Cities of the Future: Water and Resilient Cities

By
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Curtin University

Cities in 2060…

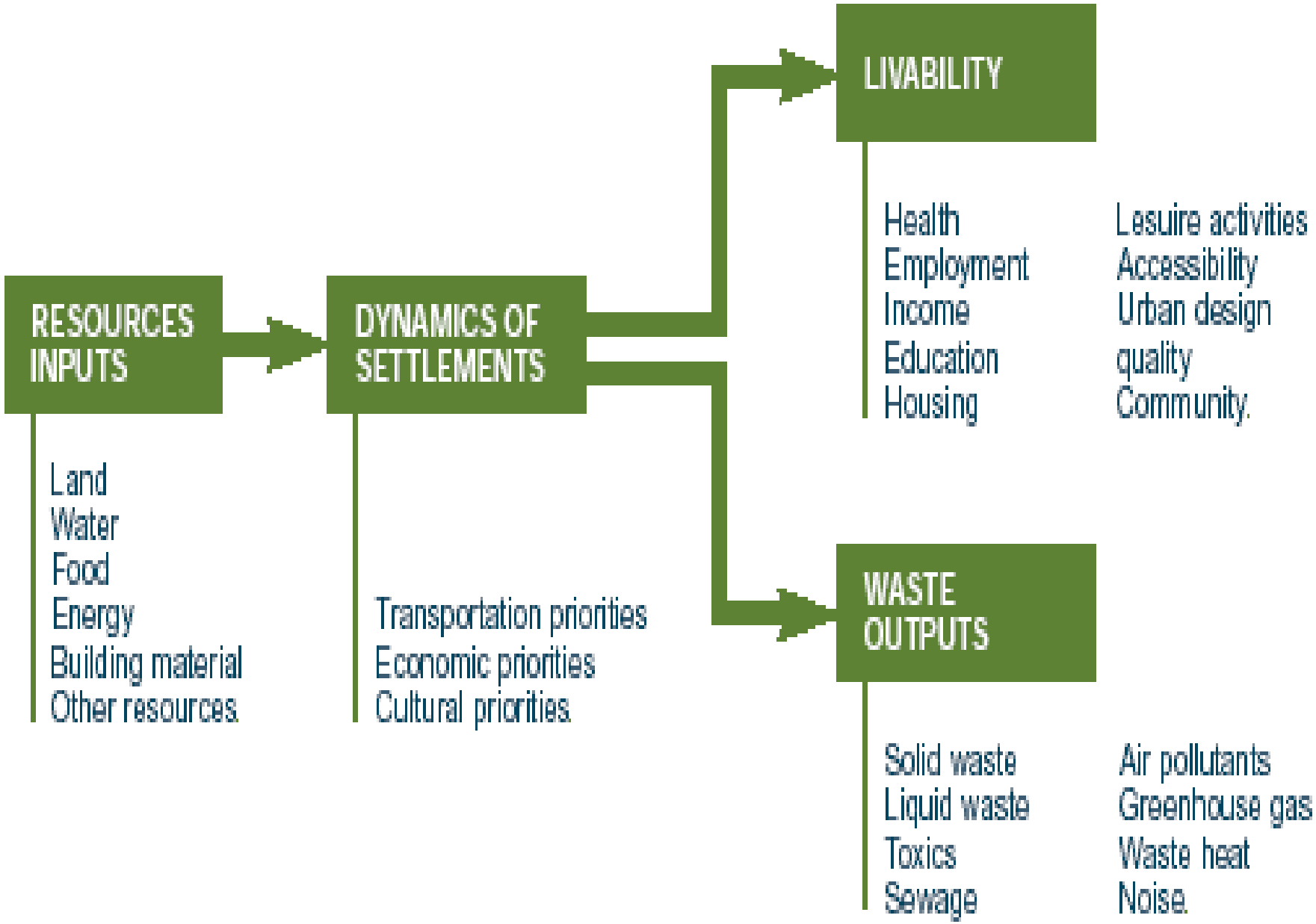
OLD GONE…

- Coal phased out
- Petroleum finished
- Big pipes and big roads not extended
- Sprawl stopped

NEW IN…

- 100% renewable
- Electric transit & Evs
- Smart grid & smart water systems (grid linked)
- Compact polycentric cities with distributed infrastructure

Figure 5. Extended metabolism model of human settlements.



Sustainable Cities are:

‘reducing their footprint whilst improving their liveability simultaneously’

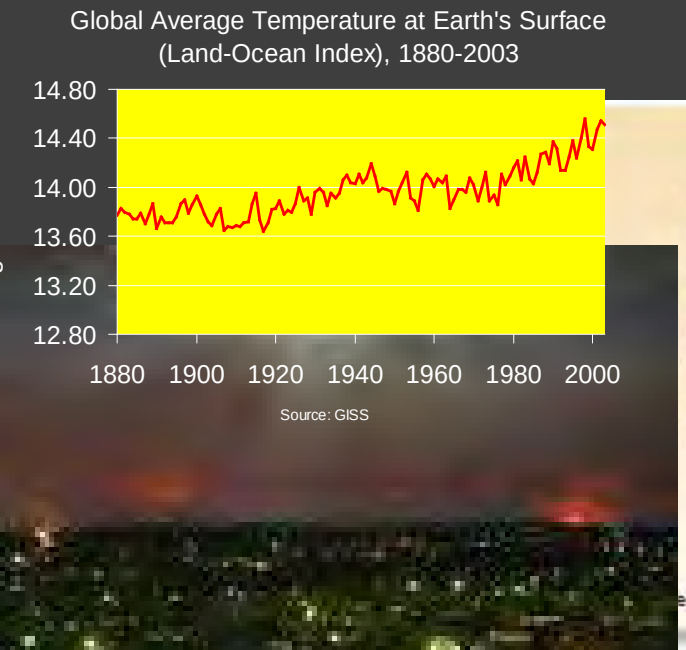

The World's First
Eco-Friendly Gift Set
360
VODKA

Cities need to become more urban and the countryside more rural....

- Core principle for climate change and peak oil adaptation.
- Been a core principle of landscape planning and urban planning for some time....
- How?

Climate change and peak oil now make sustainability essential....

- Global governance is going one way: 50% less ghg by 2050
- Peak oil happened in 2008 in the economy...



RESILIENT CITIES

Responding to Peak Oil and Climate Change

Peter Newman, Timothy Beatley, and Heather Boyer

www.resilientcitiesbook.org

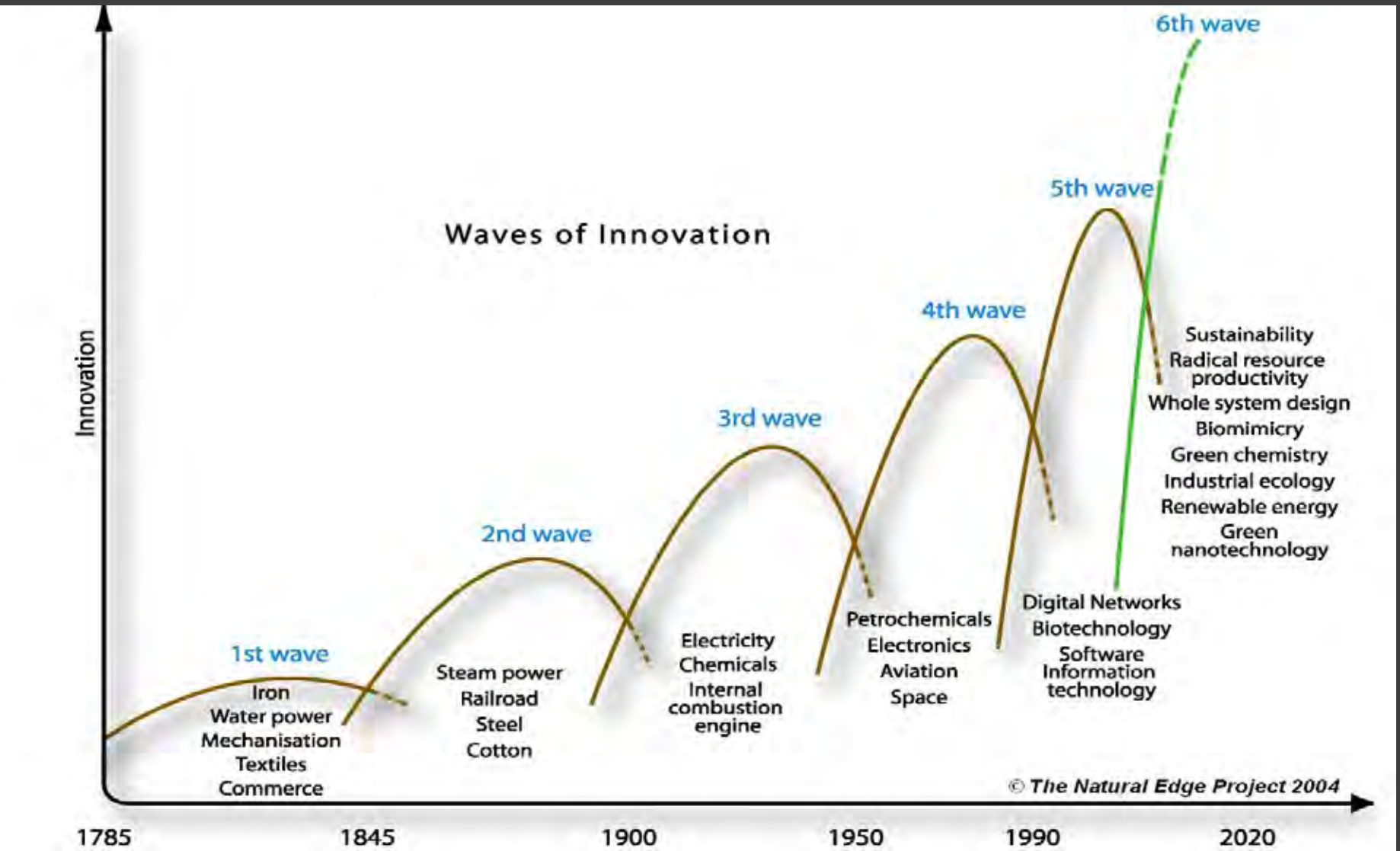
GREEN URBANISM DOWN UNDER

Learning from Sustainable Communities in Australia

Timothy Beatley with Peter Newman

History of innovation and crashes....

