4th GRIHA Regional Conference on
Innovations in
Sustainable BUILDINGS

15-16 Nov 2013

"GREEN URBANISM" – WAY TO FUTURE

Presentation by:

MR. J.SATYA SAI KUMAR
TEAM LEADER (TRANSPORTATION & CITIES)

CiSTUP, Indian institute of Science (IISc)
Former consultant to united nations escap

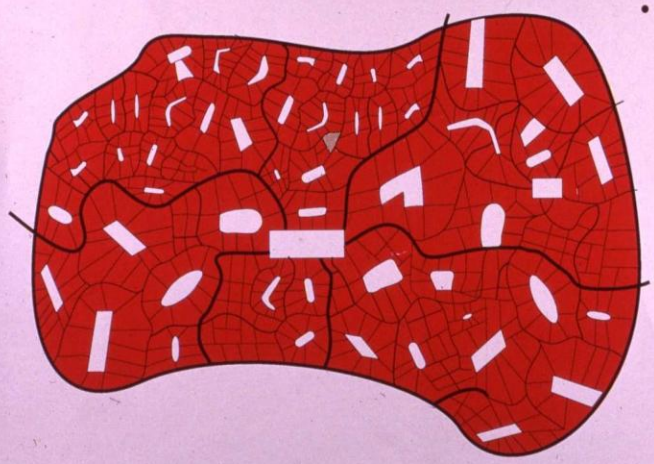
"Era of Scarcity"

- Drink Pure Water
- Breathe Clean Air
- Live in Hygiene Place
- Eat Good Fresh Vegetables/Greens, etc

TRADITIONAL WALKING CITY

Up To 1850 In Europe

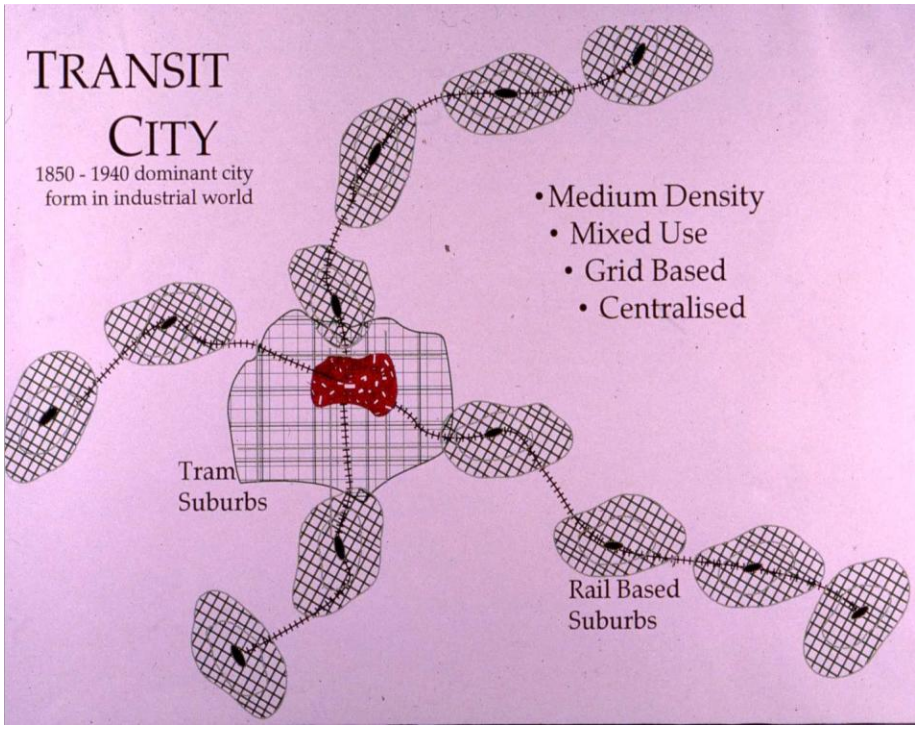
- High Density
- Mixed Use
- Organic Structure

