

RESILIENT CITIES

Responding to the Crash, Peak Oil and Climate Change

By

Peter Newman

Professor of Sustainability

Curtin University

Australia

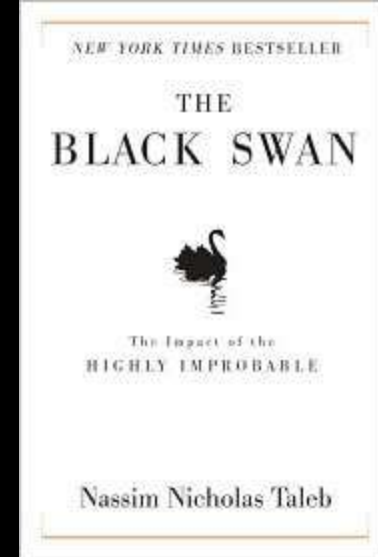
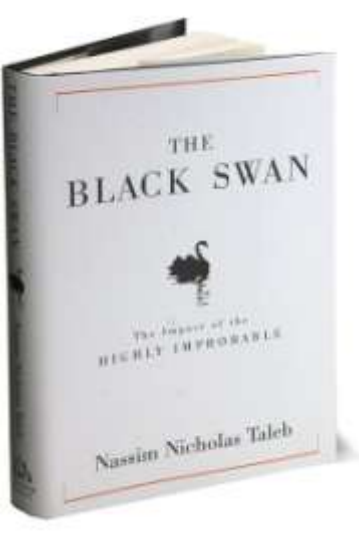


PB-CUSP Alliance

Greetings from Perth

- the Swan River Colony, home of the Black Swan





Nassim Nicholas Taleb
"The Black Swan:
The Impact of the Highly Improbable."

A black swan is something that cannot be predicted
(the past will be no help to us as a guide to the
future).

Black Swans can be signs of fear or hope.

The three unwanted Black Swans that could have been seen:

- Climate Change
- Peak Oil
- The Crash

And how we can respond in our cities....