Each era keeps the best features, disposes worst and builds in the new dimensions



Resilient City includes...

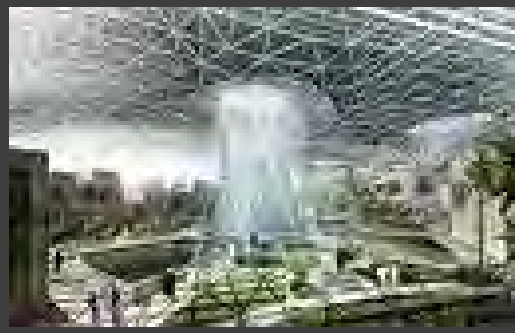
- Renewable Energy City
- Carbon Neutral City
- Distributed City
- Biophillic City
- Eco-Efficient City
- Place-Based City
- Sustainable Transport City

All combine the digital, smart technologies with the new technologies of sustainability.

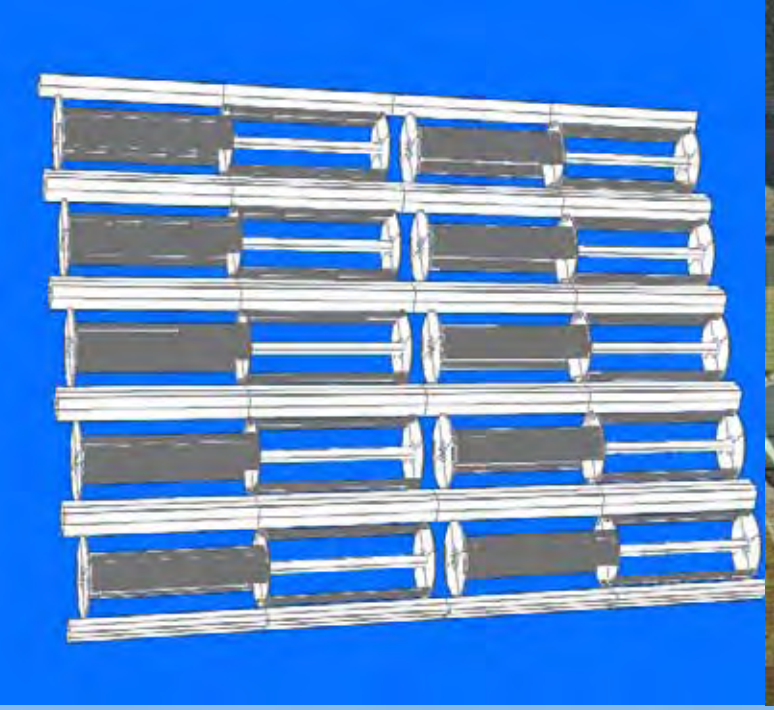
1. Renewable Energy City

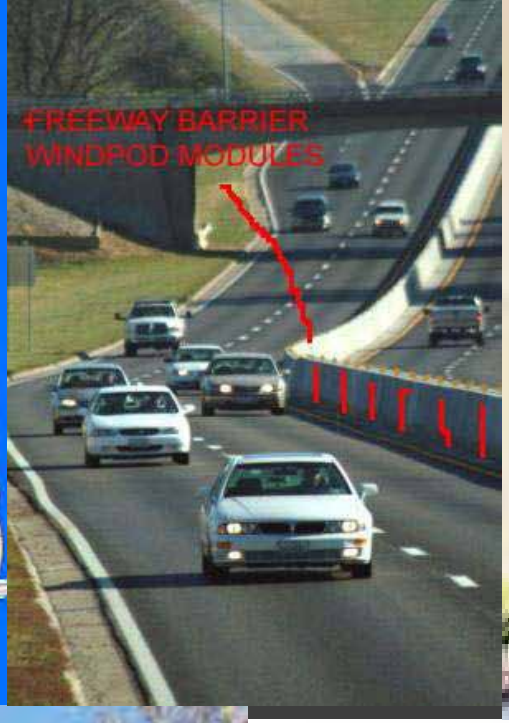
Masdar City: zero carbon, 80% water self sufficient, zero waste

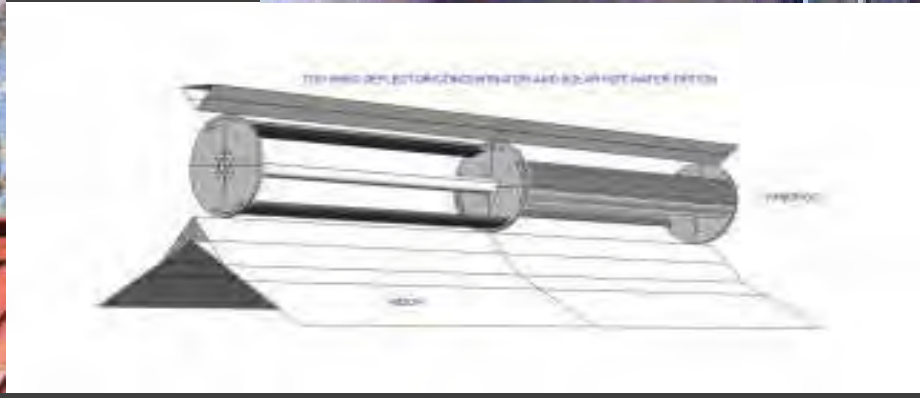
Traditional solar chimney



PV Solar growing at 40% per year







Roof mounted wind systems eg Windpods

How do you store renewables?

Needs Smart Grid

and Electric Vehicles providing the storage

Electric cars - Now! http://www.sahkoautot.fi/eng

Curtin University Sustainability Policy (CUSP) Institute
www.sustainability.curtin.edu.au/renewabletransport

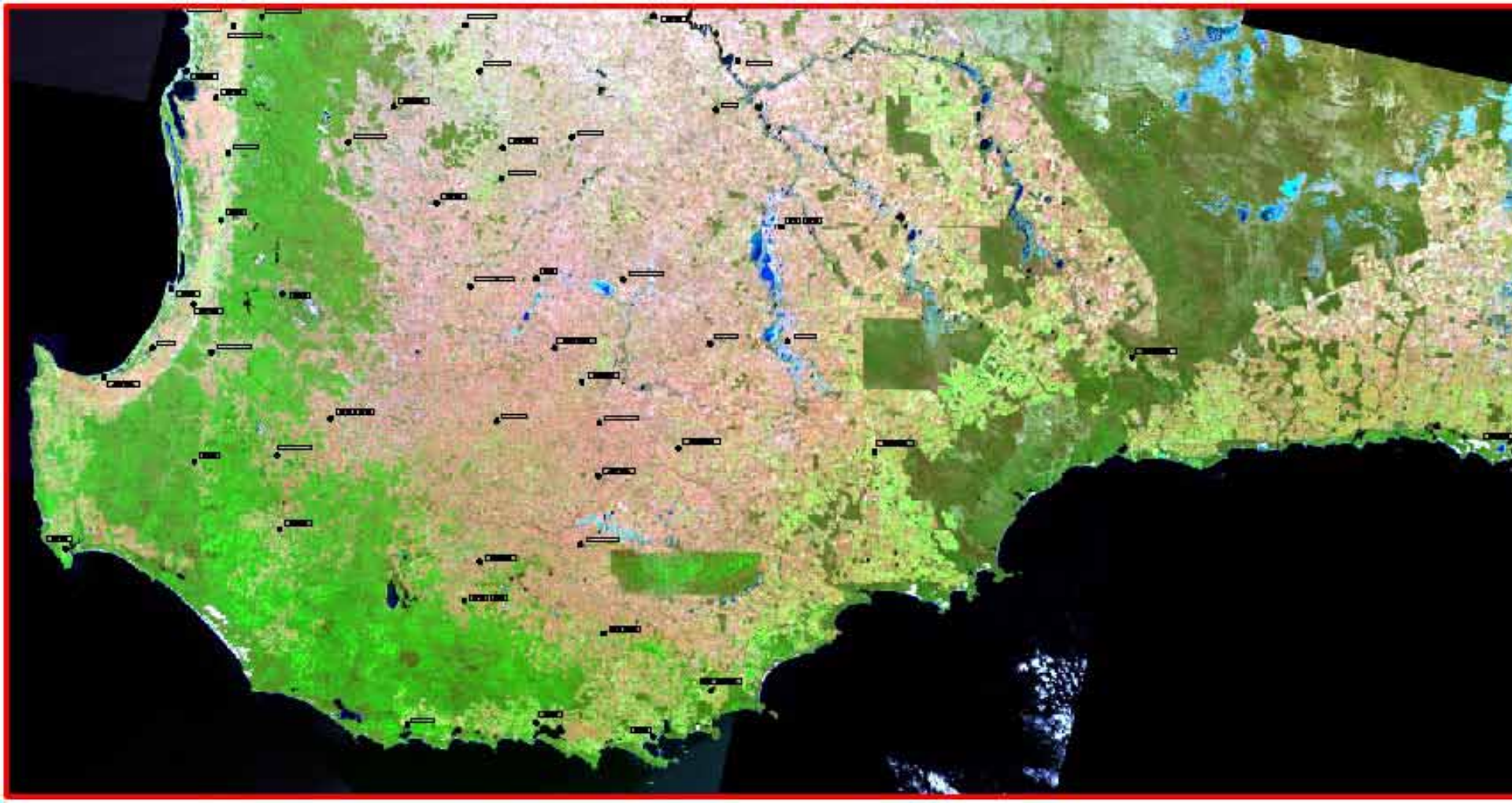
SHARP

SOLAR SOLUTIONS AT GOOGLE

System Benefits

- Sharp's solar system provides 30% [illegible] peak electricity demand.
- On a typical day, the system produces more than 6,000 kilowatt-hours. Due to this system, an estimated [illegible]
- The carbon [illegible]