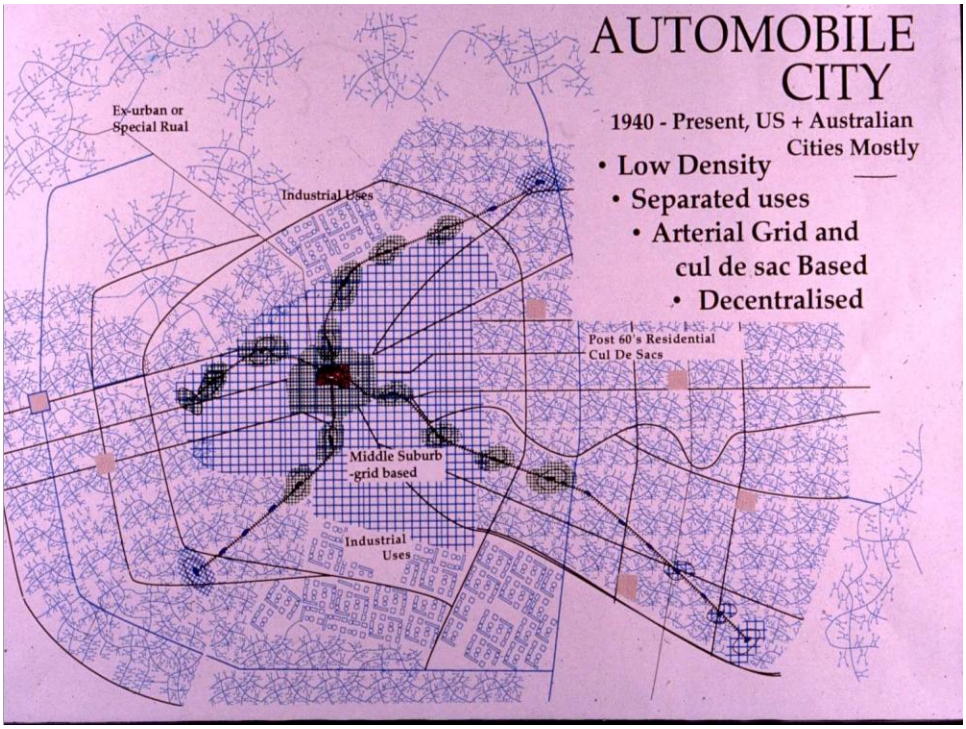


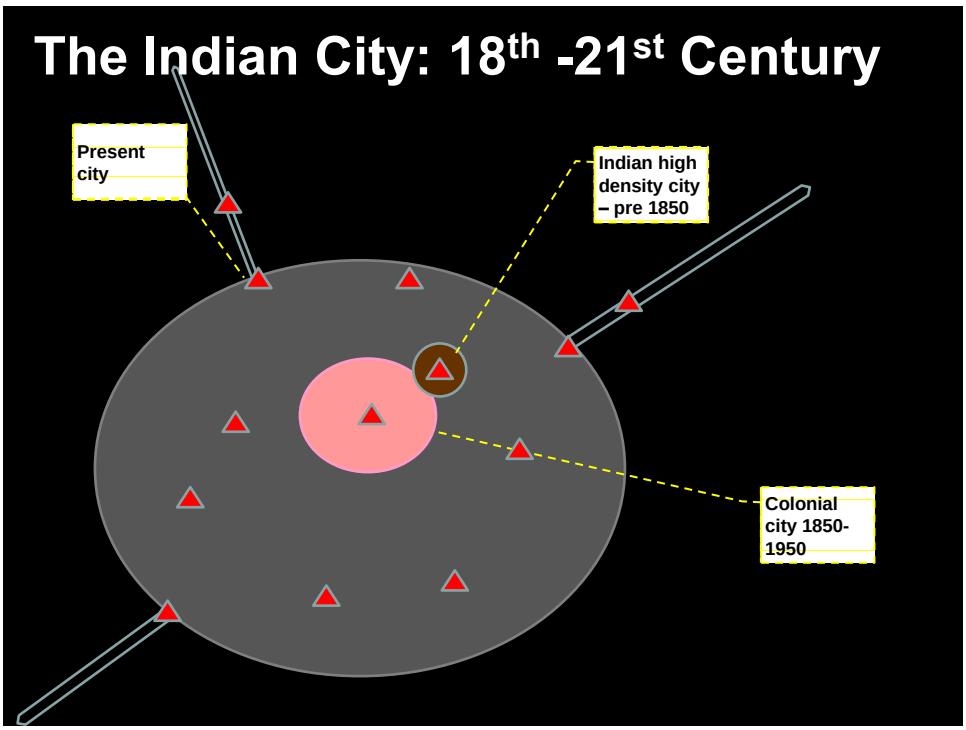
TRANSIT CITY

1850 - 1940 dominant city form in industrial world

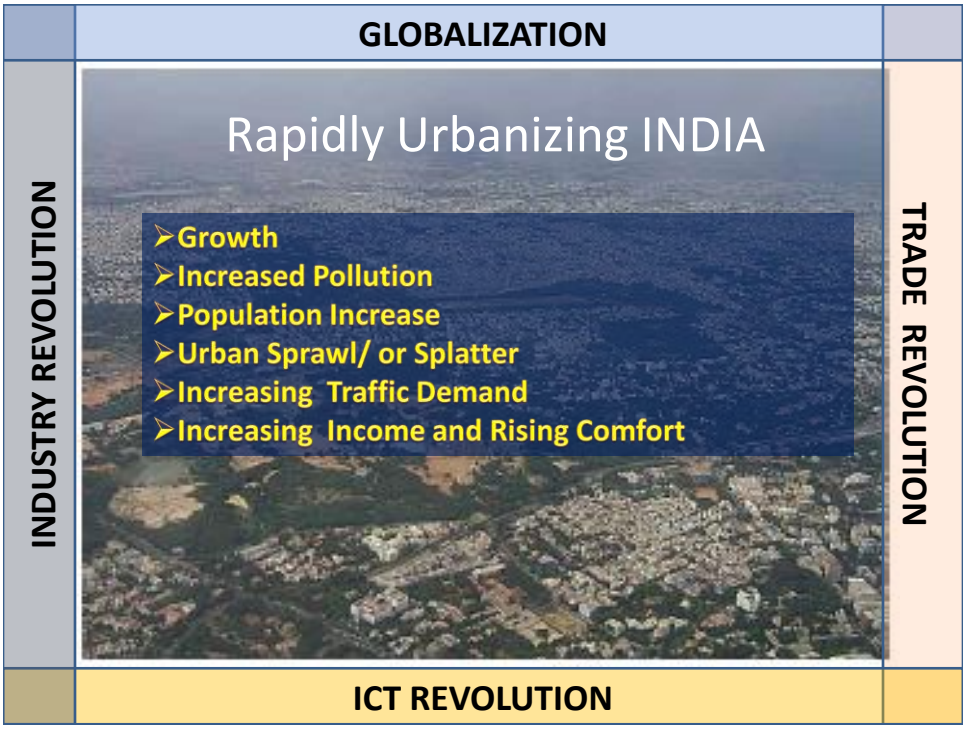
- Medium Density
- Mixed Use
- Grid Based
- Centralised

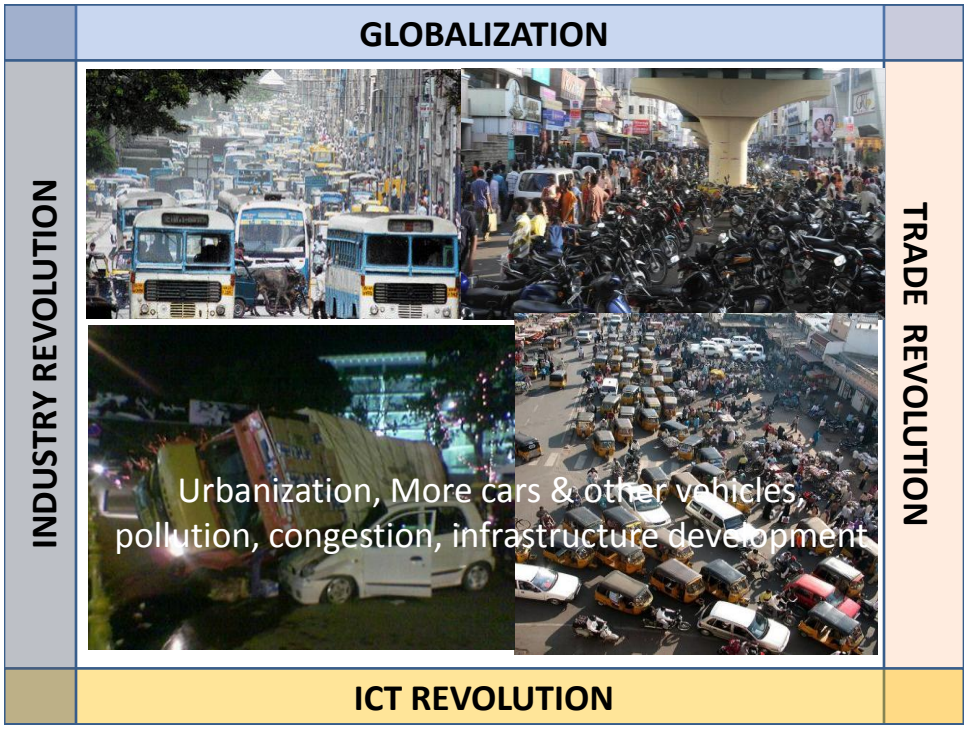



AUTOMOBILE CITY
1940 - Present, US + Australian Cities Mostly
• Low Density
• Separated uses
• Arterial Grid and cul de sac Based
• Decentralised
Ex-urban or Special Rual
Industrial Uses
Post 60's Residential Cul De Sacs
Middle Suburb -grid based
Industrial Uses

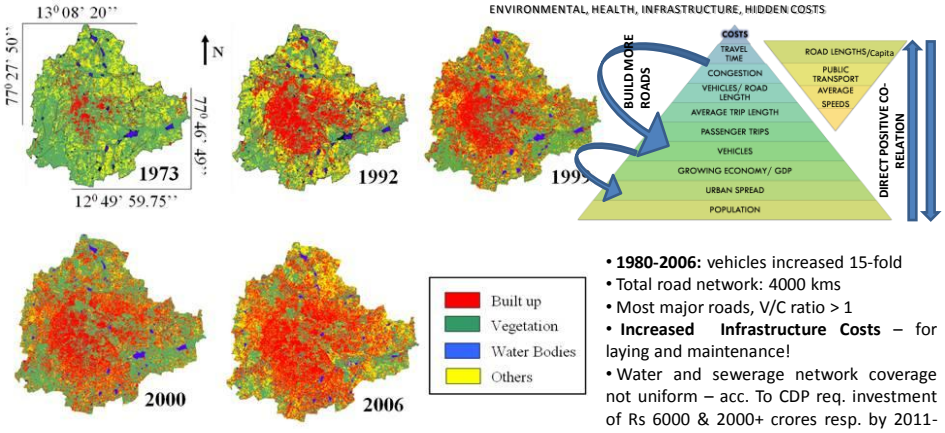

The Indian City: 18th -21st Century
Present city
Indian high density city – pre 1850
Colonial city 1850-1950

Mature European Cities (19th and mid 20th century)	Post colonial Indian City (Late 20th – 21st Century)
Central business district critical	Multiple business districts, cities within cities
Public transport (mainly rail) before cars	Motorcycles, inexpensive comfortable cars challenge role of public transport
Manual labour in factories	Service and informal sector
Car movement & speed concerns dominate	Safety, climate change & pollution
Management by mechanical systems	Internet & ITS





❑ Bangalore: Urban Sprawl

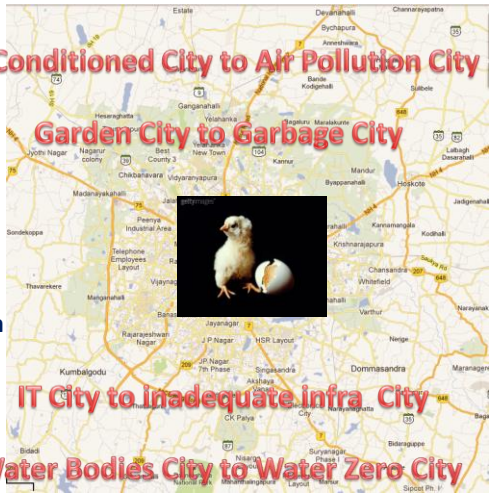


- **1980-2006:** vehicles increased 15-fold
- Total road network: 4000 kms
- Most major roads, V/C ratio > 1
- **Increased Infrastructure Costs** – for laying and maintenance!
- Water and sewerage network coverage not uniform – acc. To CDP req. investment of Rs 6000 & 2000+ crores resp. by 2011-12. Storm water drains - 1000+ crores.
- Cost of transportation of municipal waste - 270 Crores

1973-2009:
- Increase in built-up area: 632%
- Decrease in water bodies: 79%
- Vegetation decreased by 32% from 1973-1992, 38% from 1992-2002 and by 63% from 2002 -2009; loss of valuable agricultural and eco-sensitive lands.
- Increasing temperatures and urban heat island effect

❑ Bangalore at a glance…..