RESILIENT CITIES

Responding to Peak Oil and Climate Change

Peter Newman, Timothy Beatley, and Heather Boyer

www.resilientcitiesbook.org



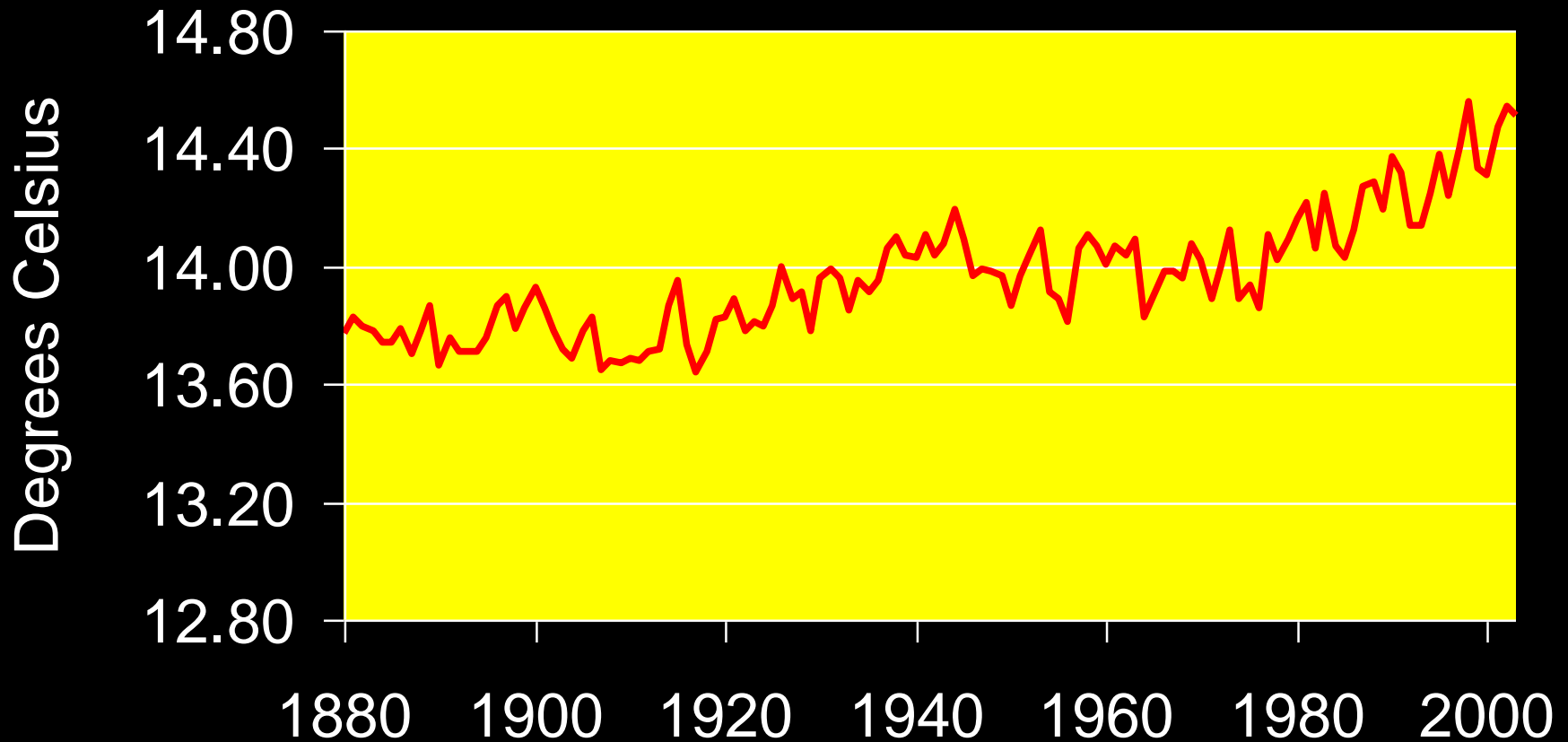
GREEN URBANISM DOWN UNDER

*Learning from
Sustainable Communities
in Australia*



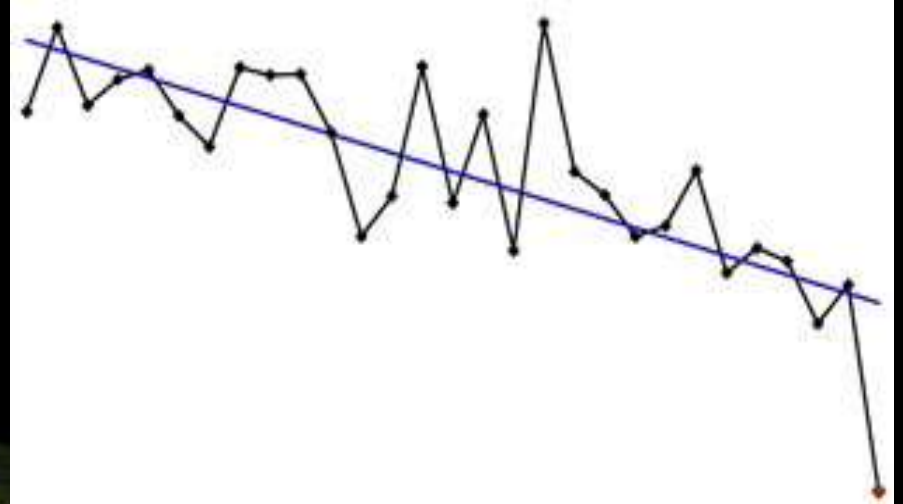
**Timothy Beatley
with Peter Newman**

Global Average Temperature at Earth's Surface (Land-Ocean Index), 1880-2003



Source: GISS

Arctic sea ice extent 1978-2007
in millions of km²
(National Snow and Ice Data Center)



**Climate
change
threatens
cities
and
regions**



Global governance seeks 50-80% less ghg by 2050...

- Undermines confidence in the economic system which has been based on growth in fossil fuels.
- No alternative and early action is economically sensible – Nicholas Stern.
- Australia now has joined the world....

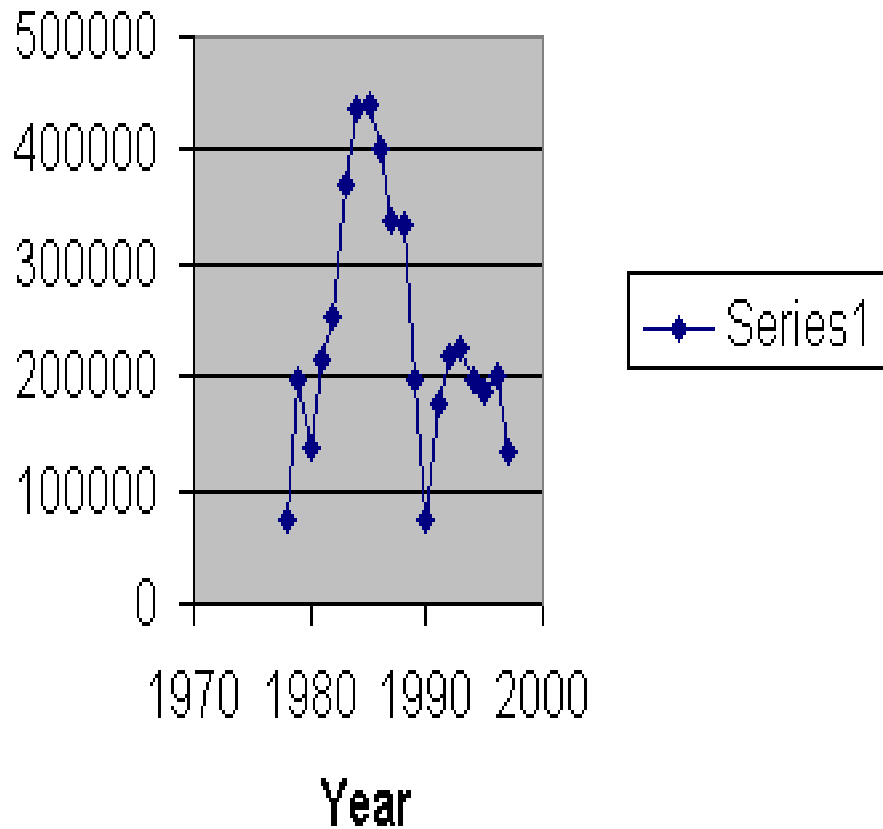
Peak oil?

'The world is approaching a practical limit to the number of barrels of crude oil that can be pumped every day.'