2. CARBON NEUTRAL CITIES
Bioregional connection, eg Gondwana Links....

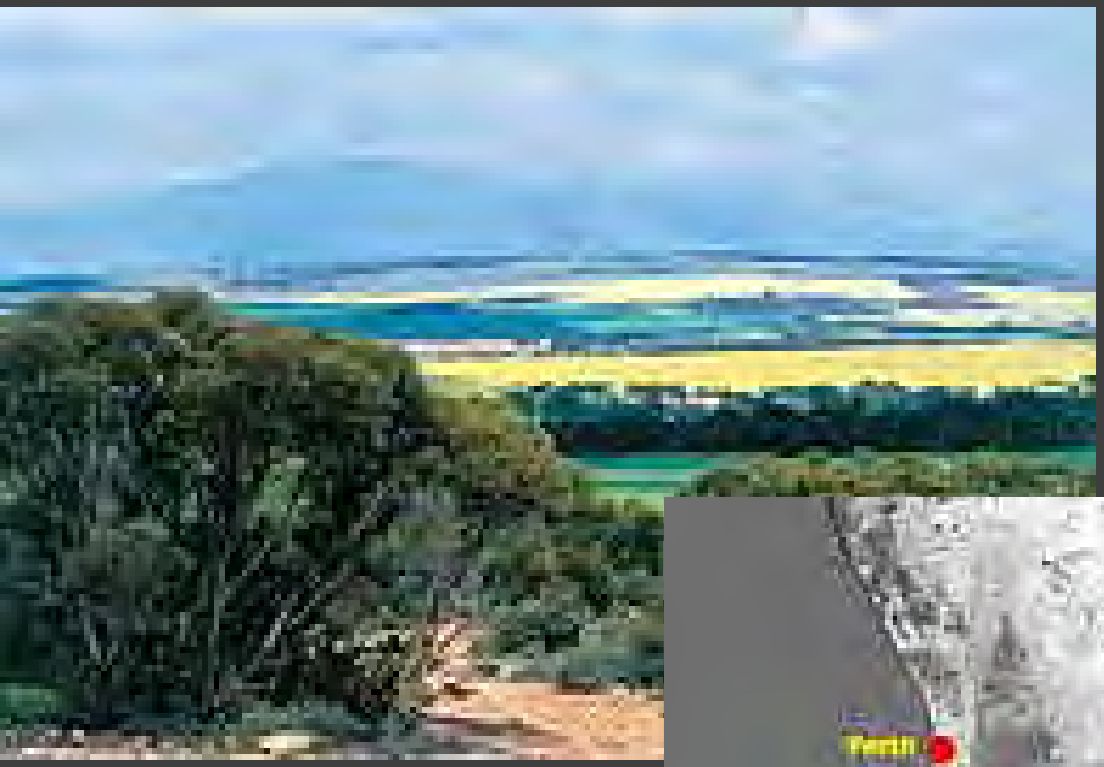


GO CARBON NEUTRAL NOW

Greening Australia
Breathe Easy

THE SECRET TO
LIVING
CARBON
NEUTRAL

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




Perth
Albany
Gondwana Link

South Fremantle High School

- 1st Carbon neutral school...
- Unveiling the PV from a community partnership May 6th
- Forging links with the bush...

Shutting down the urinals… Saved 70% of the water

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


3. Biophillic City

200 green roofs in Chicago to reduce urban heat island effect, reduce energy and recycle water...


Ford

Greening especially important in a high density city

Sky Garden subsidies

Facade greening is encouraged via the provision of planters and green balconies. The window facades are oriented in a north-south direction and in the direction of prevailing winds to minimise heat build up from the western sun and facilitate ventilation. The gable-end walls are insulated to prevent heat transmission into the units, especially from the afternoon sun.

The dwelling units are designed to capitalise on natural daylight and effective cross-ventilation to lower energy usage from lighting and mechanised cooling.

The residential buildings sit on a landscaped deck above the naturally ventilated carpark and driveways to keep the podium level vehicle-free and green.

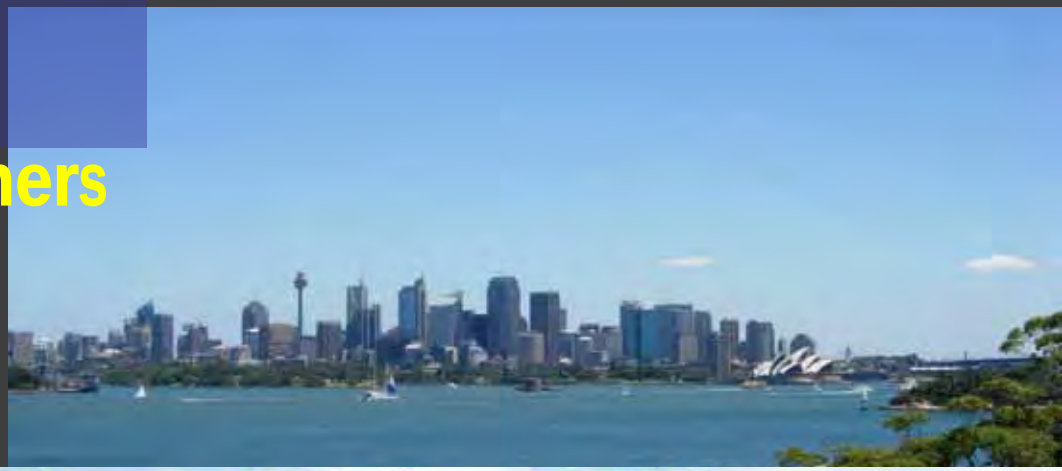
Extensive greenery has also been provided to some areas of the rooftop to reduce heat gain in the estate.

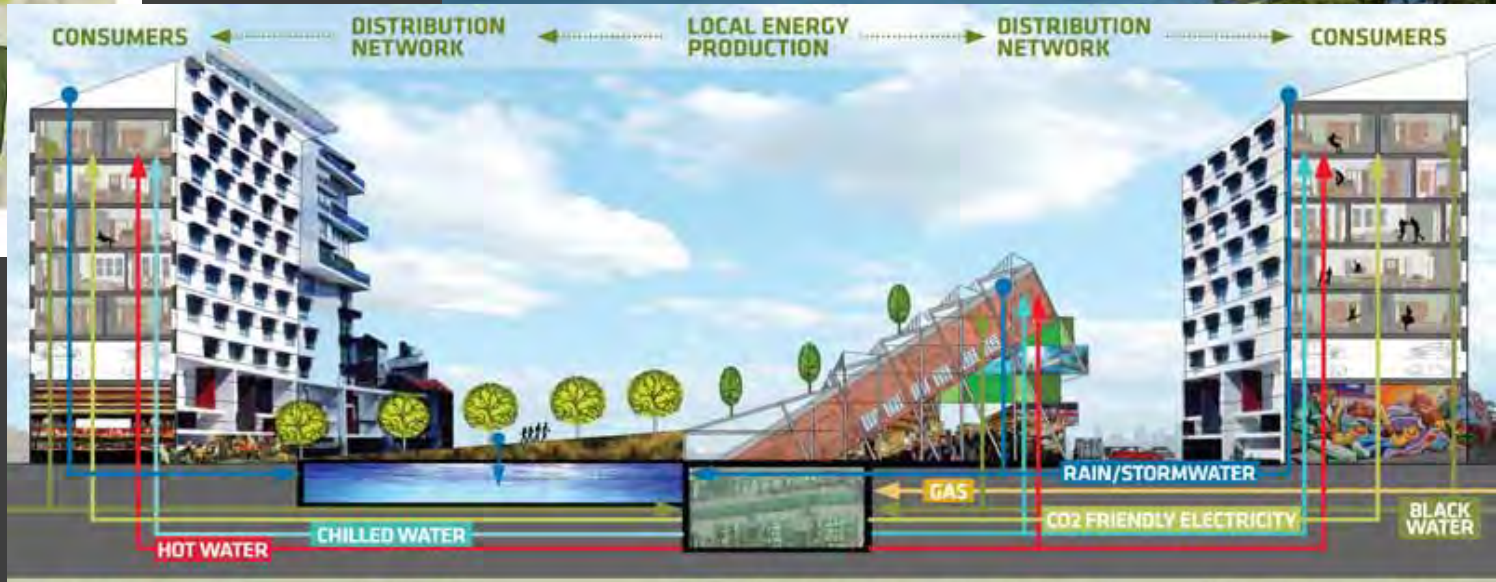
Republic Polytechnic vertical greening


Filtration,
the natural way
ANC
PUB

4. Distributed City

Sydney Green Transformers





RESIDENTIAL/RETAIL
- high density
- mixed use
- active frontages

LOCAL PARK
- water harvesting

GREEN TRANSFORMER
1. co-gen energy plant
2. water recycling
3. waste to energy

—re-think use of underground space

MULTI-PURPOSE COMMUNITY FACILITY
- leisure and cultural uses
- fresh food market
- green roof
- carbon negative

COMMERCIAL/RESIDENTIAL
- high / medium density
- above ground parking

—reduce environmental impacts of development and improve affordability

Localised Solutions:

Building capacity and resilience with distributed production systems

An initiative of the Victorian Eco-Innovation Lab and the McCaughey Centre

The McCaughey Centre
VicHealth Centre for the Promotion of Mental Health and Community Wellbeing

VEIL victorian eco innovation lab

Are we on the edge of a 're-localisation' revolution?

With large, centralised infrastructure appearing vulnerable to climate change and 'peak oil', alternative models are emerging everywhere.