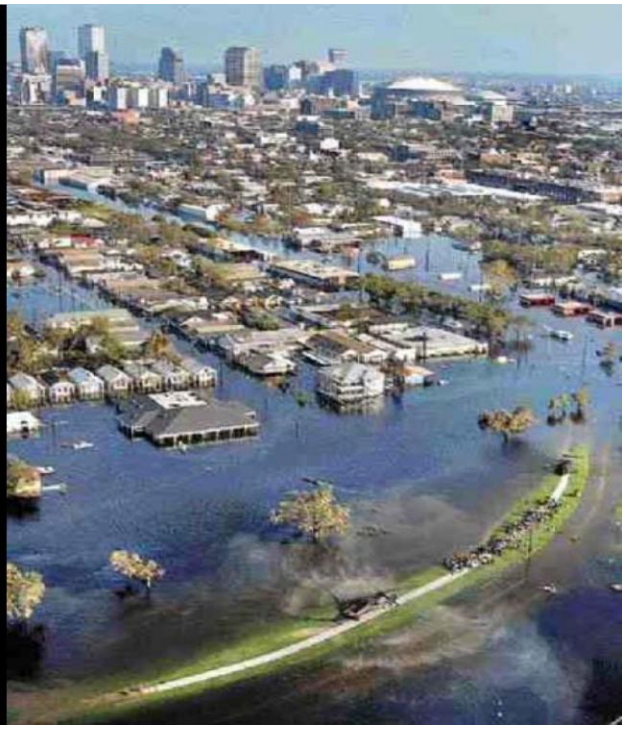
- **Population – 9.5 million**
- **Area – 742 sq.km.**
- **GDP – $83 billion (Rs 448200 cr)**
- **Wards – 198**
- **Households - 22,77,056**
- **Education – 89% literacy rate with 20 lac college degree holders**
- **Per Capita Income – Rs. 14,000 pm**



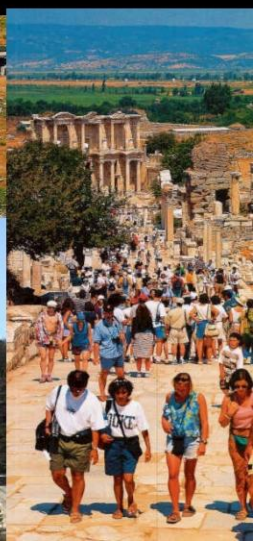
Source: Google Maps

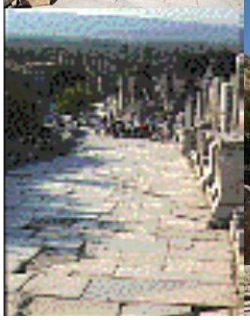
Bangalore's ambient air quality is under threat

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.

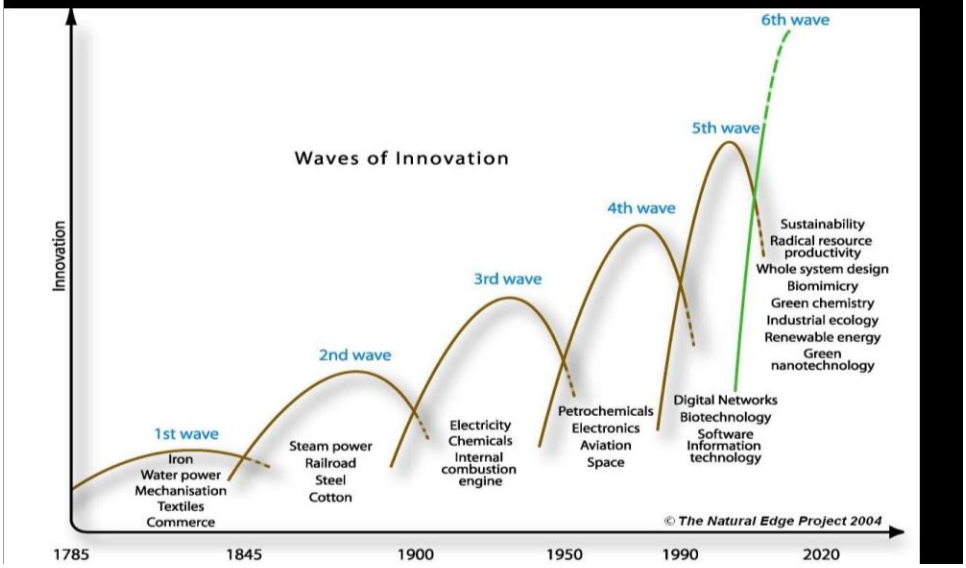
Vision of the last century

- Heavy infrastructure
  - Fly overs
  - Under passes
  - Wide roads
- Drawbacks
  - Resource wastage
  - NO feed back
  - Costly
  - Unsustainable
  - Car centered

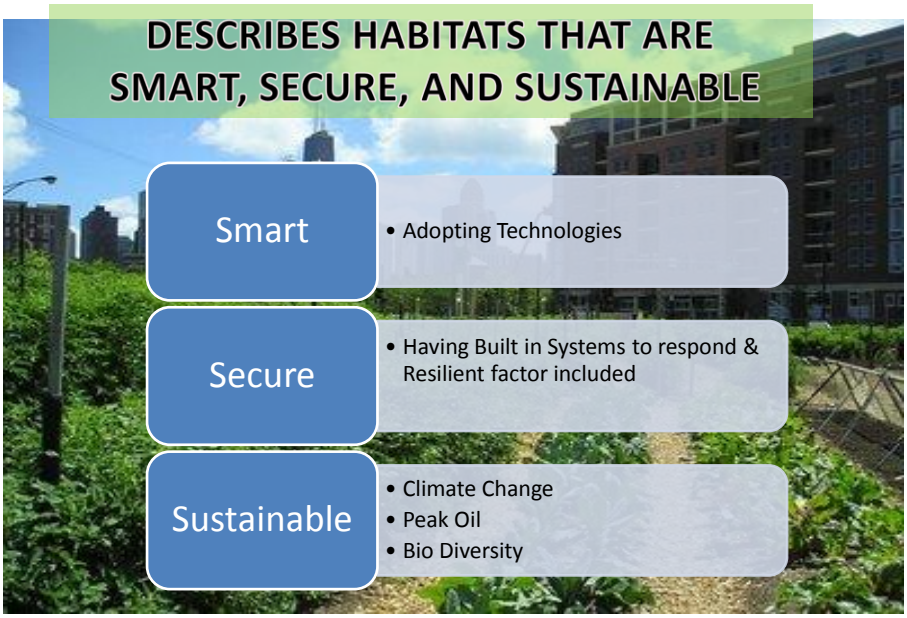
Vision of the next century

- 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...



What is GREEN URBANISM



Ten Principles – a holistic approach to sustainability

ONE PLANET LIVING®

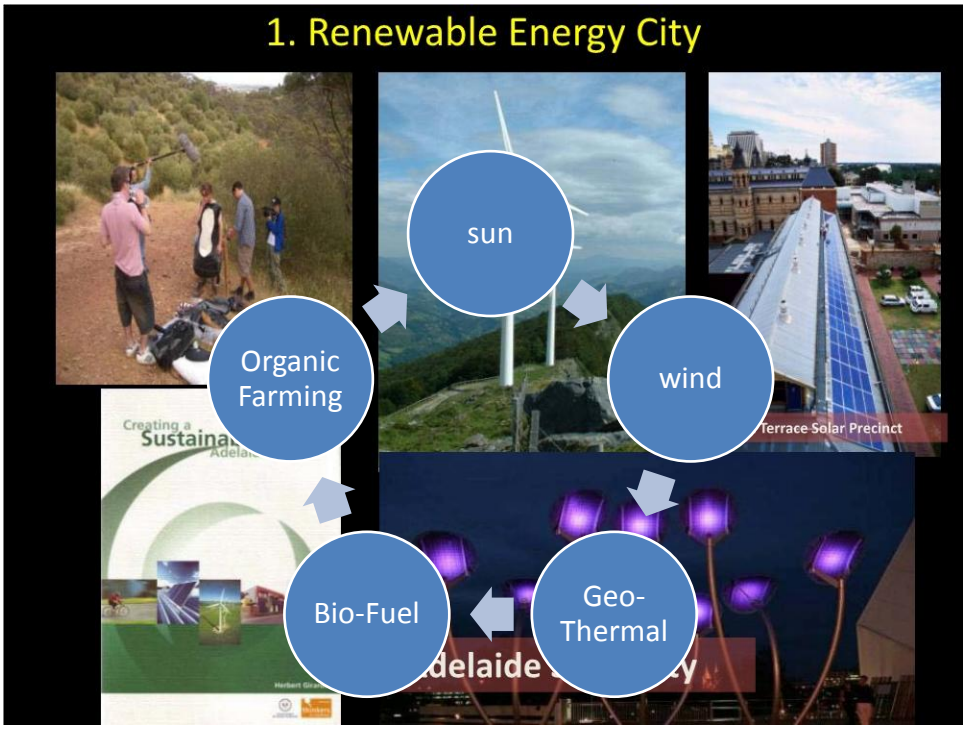
- Zero Carbon * (construction practices)
- Zero Waste * (construction waste segregation)
- Sustainable Transport
- Local & Sustainable Materials * (selection of materials)
- Local & Sustainable Food
- Local & Sustainable Water * (minimising use)
- Natural Habitats & Wildlife * (protecting environment)
- 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