Russell Gold and Ann Davis

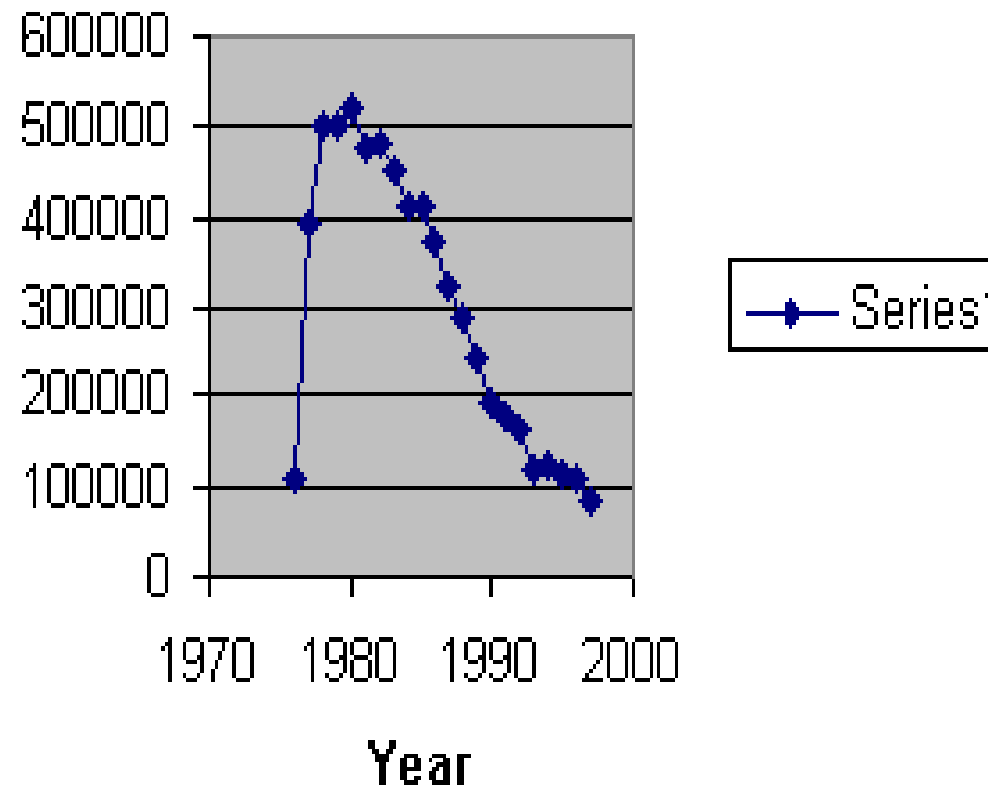
Wall Street Journal, November 19th, 2007