Energy, water and food are being delivered via networked, localised production and consumption systems that lower carbon, increase efficiency, build resilience and strengthen local economies. This 'distributed' systems model is over-turning old ideas of services and is re-shaping our image of

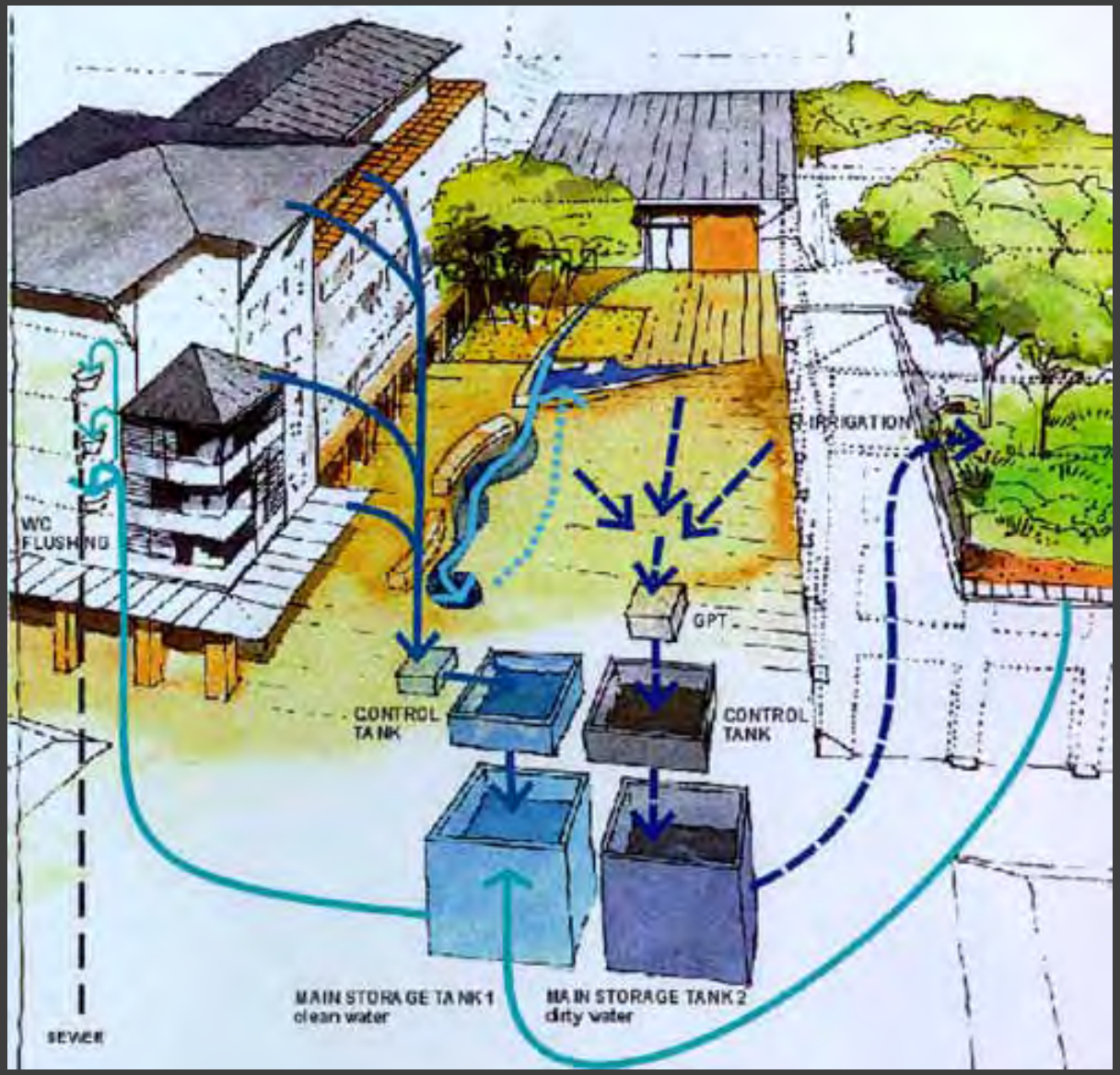
Treasure Island – zero carbon/zero scheme water/zero waste redevelopment SF Bay

Dongtan

- 100% renewable
- Localised energy and water systems
- Bioregional food and water.

Kogarah - Green TOD

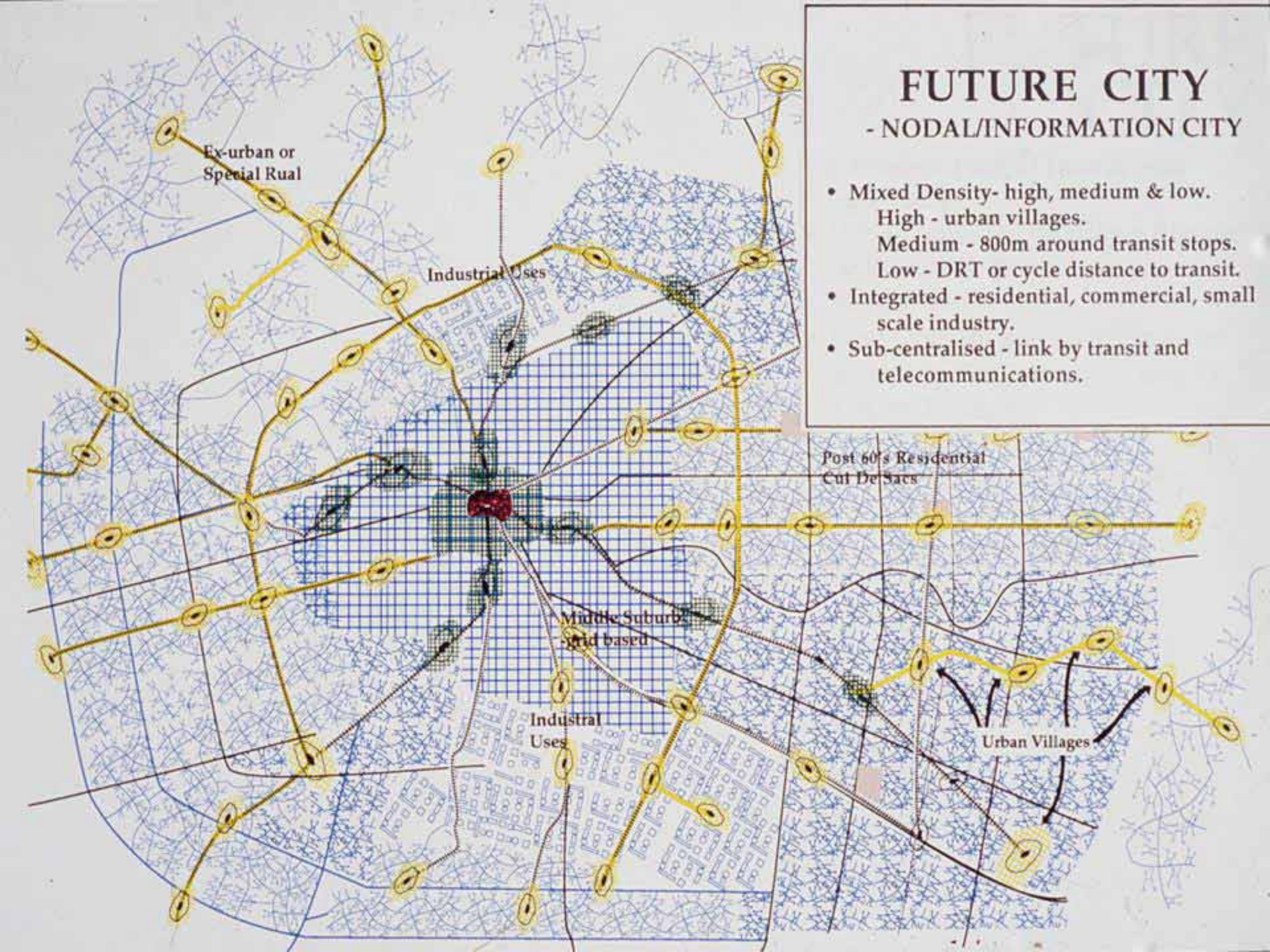
Water Sensitive Urban Design



Armstrong Creek…

Sustainability Victoria shows:

- Distributed infrastructure saves $500 million over 10 years.



FUTURE CITY

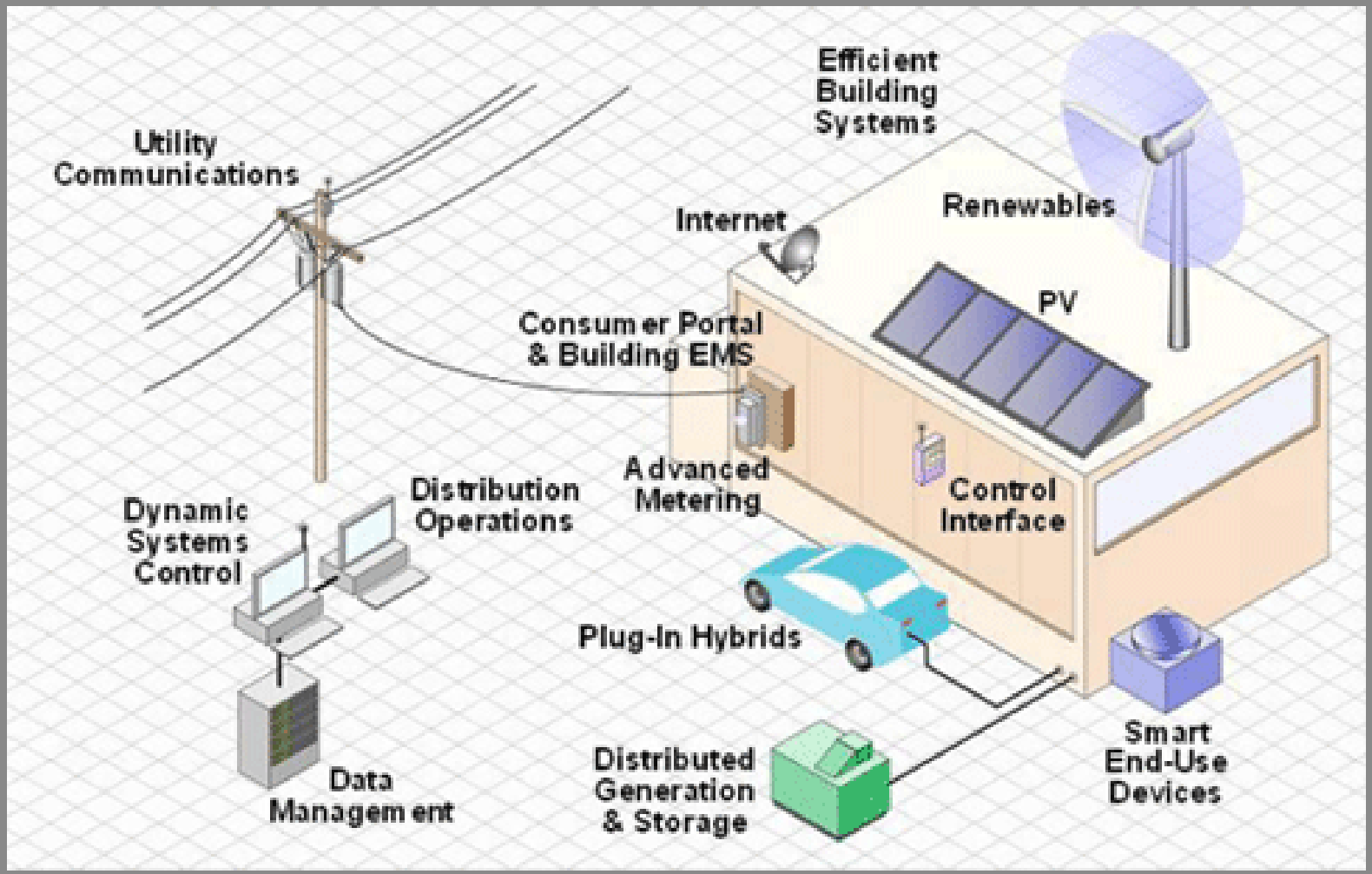
- NODAL/INFORMATION CITY

- 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.