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

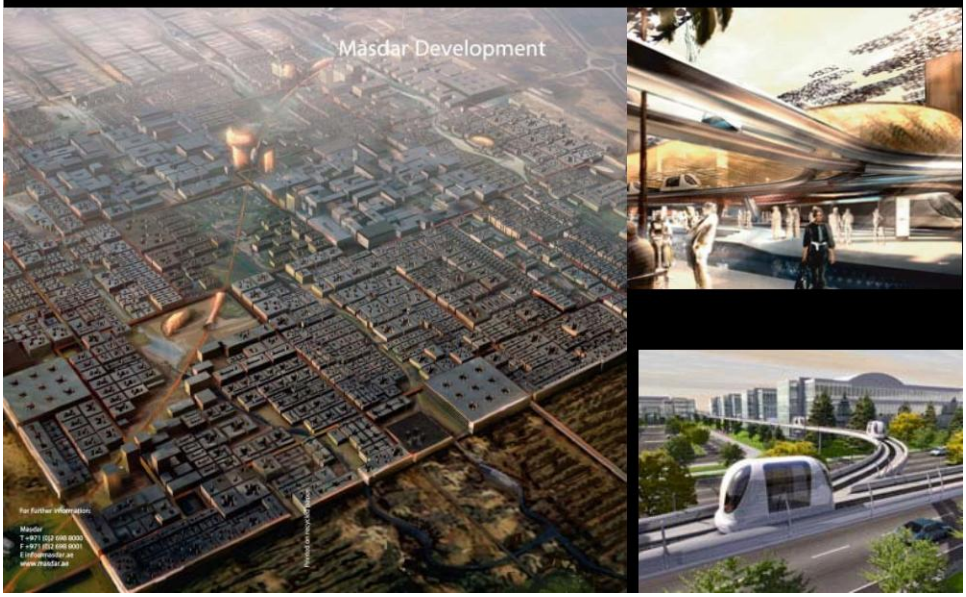
Source: Peter & Annie, CUSP 2012




Singapore Ubin – solar island?
This facility runs o solar power!
Gujarat Solar Power Initiative, another good example


MASDAR
ABU DHABI FUTURE ENERGY COMPANY

Masdar City – first zero carbon city



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

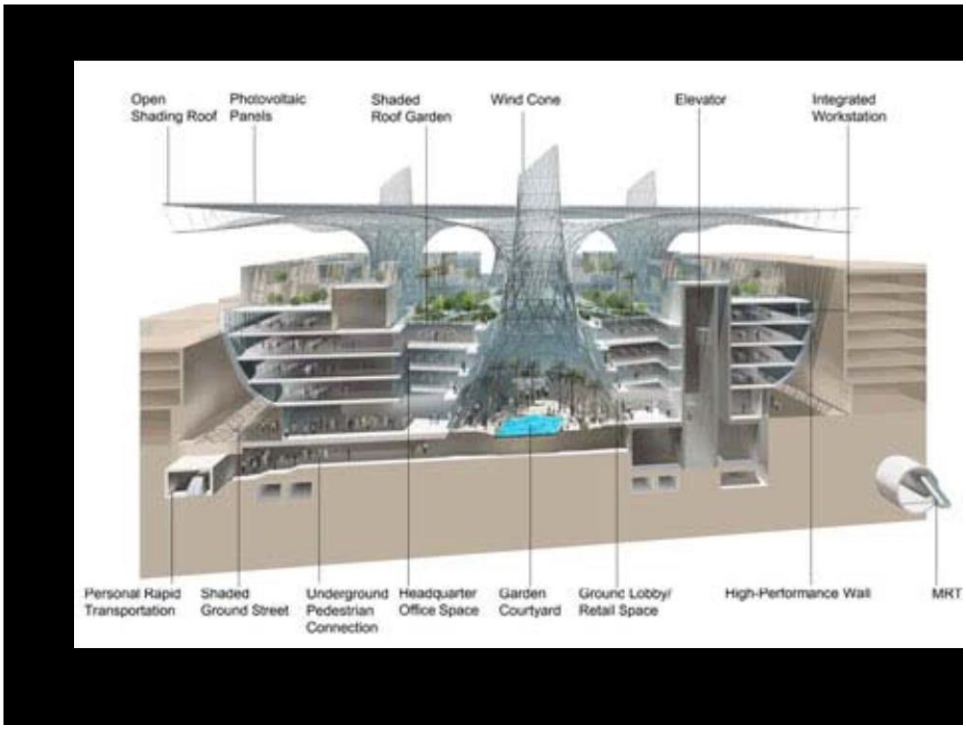
Biological → soil and fertilizer

Plastics and Metals → recycled

Car free
Personal Rapid Transit

In Plan

Traditional narrow streets for shade



2. The CARBON NEUTRAL CITY

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.

GO CARBON NEUTRAL NOW

Greening Australia
Breathe Easy

THE SECRET TO
LIVING
CARBON
NEUTRAL

Fully accredited scheme soon…
www.greeningaustralia.org.au/

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

dcarbon8
CARBON & SUSTAINABILITY CONSULTANTS

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

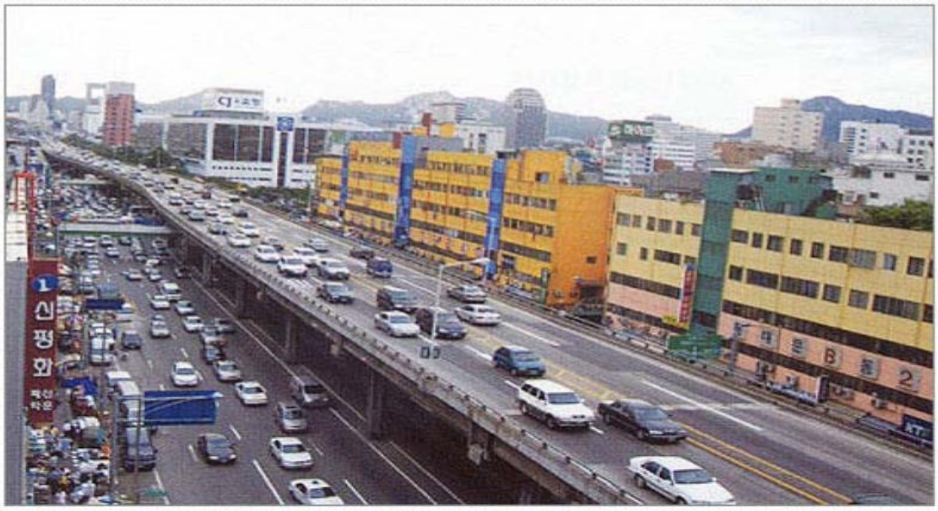
Low Carbon Mobility Strategy

Comparison between CMP and LCMP aims

CMP	LCMP
Projects to meet present and future mobility demand	Strategies to reduce emissions from transport without compromising the mobility needs
Achieve desirable development goal depends on the objectives set by the responsible authority	Desirable development goal is to reduce travel demand by motorized transport

⑤-1 Cheonggyecheon Area before Restoration

(http://www.metro.seoul.kr/kor2000/chungaehome/en/seoul/2sub.htm)



⑥-1 Cheonggyecheon Area after Restoration

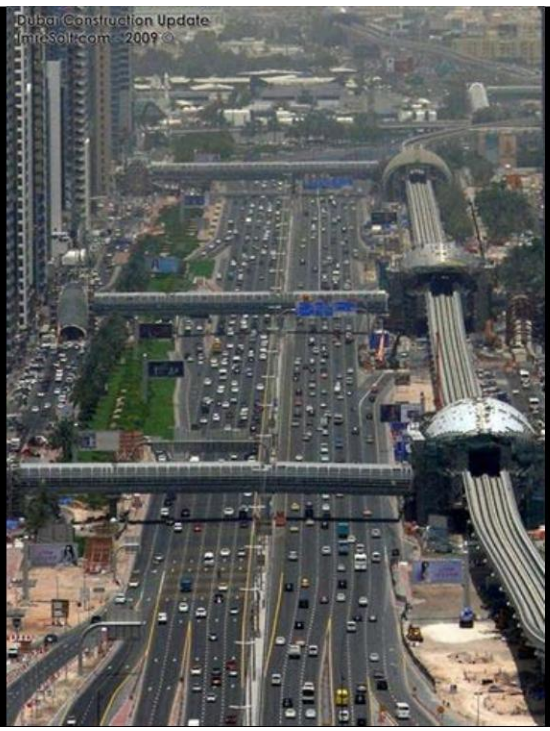
(http://www.metro.seoul.kr/kor2000/chungaehome/en/seoul/2sub.htm)

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.