Brent Field Production



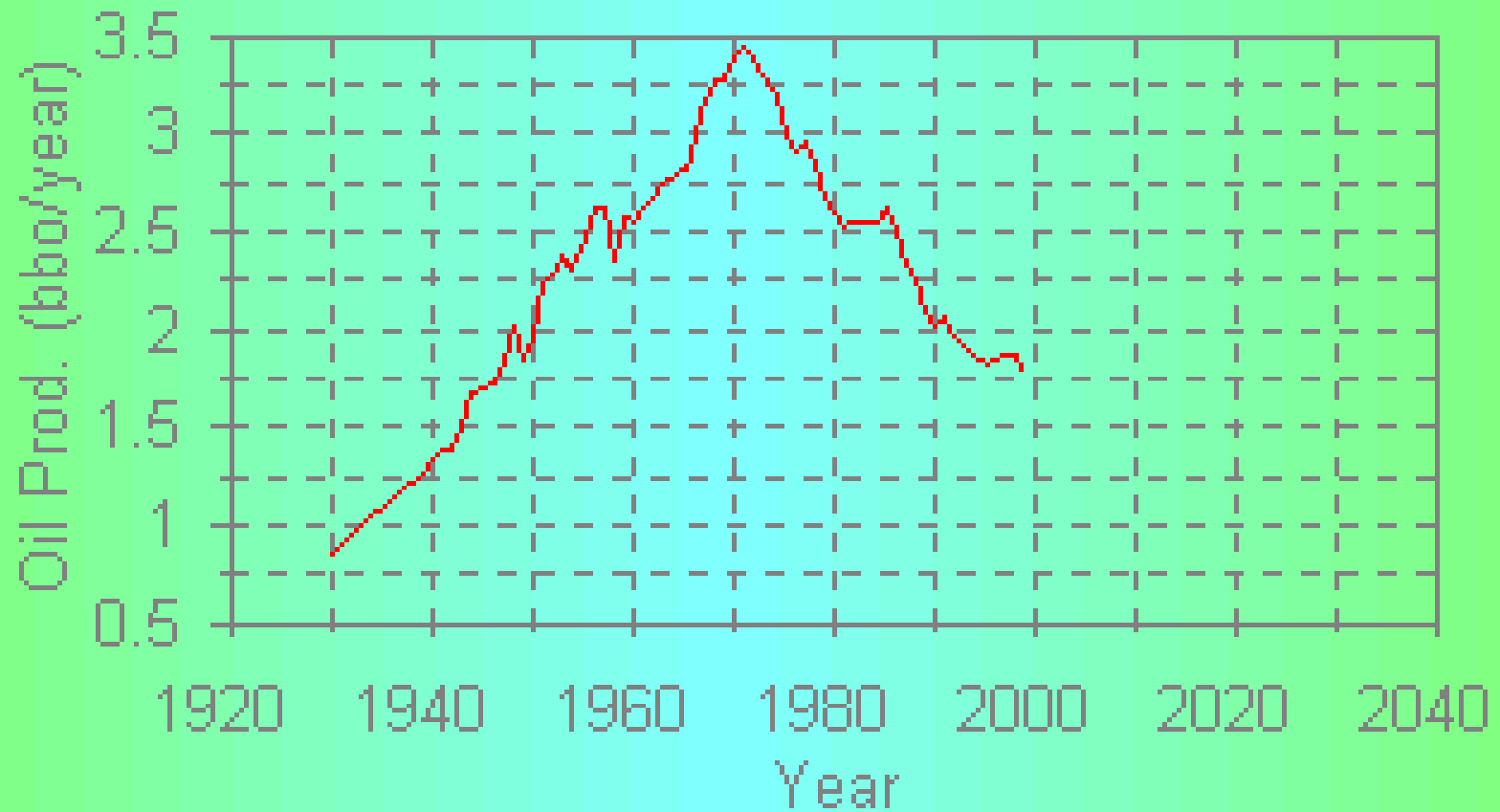
Production cycle of an oil field

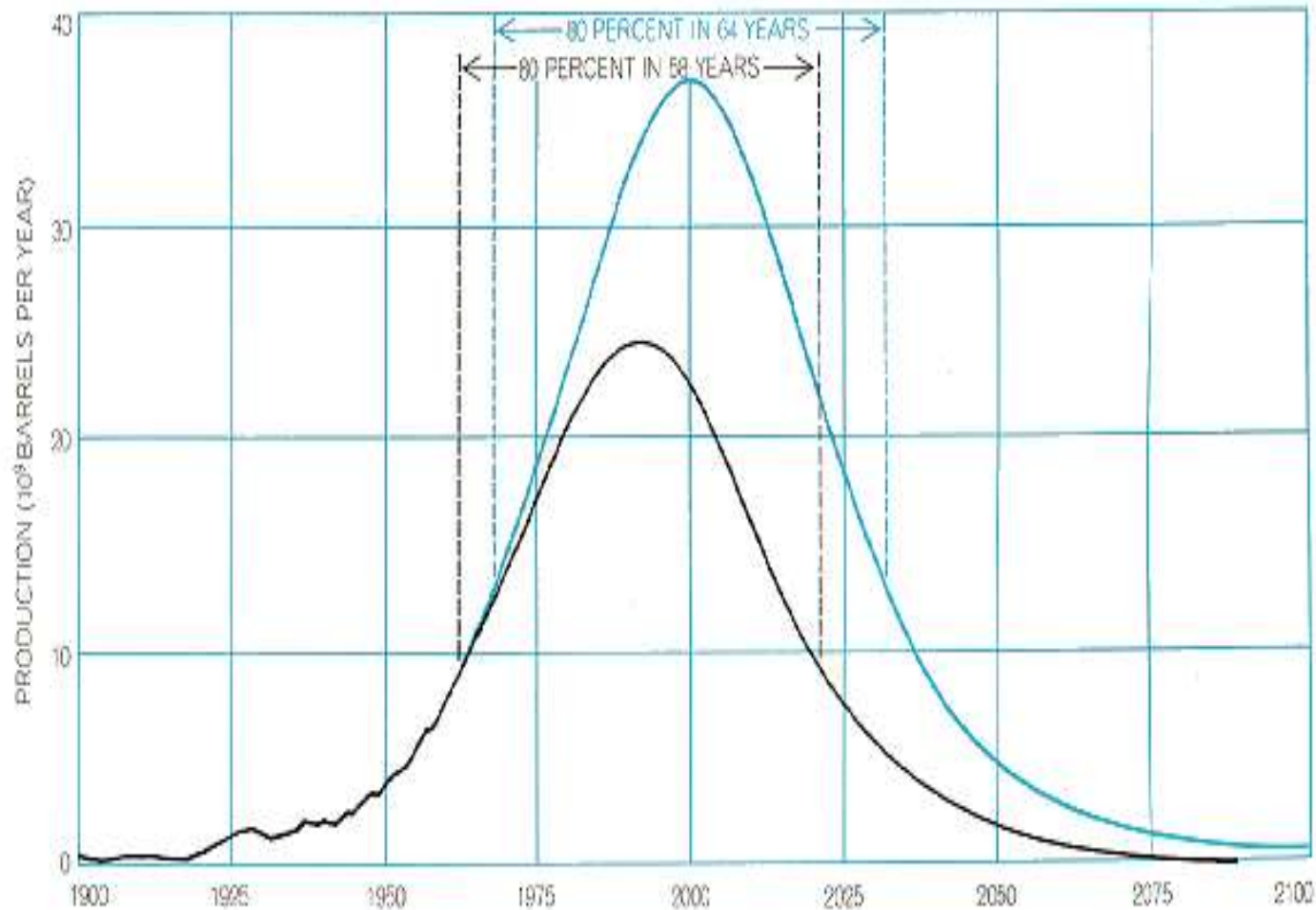
Forties Field Production



US oil now 87% depleted.