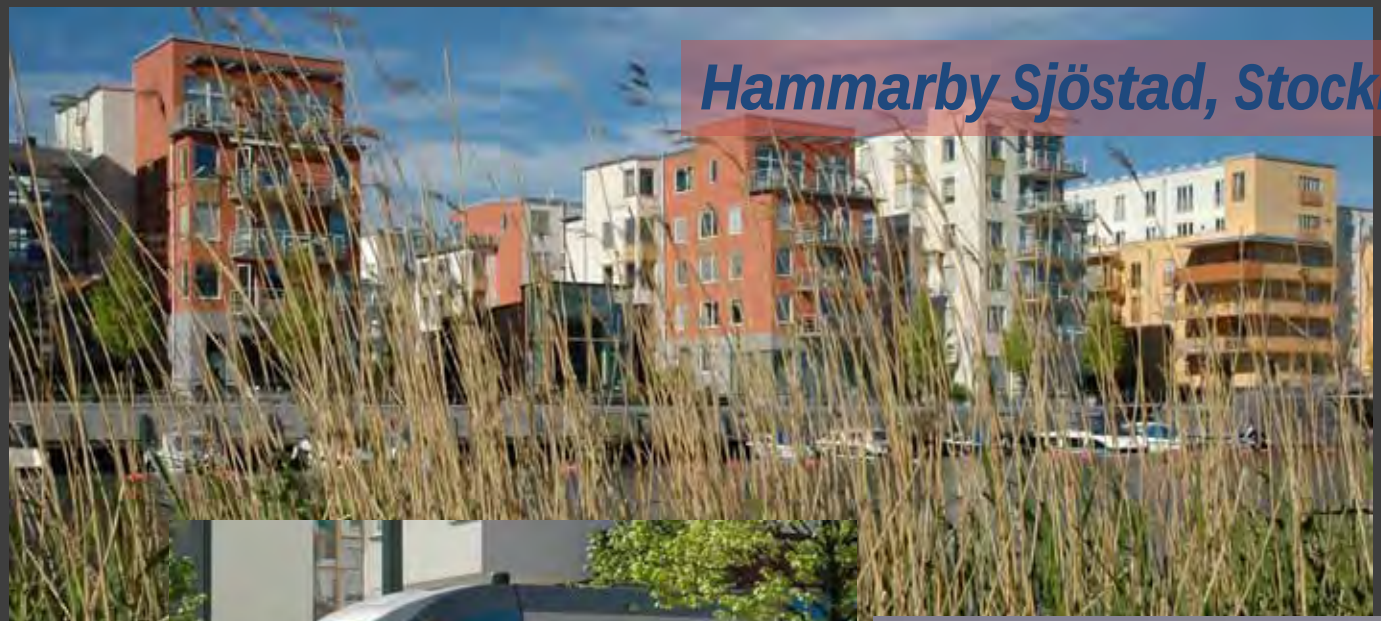
Green Infrastructure study for regenerating Stirling City Centre

North Port Quay – zero carbon Perth development: house, land and EV car package

Enabling Technology: Smart Grids

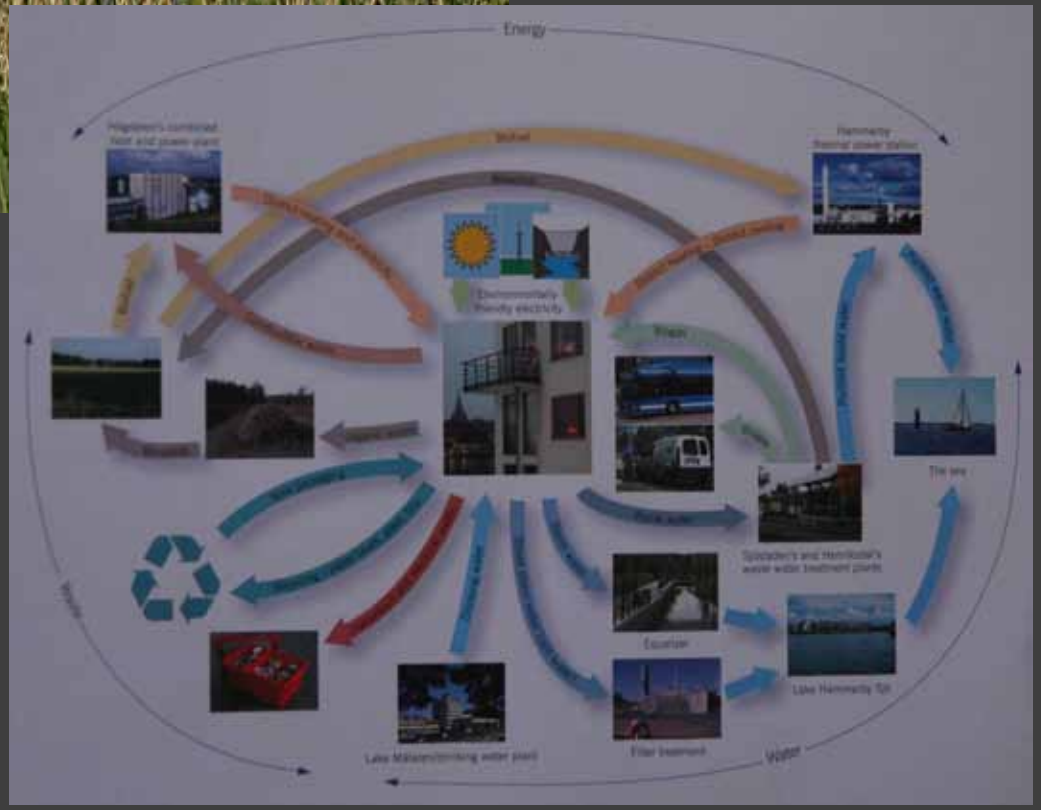


Courtesy of EPRI



Hammarby Sjöstad, Stockholm

Eco Efficient City



Industrial ecology - Kwinana

- Synergies project – 180 resource exchanges – more than Kalundborg.
- Multiple economic and environmental benefits. Waste water recycling now.

6. Place based cities

The importance of water in the city…

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/)

Reviving urban waterways

Clear Paddock Creek, Fairfield, Sydney.

7. Sustainable transport city

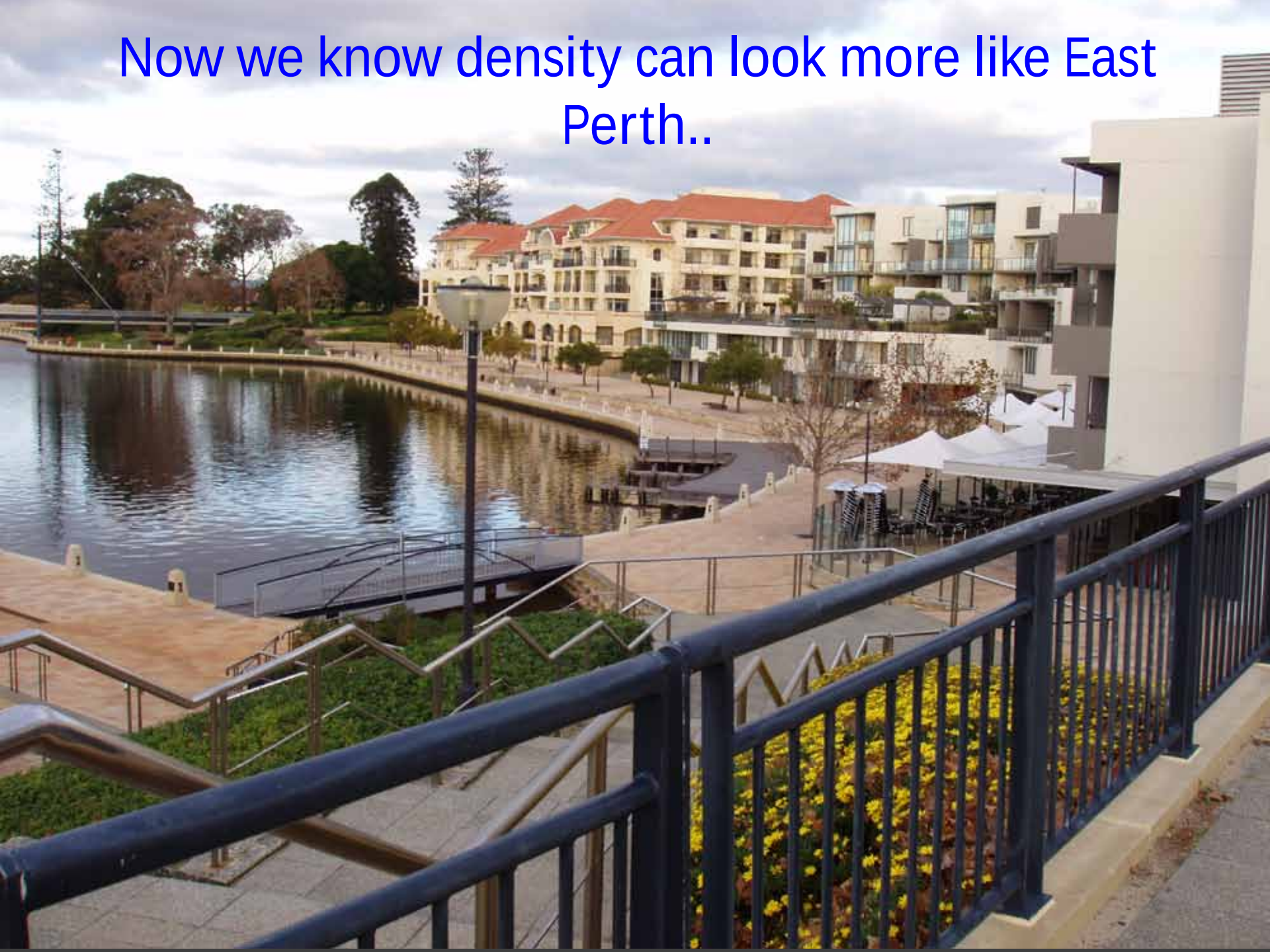
- Reducing VKT and growing quality transit
- Building city around transit
- Facilitating pedestrians and cycling
- Building renewable transport around plug-in electric vehicles

Opening of new Southern Railway
90% approval ratings and already paid off
55,000 per day cf 14,000 on buses

Global success story as it goes out to the edge of the city. $30 mill per km.