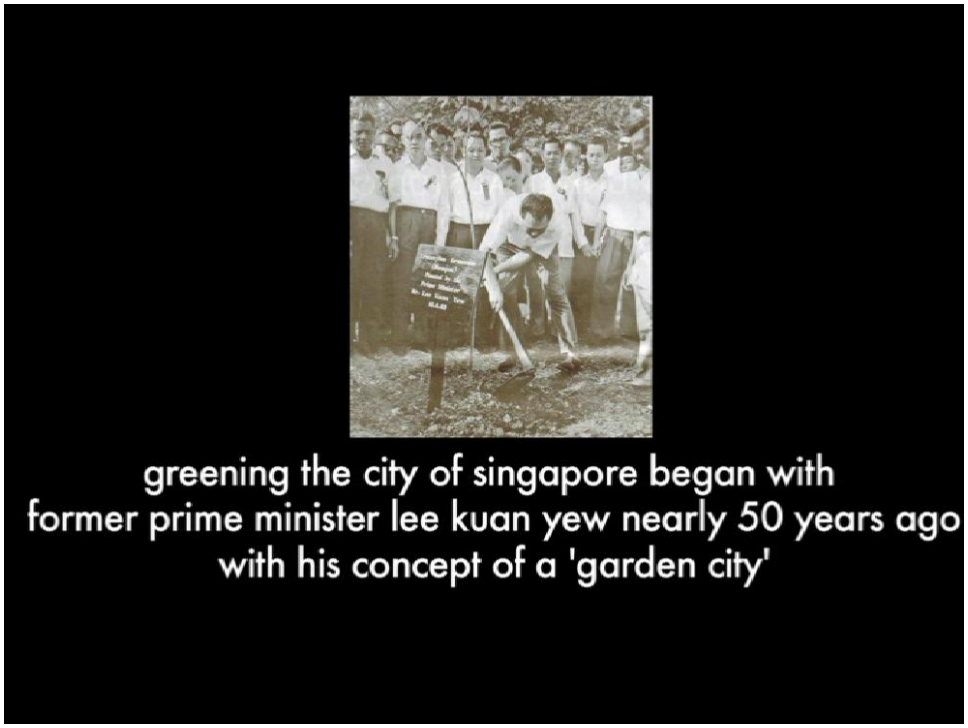


Transit Oriented Development (TOD) Plans for Dubai

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'

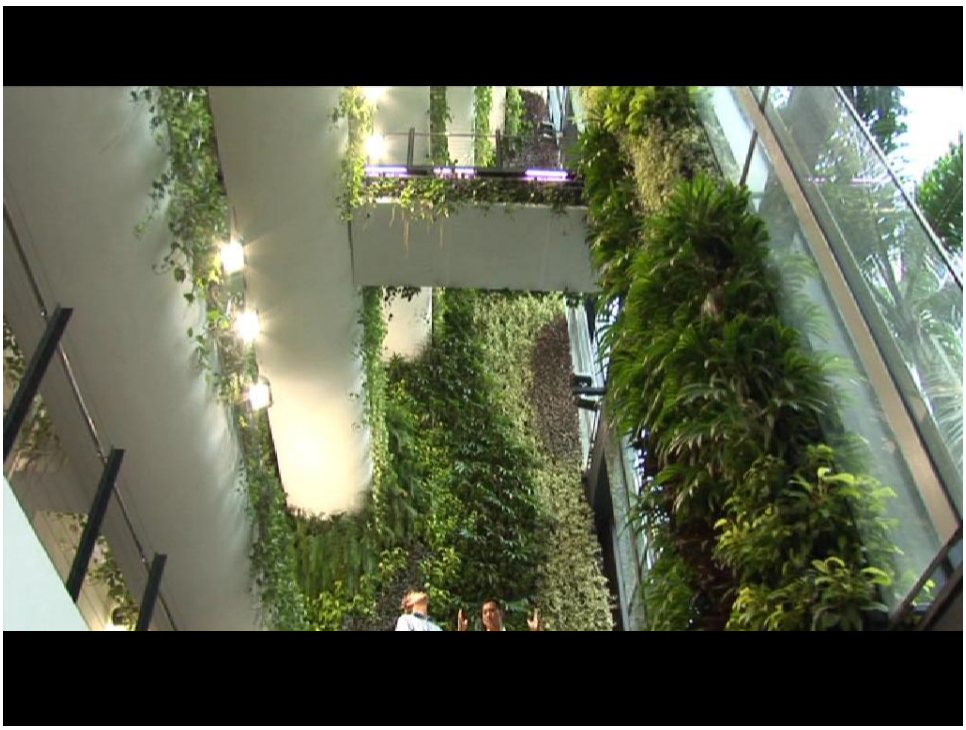
he identified a green singapore as a key competitive factor in attracting foreign investment to the country

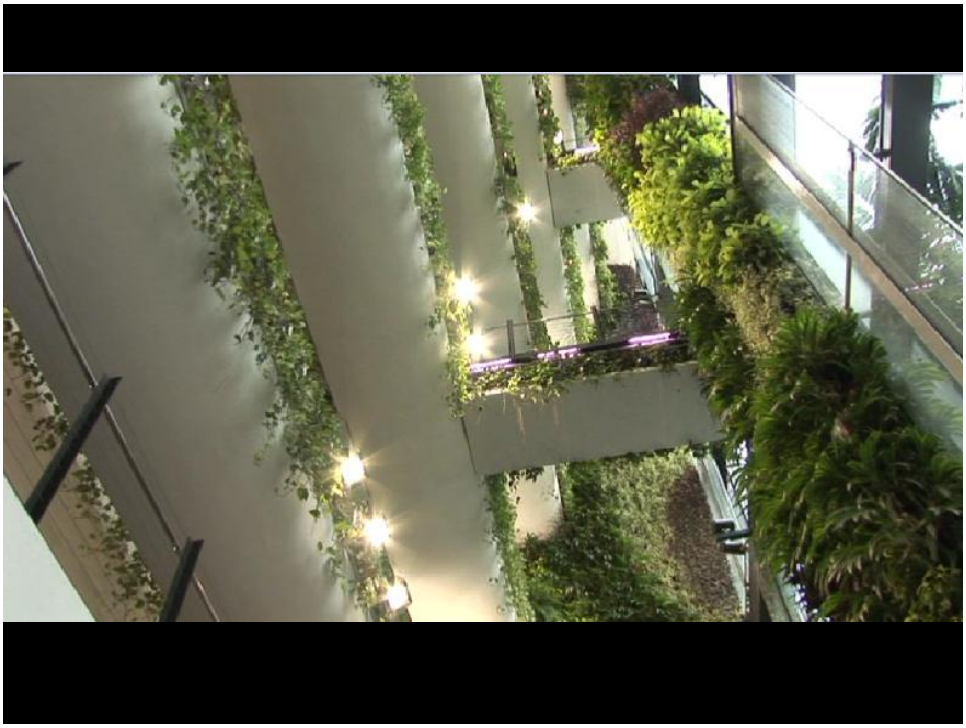
between 1986 and 2007 singapore's vegetation cover dramatically increased

between 1986 and 2007 singapore's vegetation cover dramatically increased

the skyrise greenery incentive scheme reinburses half the cost of green wall and green roof installation

