

Reducing VKT and growing quality transit
Building city around transit
Facilitating pedestrians and cycling
Building renewable transport around plug-in electric vehicles

SOLUTION TO TRAFFIC PROBLEM

• Improved Mobility of 'People' rather than 'Automobiles' should be the principle to reduce the traffic problem in urban areas
• Goal shall be to increase the modal share of public transport system to 70% or double it by 2020’
More MRT needed fast... and buses to meet them.
Rebuilding Auto City as a Smart Sustainable City with real centres

Transit Oriented Developments, TODs...land development partnerships to create the polycentric city.
Making cities more walkable...

And bicycle friendly...
A million Electric Vehicles to be produced in 3 years...

Chevy Volt  
Toyota FT-EV  
Mitsubishi MiEV  
Toyota Prius PHV  
Smart ed  
Nissan Leaf  
Ford Focus EV  
Subaru Stella  
Mini E  
Mercedes Bluezero EV  
Tesla Roadster  
Think City  
Gadz Automotive  
Detroit Electric  
Renault Fluence EV  
BVD E6  
Chevy SS8  
Vauxhall Triex  
Dodge Circuit  
Fisker Karma
RENEWABLES STORAGE PROBLEM SOLVED!

Al Gore’s moon shot:

Smart Grid + Plug-in EVs + Renewables

Electric vehicles help make a renewable city...

- Onsite renewable energy and water production
- Building efficiency and zero-waste
- Smart grids
- Transit-oriented development with electrified public transit
- Plug-in vehicles
EV Recharging Infrastructure

NB: Standardized EV infrastructure is essential.
Impassioned plea for safer, greener cities

Vancouver, 22 June, 2006 – Mr. Enrique Peñalosa, the former Mayor of Bogotá, Colombia, drew a standing ovation at the plenary of the Third Session of the World Urban Forum on Thursday when he said cities would save a lot of money if the use of cars was restricted or even banned during peak hours.

> read more
"Your descendants shall gather your fruits."

Thank You!