Curtin-UWA LRT The ‘Knowledge Arc’ Rail

Now we know density can look more like East Perth..

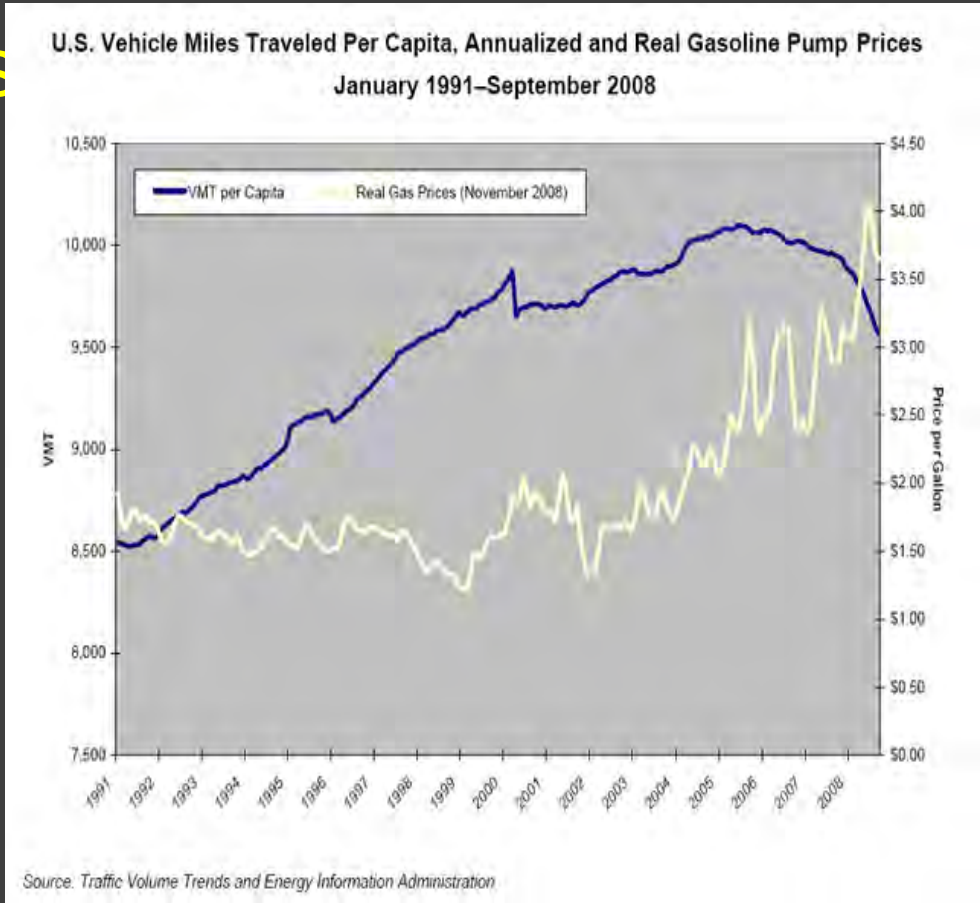


Varsity Lakes Station, Brisbane

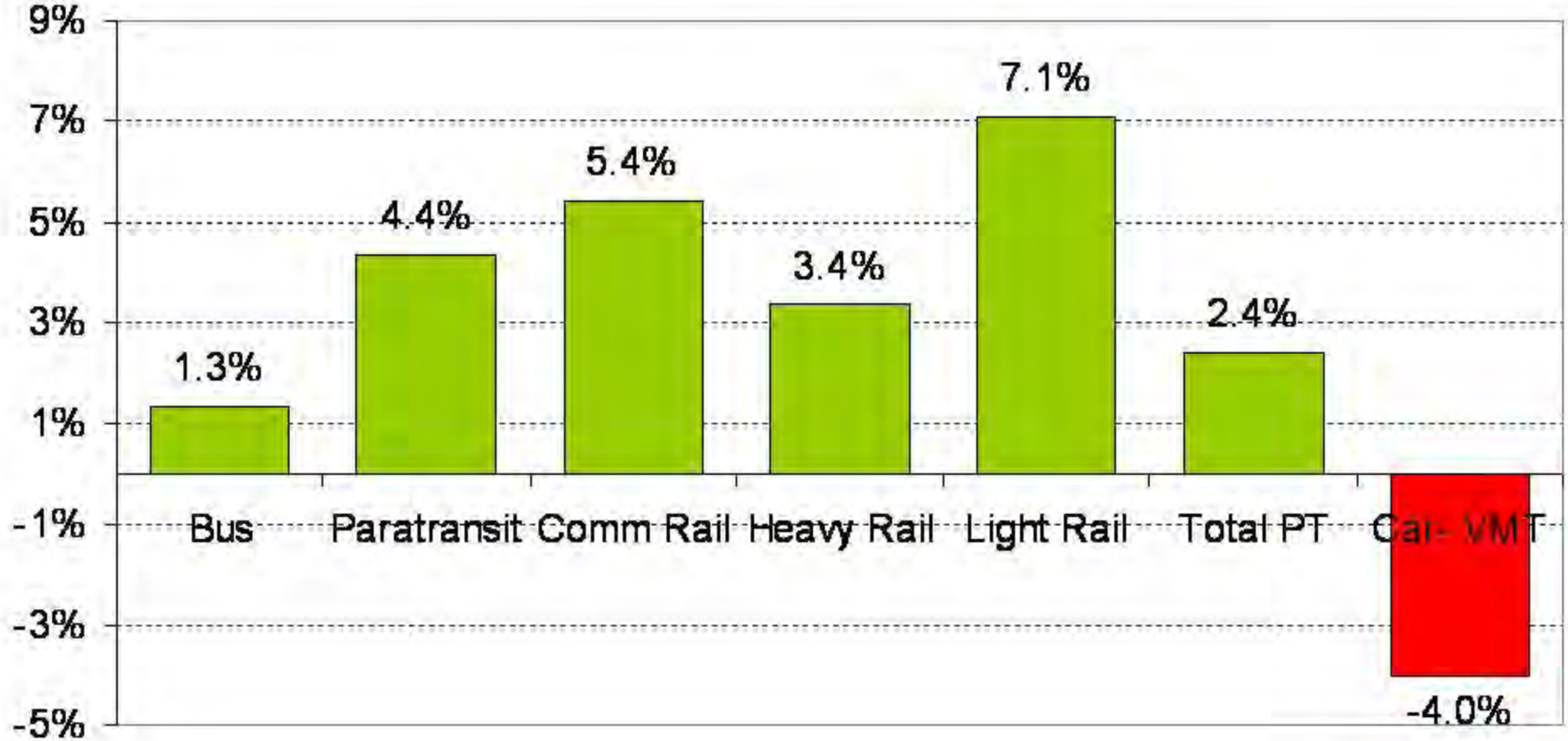
The Gold Coast – built for light rail…

US cities...

- Declining in **car use** – 4.3% in past year, plateau over the pas 5 years.
- Increasing **transit use** – 6.5% in past year.
- 'Suburban slums' and the crash....