U.S. Lower 48 States



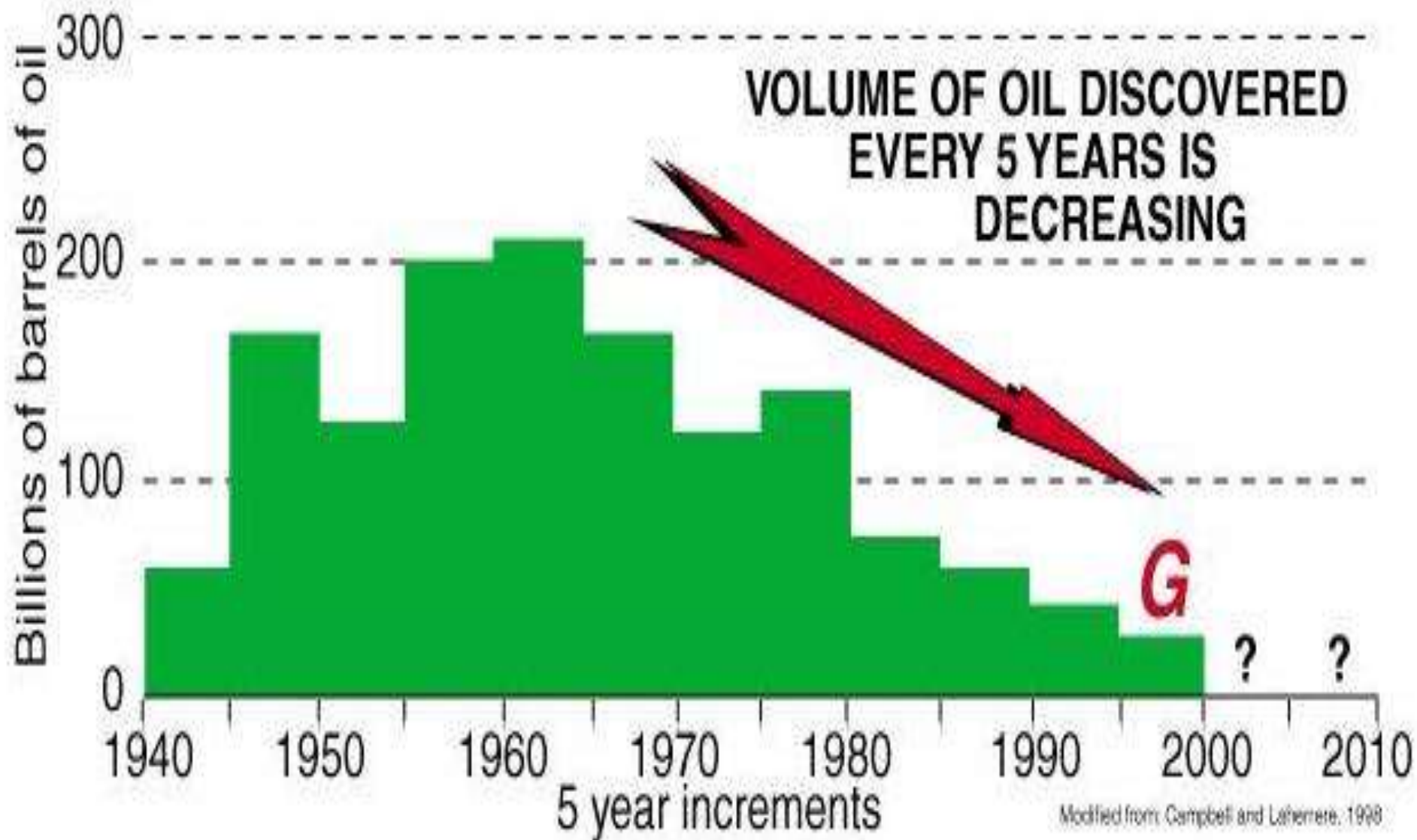


CYCLE OF WORLD OIL PRODUCTION is plotted on the basis of two estimates of the amount of oil that will ultimately be produced.

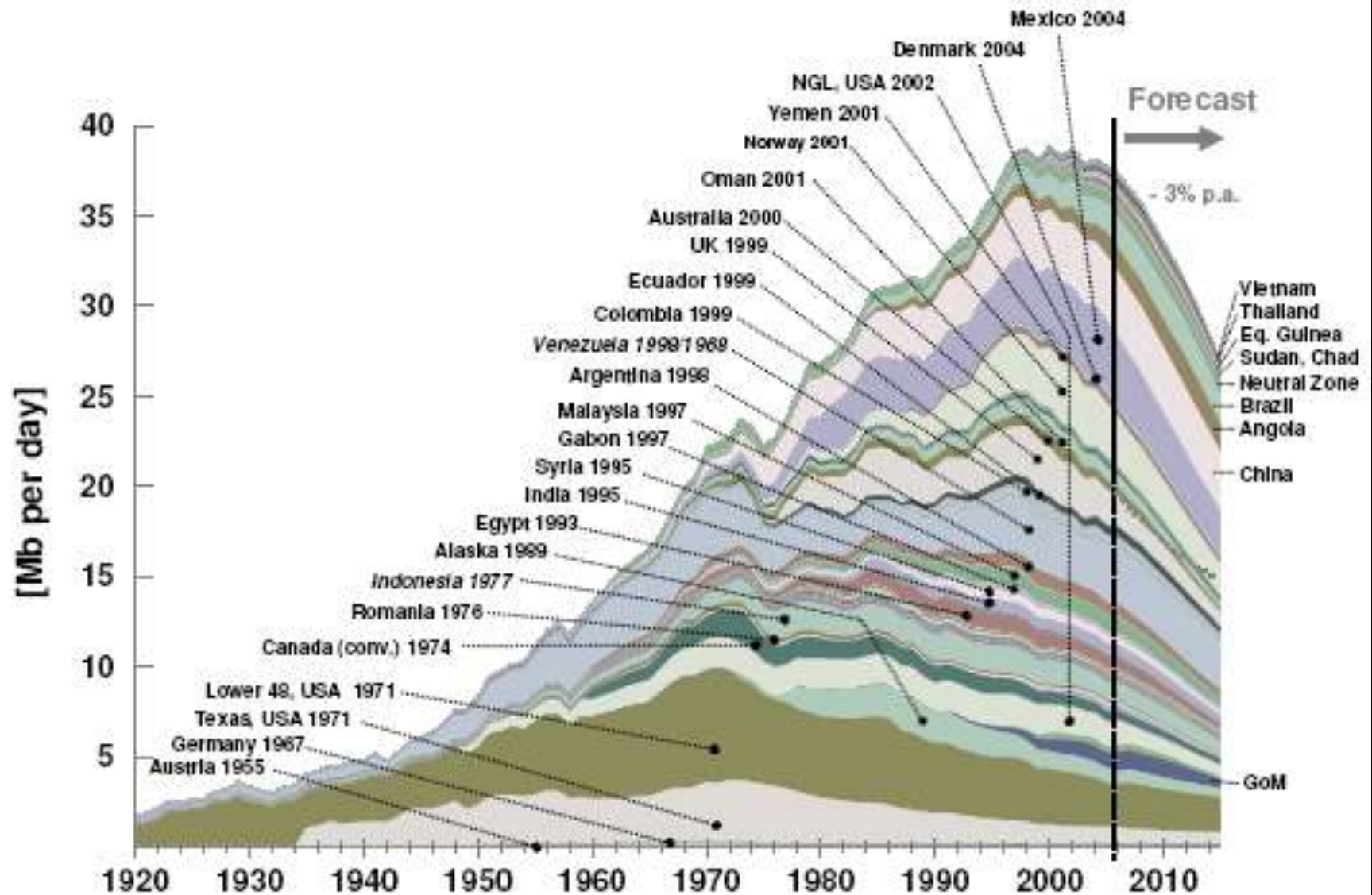
The colored curve reflects Ryman's estimate of $2,100 \times 10^9$ barrels and the black curve represents an estimate of $1,350 \times 10^9$ barrels.