CORPORATE BUSINESS HOUSE

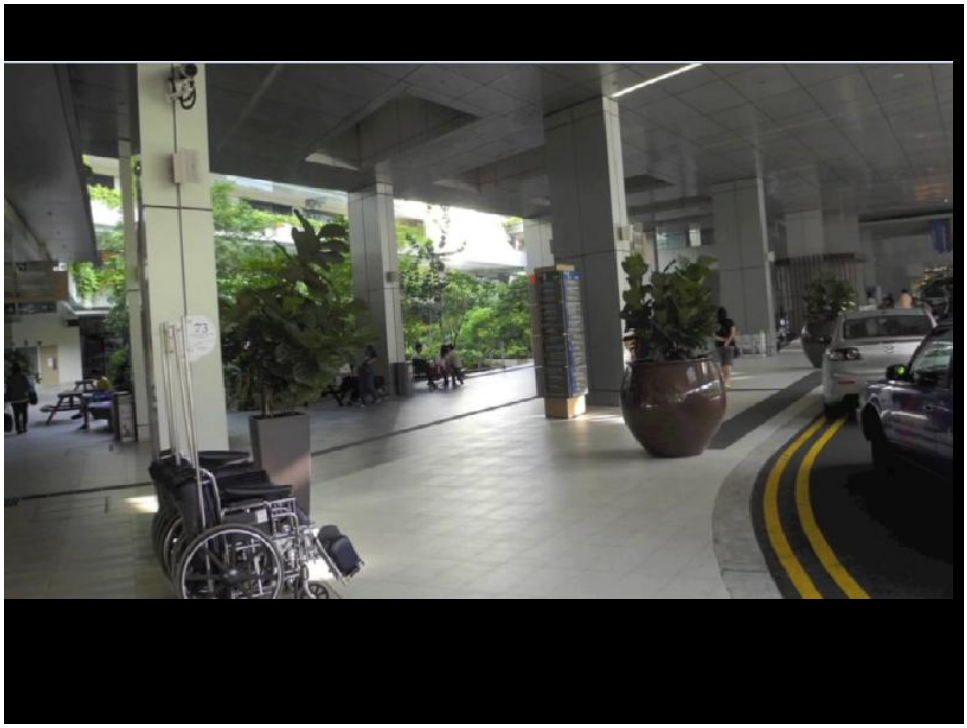


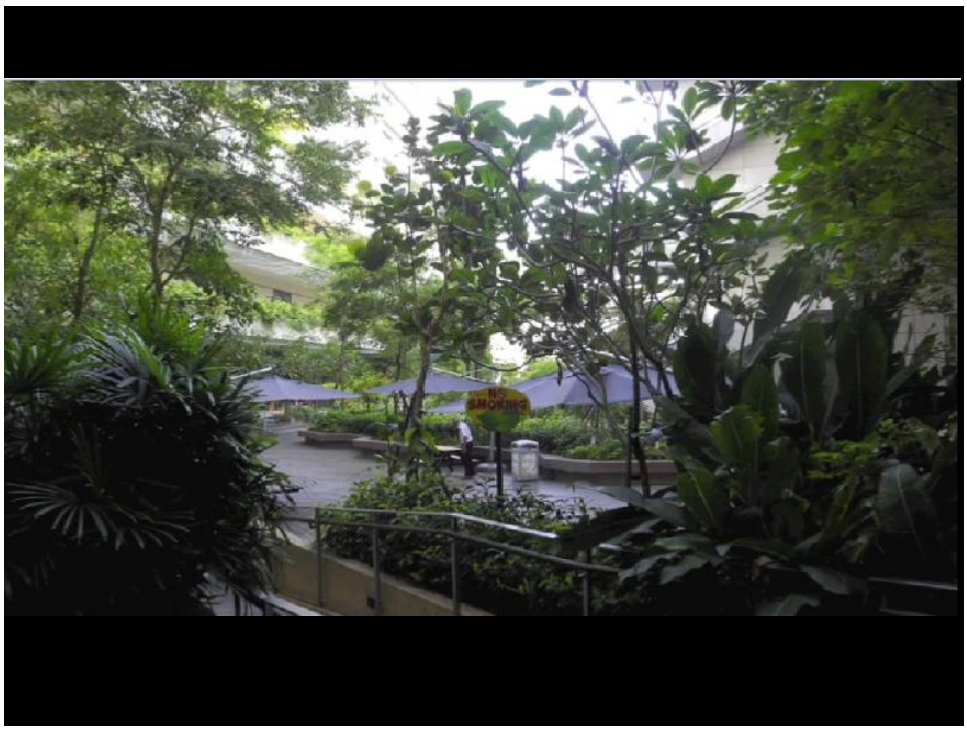


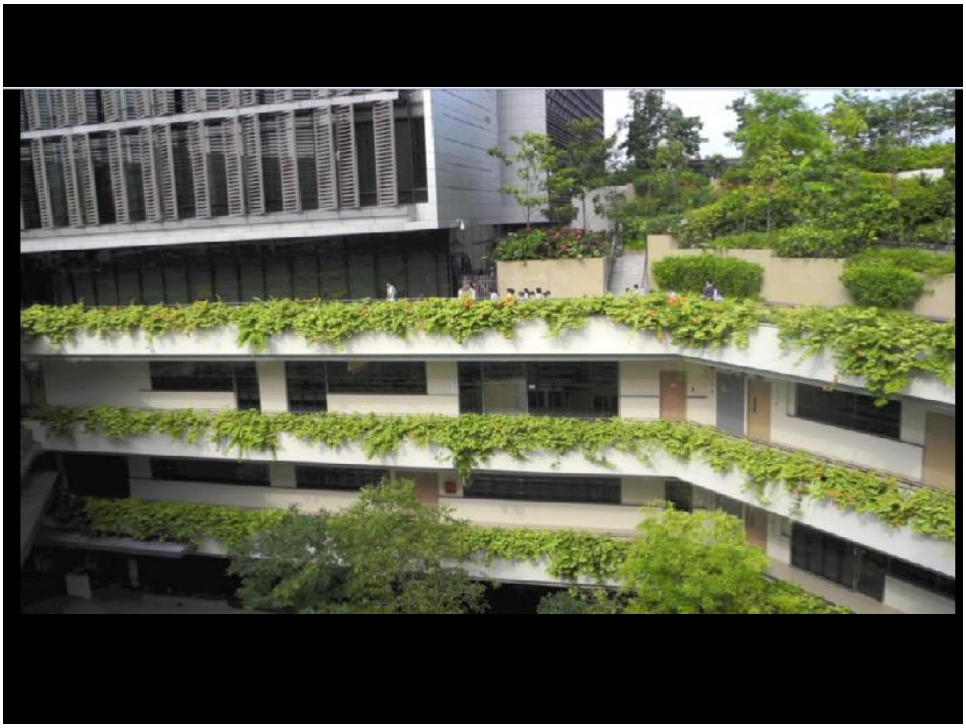

the park connectors network

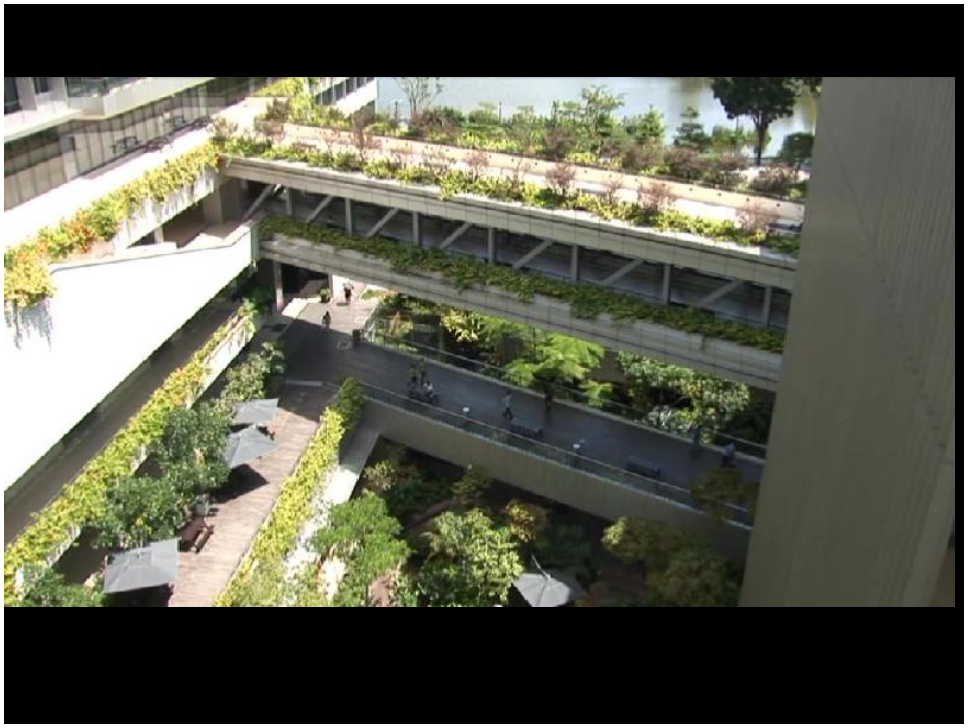

Our Park Connector Network (PCN)
In the next few years, the Park Connector Network will comprise seven loops, linking various parks and nature sites in Singapore.
It offers a wide choice of landscape and distances to enjoy around the island.
More information can be found at http://www.nparks.gov.sg/pcn
PCN
150 kilometres of park connectors


Khoo Teck Puat Hospital
3 'healing power of greenery'