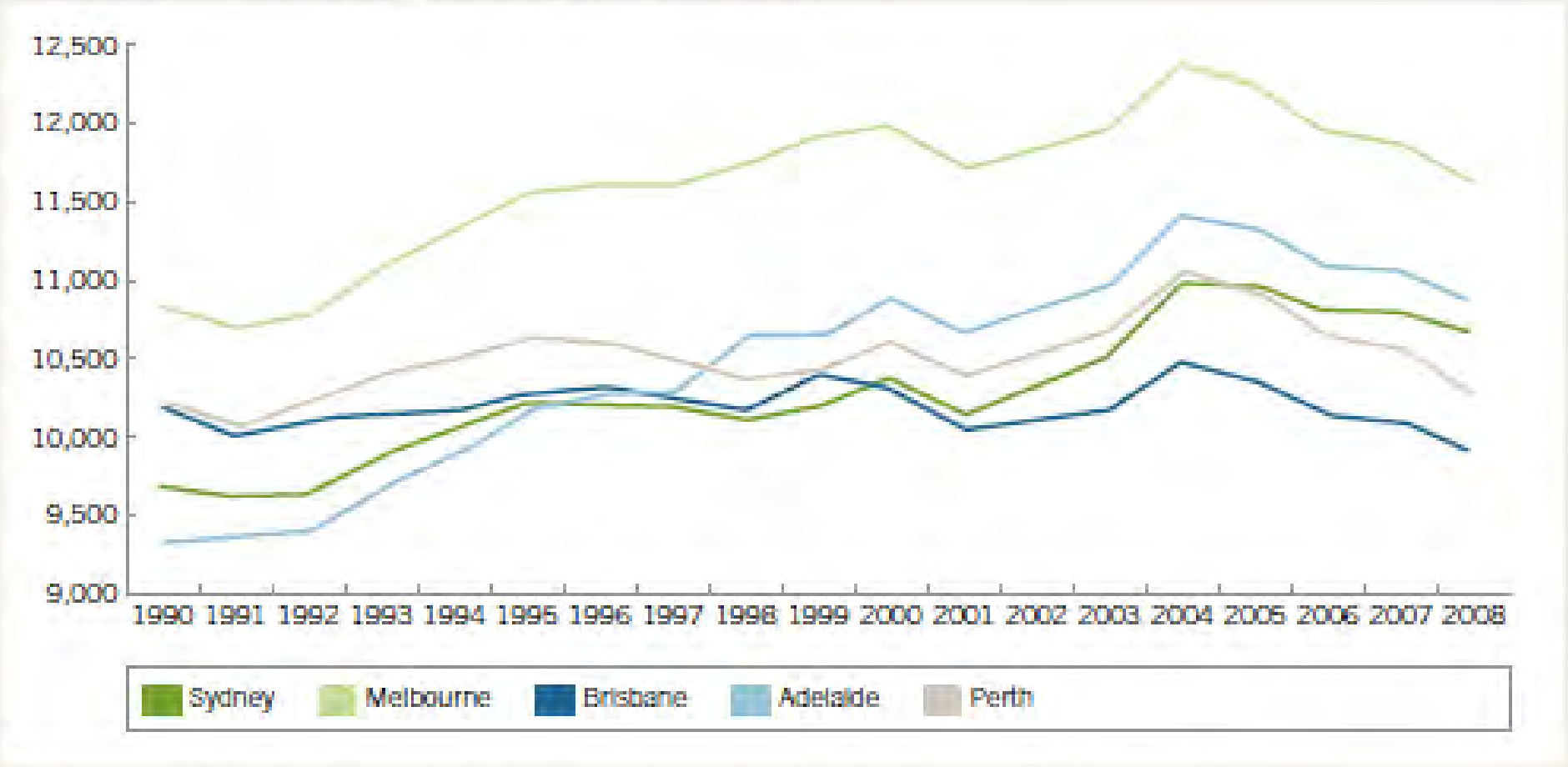


Public Transit Boardings and Vehicle Miles Travelled in US:
March Quarter 2008 vs March Quarter 2007



Car use going down…

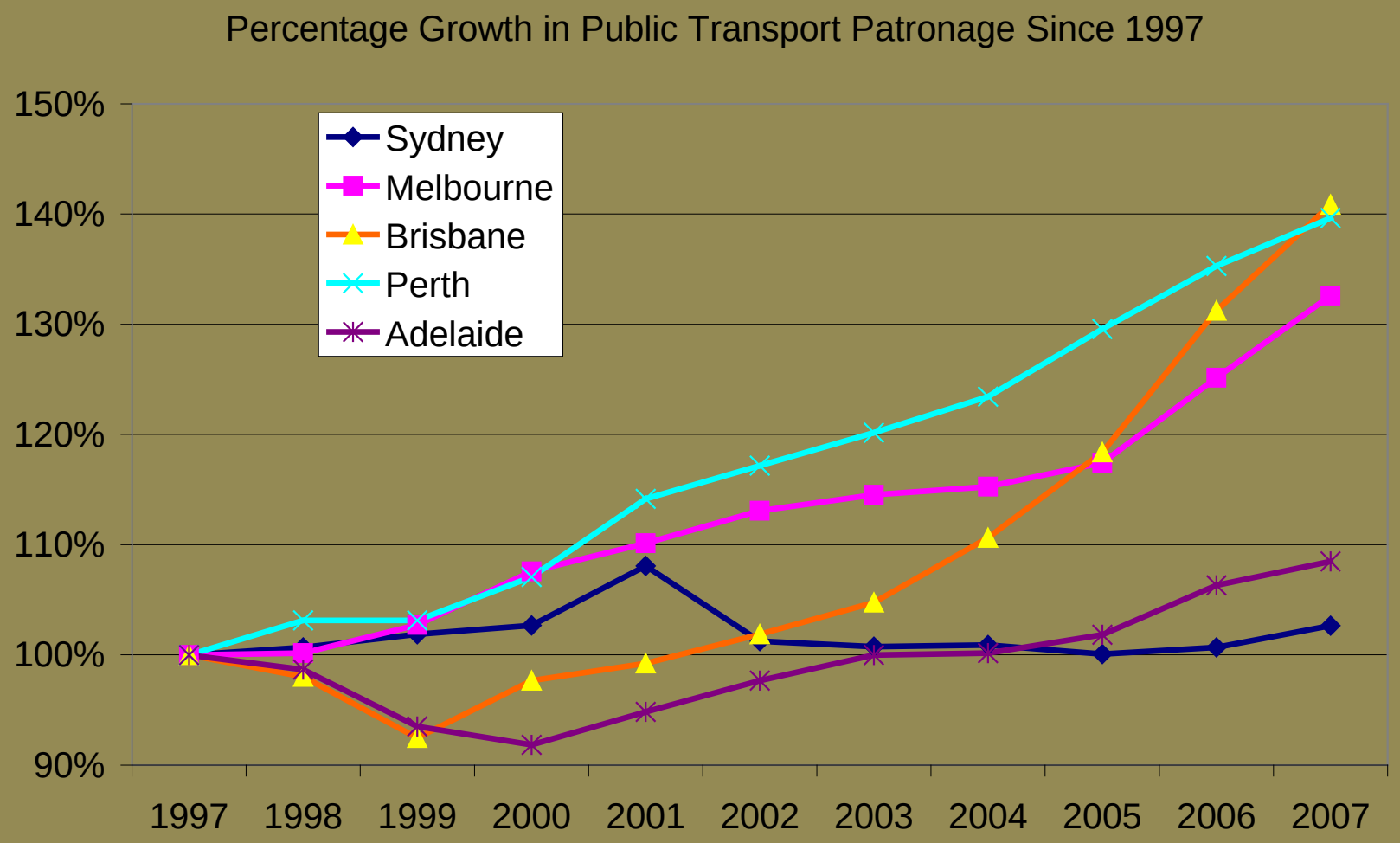
Figure 2.2: Estimated car passenger kms per capita (FY1990–2008)



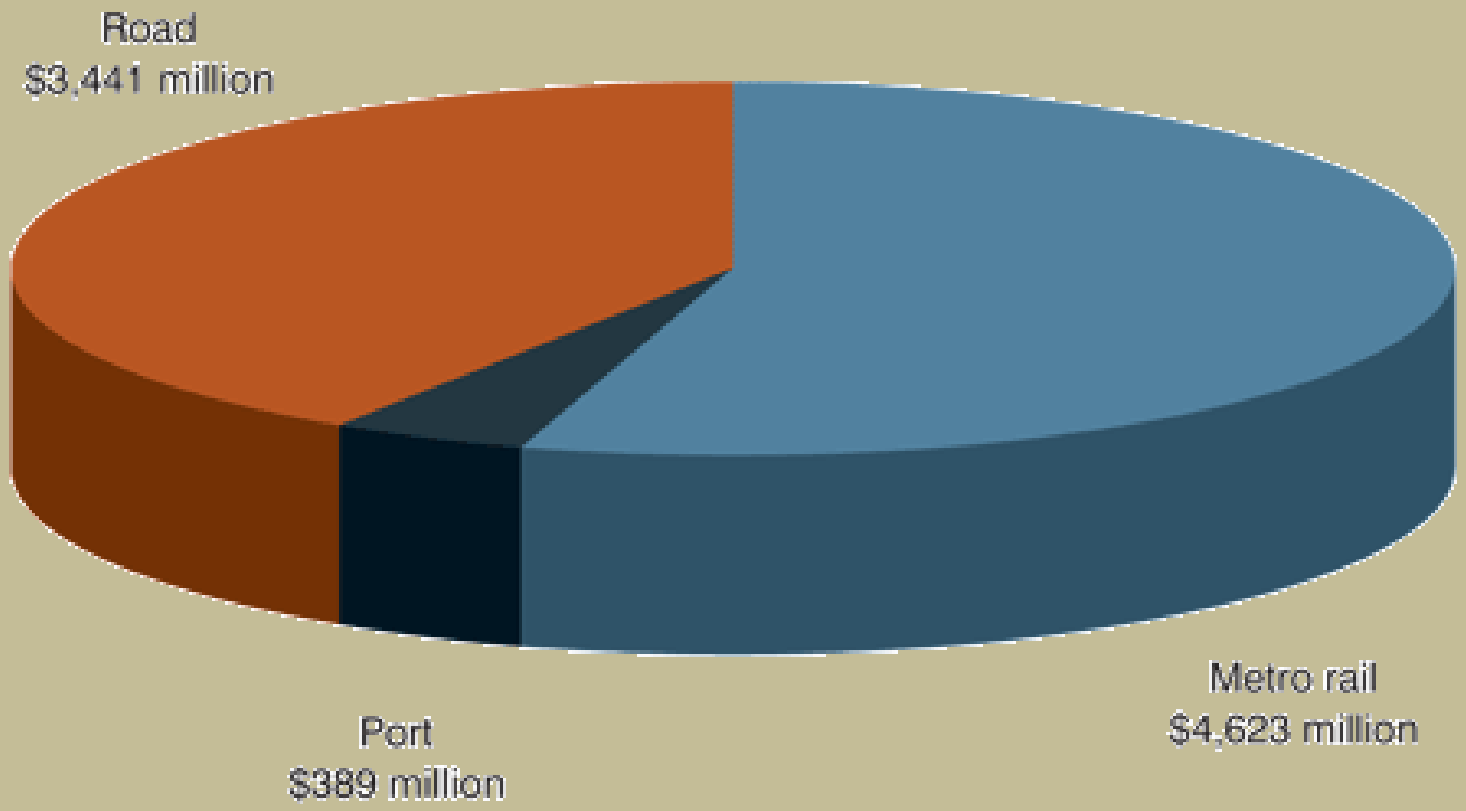
Source: Bureau of Infrastructure, Transport and Regional Economics (2009), *Australian Transport Statistics Yearbook 2009*, Department of Infrastructure, Transport, Regional Development and Local Government, Canberra; Australian Bureau of Statistics (2009), *Regional Population Growth*, Cat. no. 3218.0, ABS, Canberra.