The Hubbert Peak Sci Amer 1971

Figure 4



More and more countries are past their peak..



Ludwig-Bölkow-Systemtechnik GmbH, 2007

Source: IHS 2006; PEMEX, petrobras ; NPD, DTI, ENS(Dk), NEB, RRC, US-EIA, January 2007

Forecast: LBST estimate, 25 January 2007

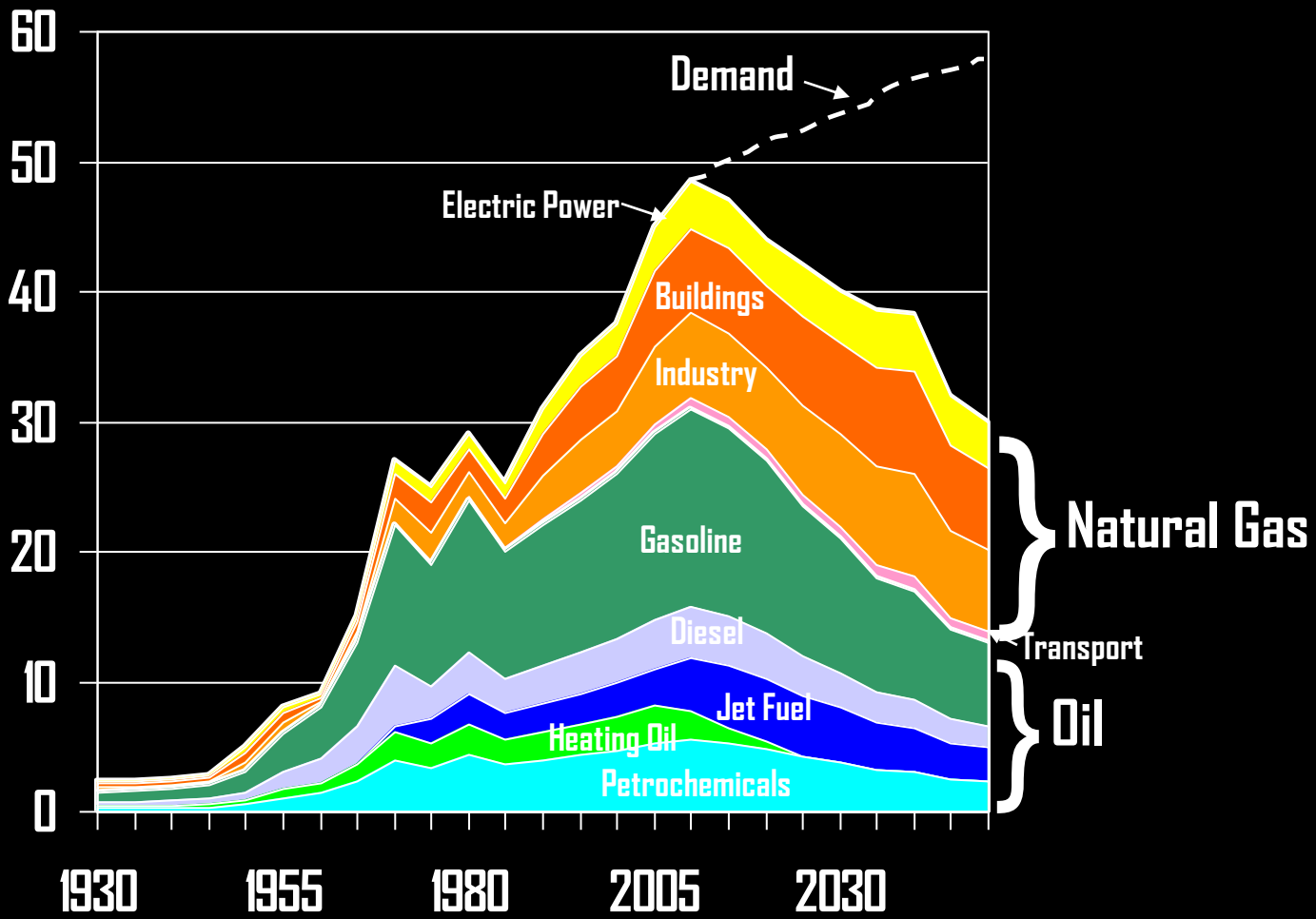


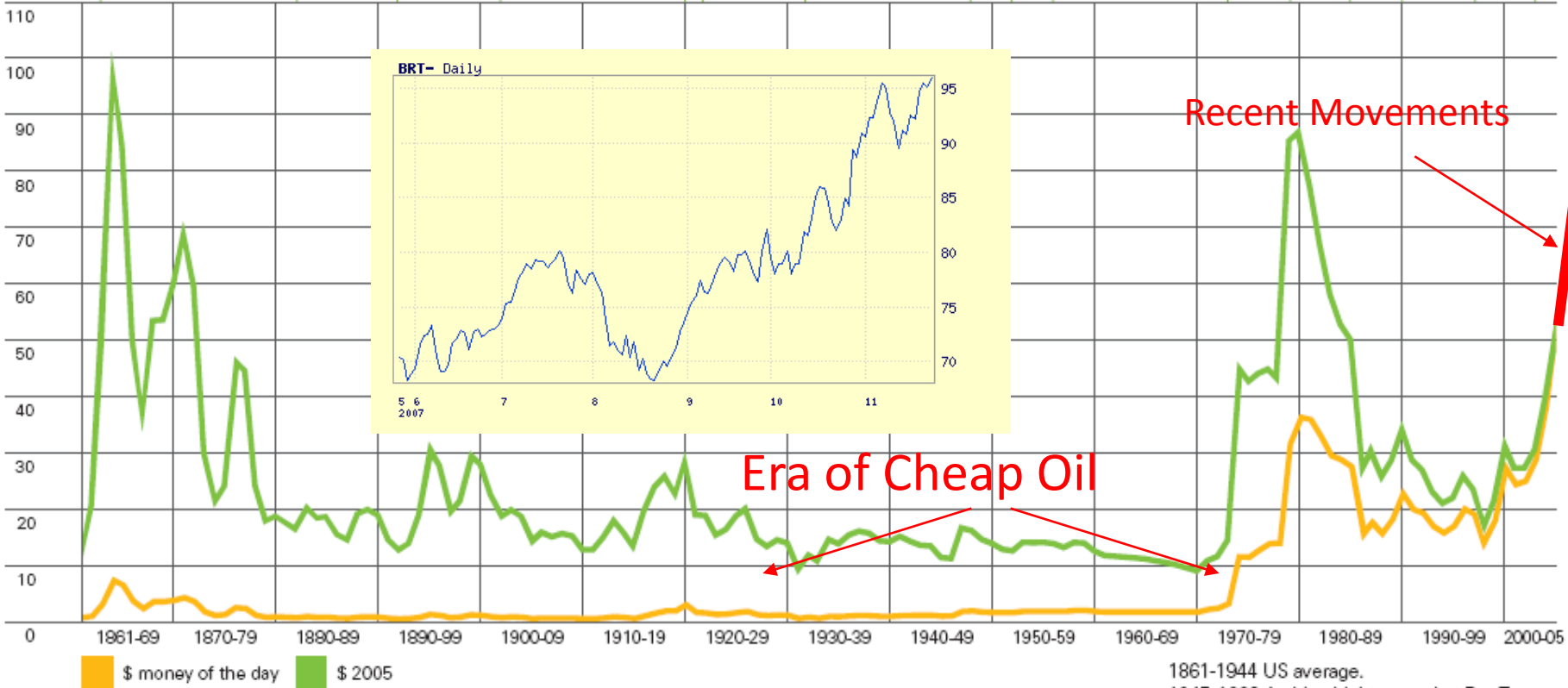
Fig 2.3 How we use oil and natural gas & how this may change as they peak in production

Long term oil prices

Crude oil prices since 1861

US dollars per barrel

World events



1861-1944 US average.
 1945-1983 Arabian Light posted at Ras Tanura.
 1984-2005 Brent dated.

UK Industry Taskforce on Peak Oil and Energy, November 2008

- the five Mega Major oil companies are in decline in oil production; they **peaked in 2004**.
- Extremely **volatile prices** are characteristic of this peak period.
- The underlying trend in the price of oil is **6% growth per year**;
- oil supplies go into **permanent decline** after 2013.
- the CEPA Index which measures exploration and development costs has **doubled** since 2005.

IEA 'World Energy Outlook', Nov 2008

- Output is declining faster than previously thought.
- Natural annual rate of decline is **9.1%** per year from 2009.
- With investment of \$360b/yr until 2030 the rate of decline drops to **6.4%**.
- Have to find a Saudi Arabia every two years.

UNCERTAINTY ON OIL IS NOW RAMPANT



- Global crash caused by **car dependent sub prime mortgages** vulnerable to tripling in fuel price.
- Banks loaned excessively on belief that car-based growth would always happen. Fuel tipped us over...
- CONFIDENCE IN OIL-BASED FUTURE UNDERMINED by sudden *rise*.
- CONFIDENCE IN OIL-BASED ALTERNATIVES UNDERMINED by sudden *fall*.