NO
SMOKING





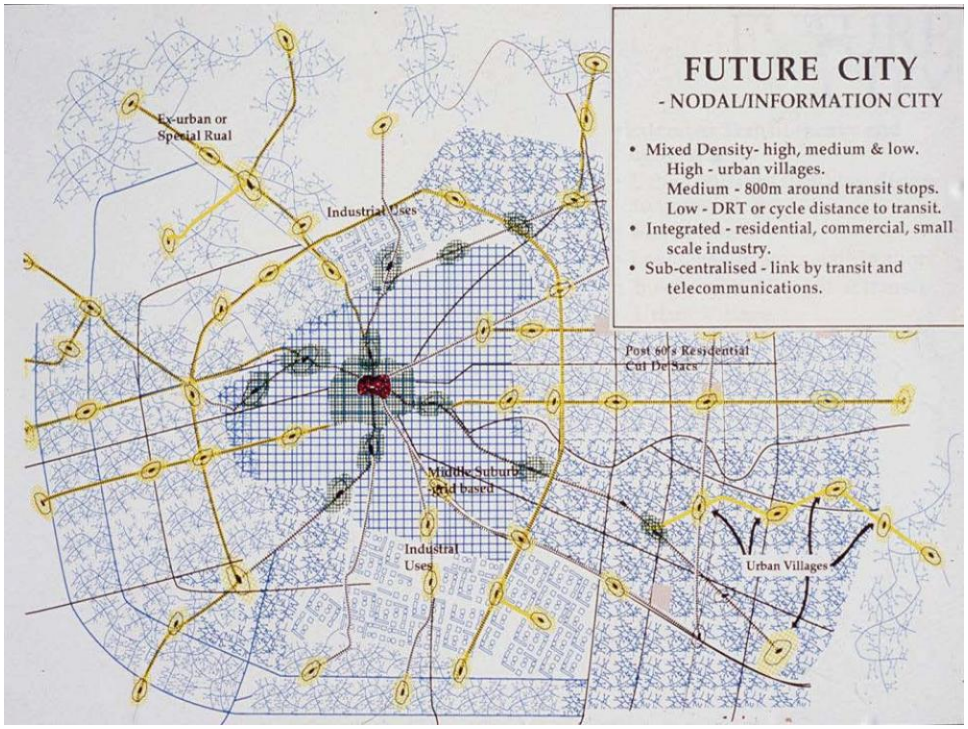

Butterflies Sighted In
Khoo Teck Puat Hospital
Khoo Teck Puat Hospital

4 'loving plants'


BISHAN PARK

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

Sydney Green Transformers


FUTURE CITY
- NODAL/INFORMATION CITY
• Mixed Density- high, medium & low.
High - urban villages.
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.
Ex-urban or Special Rual
Industrial Uses
Post 60's Residential Cul De Sacs
Middle Suburbs grid based
Industrial Uses
Urban Villages


the strategy

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.

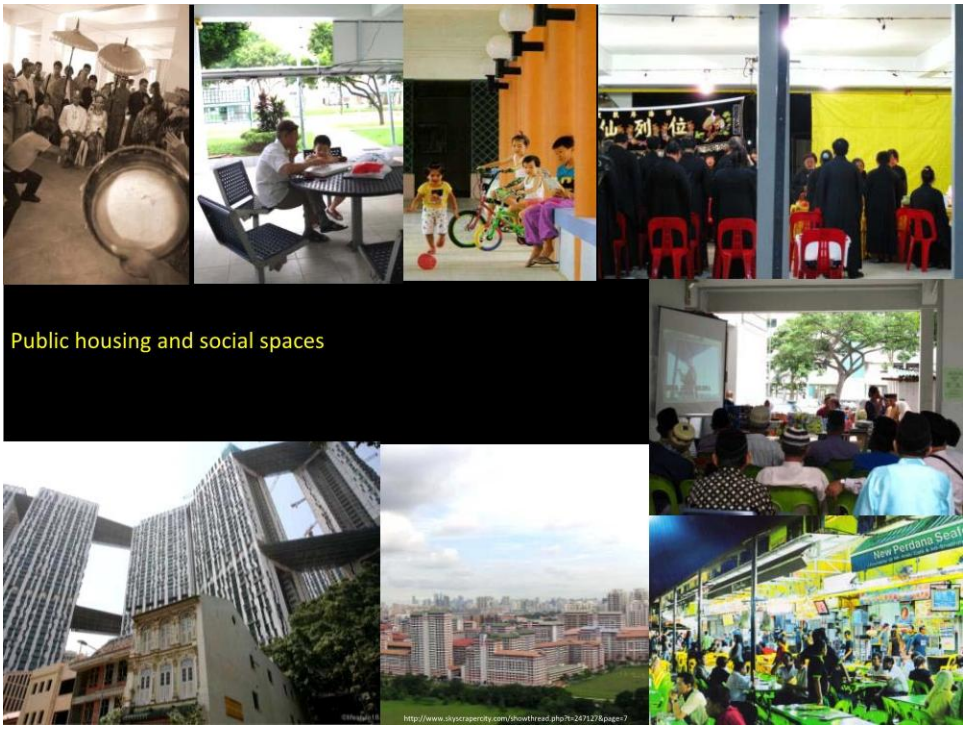
A sacred site for two cultures…

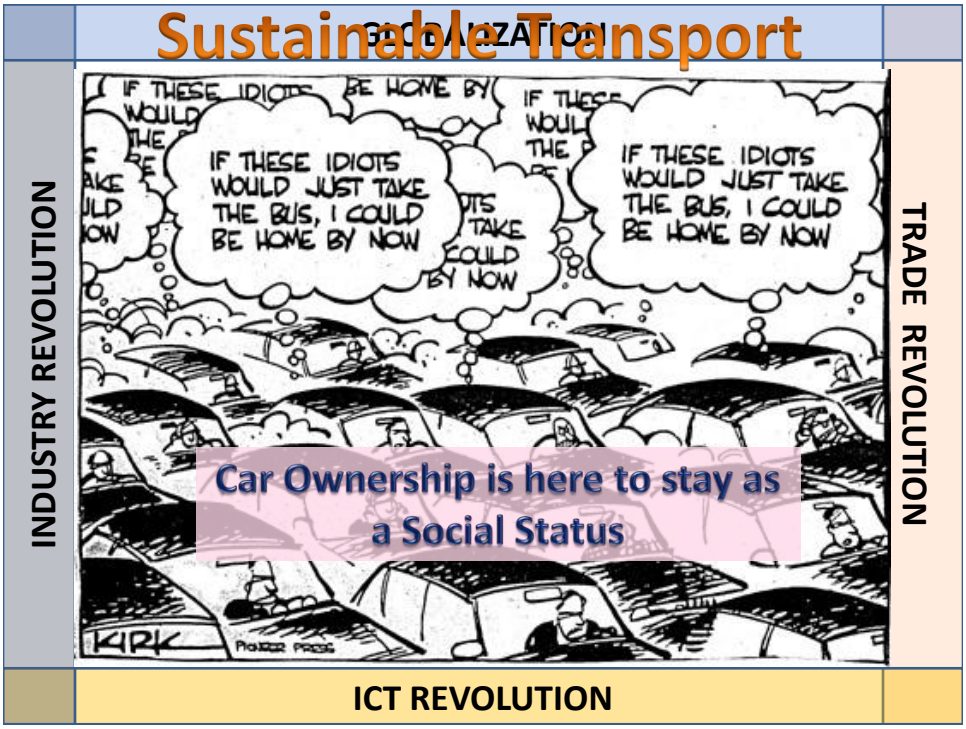
Telling a story of place...


NE4 Chinatown
SONY
MAX
PHOTO


KATONG
ARAB STREET
SINGAPORE RIVER
Identity Plan for cultural, natural, built heritage
Integrate Natural Features
SIGLAP AREA IDENTITY PLAN
Simpang
Siglap Identity Map
Green space and natural heritage


KRANJI & LIM CHU KANG
Natural heritage and park connector network
Pulau Ubin village
Park connector netw
NParks Park Connector Network Vision from webpage, Nov 2005


Public housing and social spaces


Sustainable Transport
GLOBALIZATION
INDUSTRY REVOLUTION
TRADE REVOLUTION
ICT REVOLUTION
IF THESE IDIOTS WOULD JUST TAKE THE BUS, I COULD BE HOME BY NOW
IF THESE IDIOTS WOULD JUST TAKE THE BUS, I COULD BE HOME BY NOW
Car Ownership is here to stay as a Social Status
KIRK
PIONEER PRESS

7. Sustainable transport

Reducing VKT and growing quality transit

Building city around transit

Facilitating pedestrians and cycling

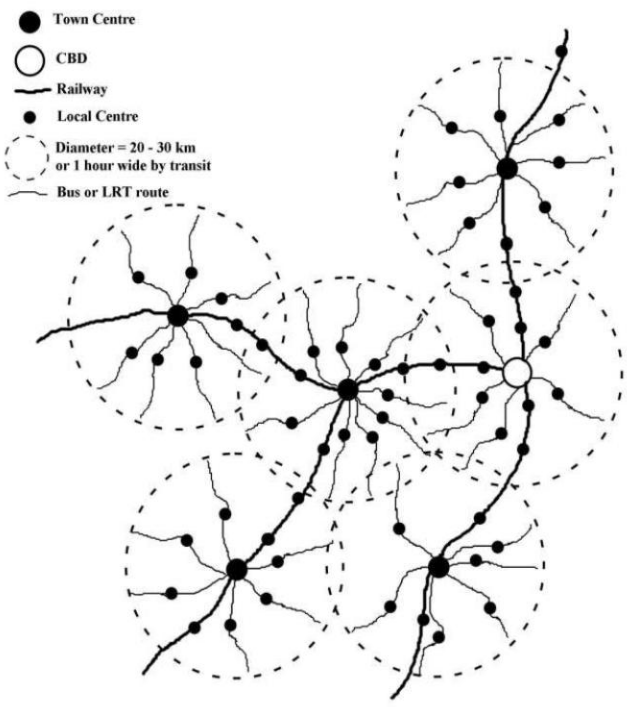
Building renewable transport around plug-in electric vehicles