Australian public transport is taking off...

- Melbourne growth of 30% in 3 years, 18% in past year
- Perth led the way... rail from 7 million to 110 million pass/yr in 17 years

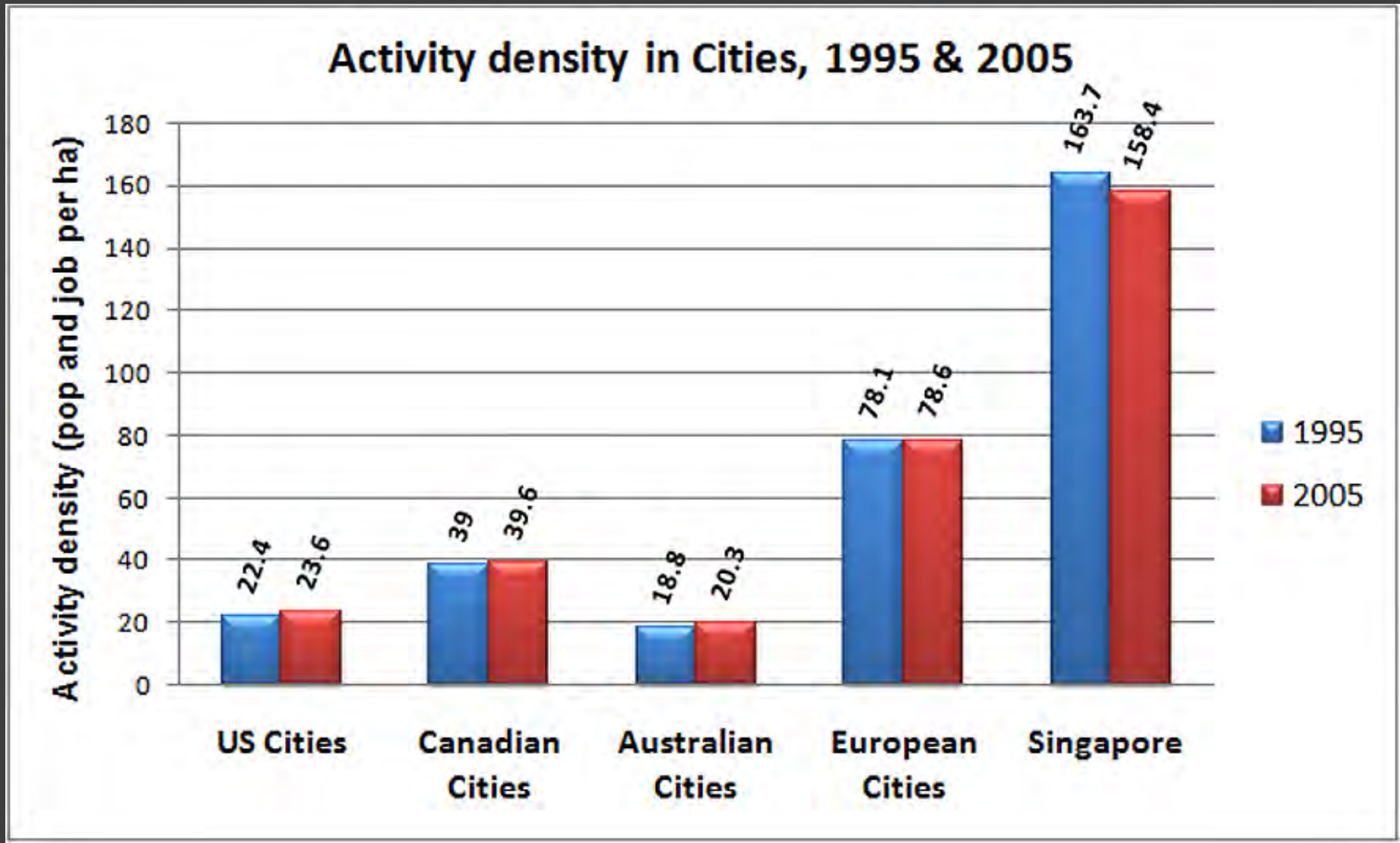


Infrastructure Australia package – 55% urban rail….historic!



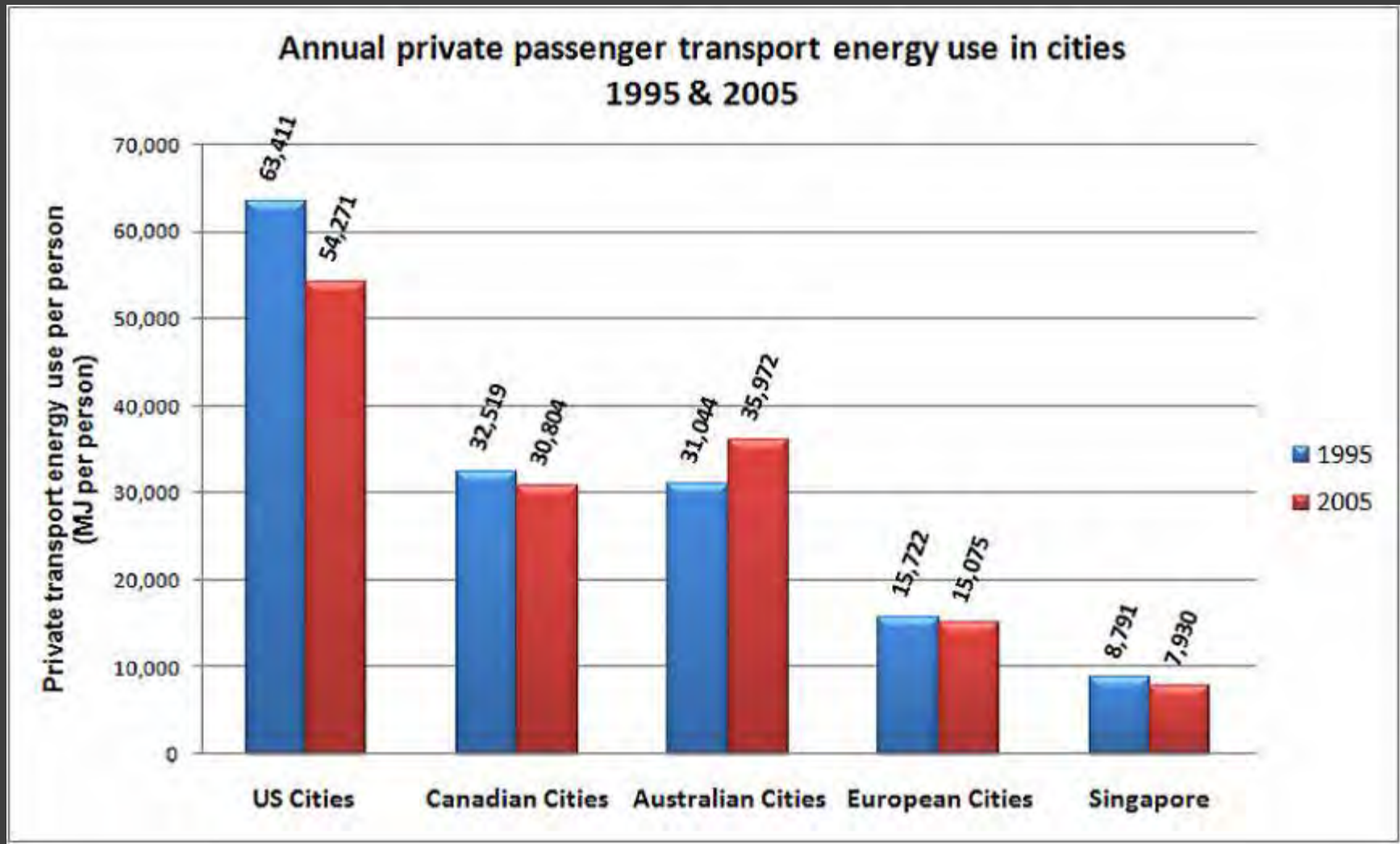
• Urban activity density (pop + jobs) has clearly reversed its decades long decline in all cities.

Sustainability generally up. Major departure from 60 year trend



- US big drop due to fuel efficiency and slow VKT.
- Canadian and European cities and Singapore have dropped also.
- Australian cities on the other hand continue to rise in energy use...car use growth outstrips any car fuel efficiency gains.

Sustainability generally up



Doing it all?
Vauban Frieburg
Eco-village with car-free housing.


EUROPA-PARK


3
Vrutok
260
30
ZONE


mini MAL

The new ‘resilient, sustainable, solar city’ demonstrations will be the global leaders in innovation.

What will be needed for this transition…?

- **National plan for decarbonising cities…**
- **National electricity grid –** linking renewables to cities and across states;
- **National gas grid** – linking gas production to regional transport routes and major industries.

- Demonstrations

Infrastructure Australia

- Board of 12 from across Australia, with Sir Rod Eddington Chair.
- IA and the Infrastructure Co-ordinator (Michael Deegan, ex NSW DGT) based in Sydney with the Major Cities Unit.
- Part of DITRDLG....

Infrastructure Australia Council
Sir Rod Eddington, Mr Anthony Kannis
Hon Mark Birrell, Mr Terry Moran (Mike Mrdak), Mr Jim Hallion, Prof Peter Newman
Mr Phil Hennessy, Ms Heather Ridout
Dr Ken Henry (Jim Murphy), Mr Ross

National Strategic Priorities

- Expand Australia's productive capacity
- Increase Australia's productivity
- Diversify Australia's economic capabilities
- Build on Australia's global competitive advantages
- Develop our cities and regions
- **Reduce greenhouse emissions**
- Improve social equity, and quality of life, in our cities and our regions

Infrastructure Australia 7 themes

and how it can help sustainability

1. **A national broadband network** – for smart infrastructure
2. **A true national energy grid** – for renewables
3. **Competitive international gateways** – for exports, including our green products
4. **A national rail freight network** – for reduced carbon freight carriage.

Infrastructure Australia 7 themes

and how it can help sustainability

5. **Adaptable and secure water supplies** - resilient to climate change
6. **Transforming our cities** – for a low carbon future
7. **Providing essential indigenous services** – for sustainable communities.