SOLUTION TO TRAFFIC PROBLEM

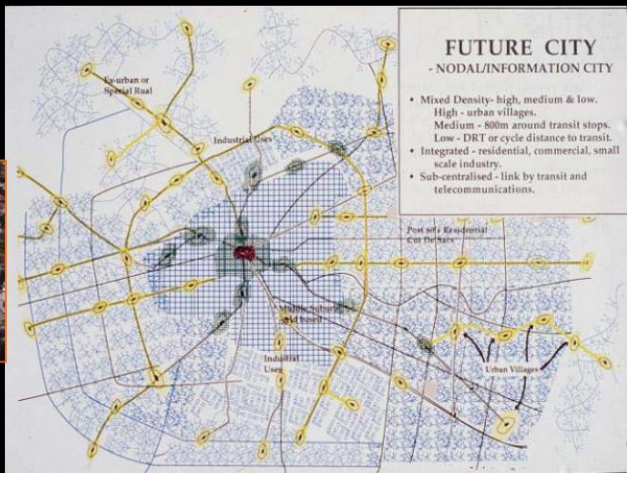
- **Improved Mobility of 'People' rather than 'Automobiles' should be the principle to reduce the traffic problem in urban areas**
- **Goal shall be to increase the modal share of public transport system to 70% or double it by 2020"**

More MRT needed fast… and buses to meet them.

Rebuilding Auto City as a Smart Sustainable City with real centres

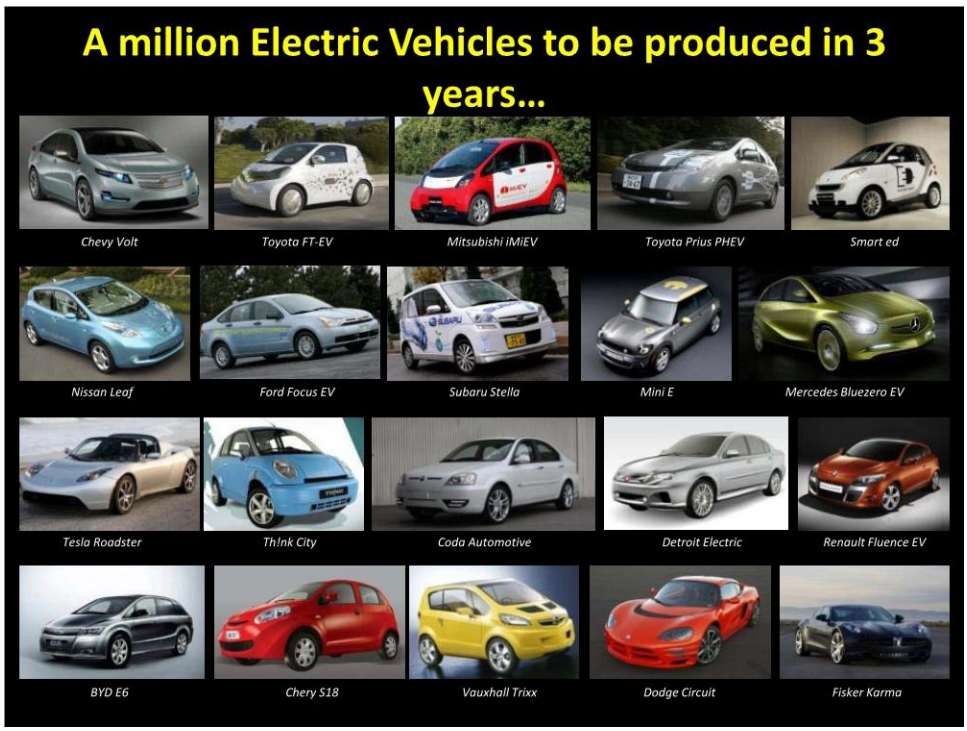


Transit Oriented Developments, TODs...land development partnerships to create the polycentric city.



Making cities more walkable…

And bicycle friendly…

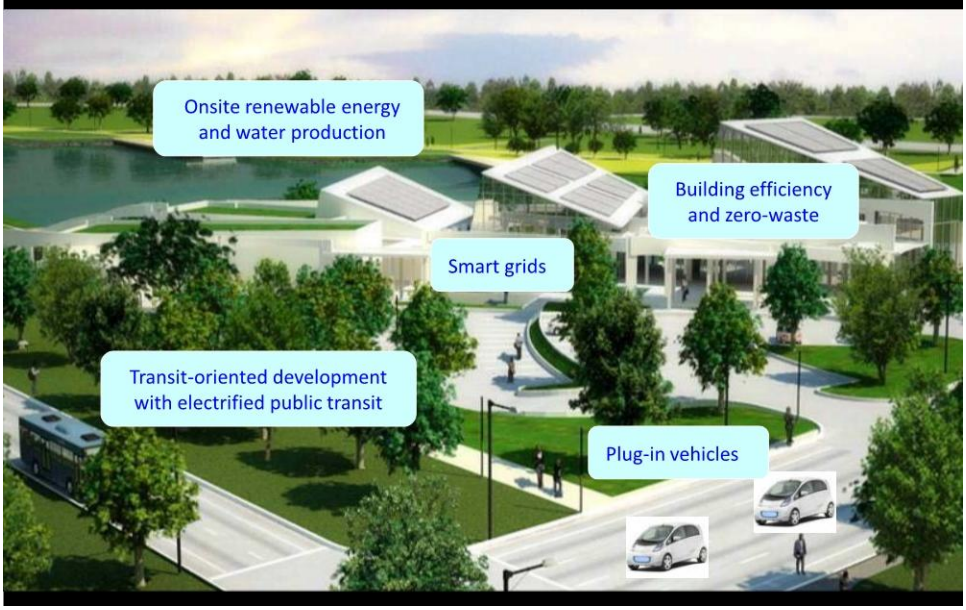

A million Electric Vehicles to be produced in 3 years…
Chevy Volt
Toyota FT-EV
Mitsubishi iMiEV
Toyota Prius PHEV
Smart ed
Nissan Leaf
Ford Focus EV
Subaru Stella
Mini E
Mercedes Bluezero EV
Tesla Roadster
Th!nk City
Coda Automotive
Detroit Electric
Renault Fluence EV
BYD E6
Chery S18
Vauxhall Trixx
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…



EV Recharging Infrastructure

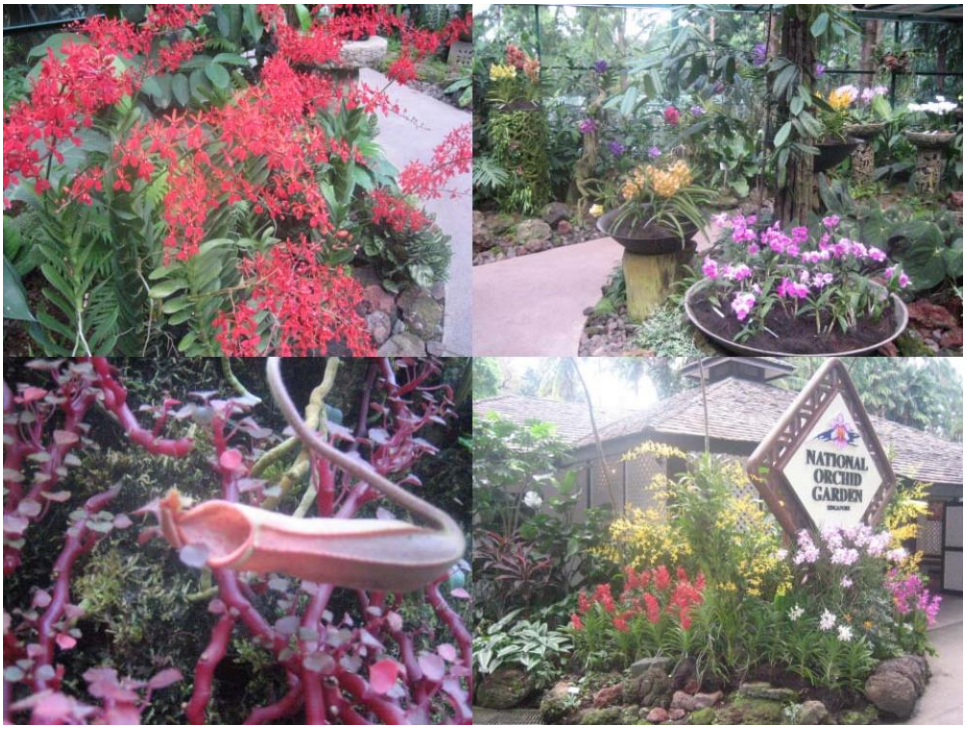
Coulomb Technologies / Charge Point

Better Place

ndustries

Elektromotive

NB: Standardized EV infrastructure is essential.



Impassioned pleas 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 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."