Toxic loans are linked to toxic urban scatter..

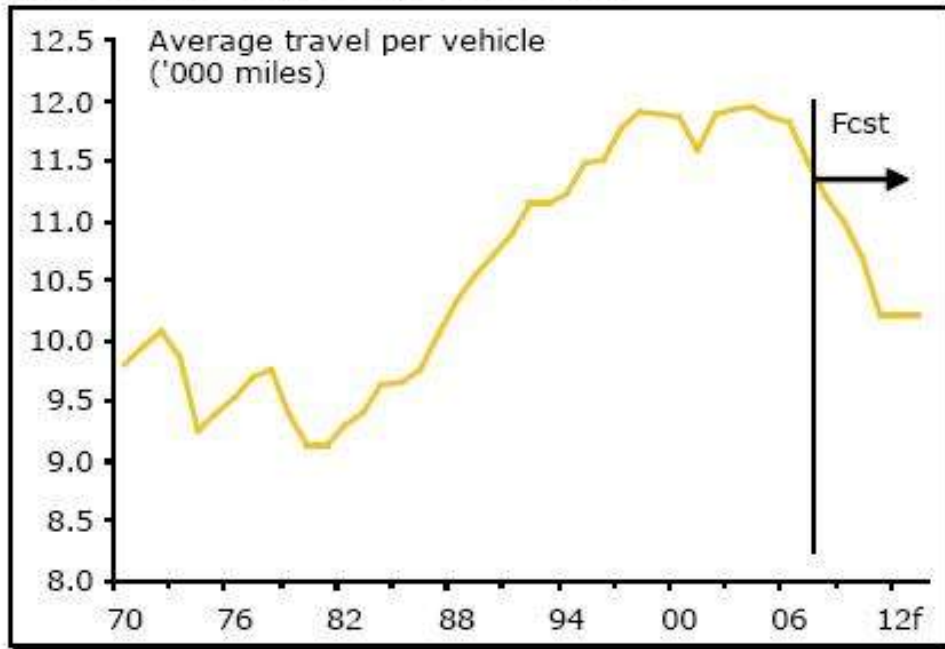


The CRASH.... Oil-based economic confidence undermined.
Deservedly.
Fear abounds.... Are we RESILIENT?



Chart 8

Americans Will Soon Drive Less



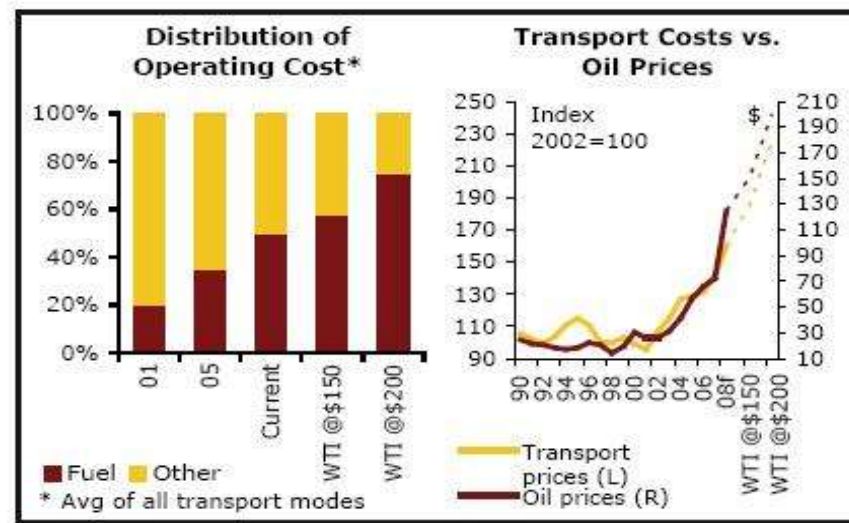
Source: Federal Highway Administration, CIBCWM

http://research.cibcwm.com/economic_public/download/sjun08.pdf

Declines in all fuel intensive transport are beginning.

Chart 1

Transport Costs Highly Sensitive to Oil Prices



Source: RMT, CIBCWM

http://research.cibcwm.com/economic_public/download/smay08.pdf

How do we Respond?

Four scenarios...

- **Collapse**
- **Ruralised city**
- **Divided city**
- **Resilient City**

1. Collapse

- ‘When the oil peaks the economic and social dislocation will be unprecedented.’ Michael Meacher, UK Minister for Environment, 1997-2003.
- ‘The unforeseen consequences are devastating.’ Matthew Simmons, Houston Oil Banker.
- ‘Civilization as we know it will end soon.’
Republican Congressman Roscoe Bartlett

Collapse can happen...and has...

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.



But...

- Awareness is increasing exponentially.
- If '*Only white swans exist...*' is the response then that city can go into severe decline.
- Some cities will do better than others.

2. Ruralised city

(cities are for permaculture – only.
All food and produce is from your
garden or locality)

‘What should we do? Start growing your own
food...’ Mathew Simmons

Havanna example... 40% of its own food
produced locally after oil cut off.

Urban scatter is good for permaculture.....

- **Localized food production will increase. Food miles and slow food...**
- **But cities will remain as cities... The great urban experiment is to create opportunity.**
- **Green urbanism means cities are more urban and more green....**



3. Divided city

- **Wealthy eco-enclaves surrounded by Mad Max suburbs...**
- **Highly probable as it is the 'market' solution.**
- **Eventually undermines the city which is based on collective responses providing opportunities for everyone.**



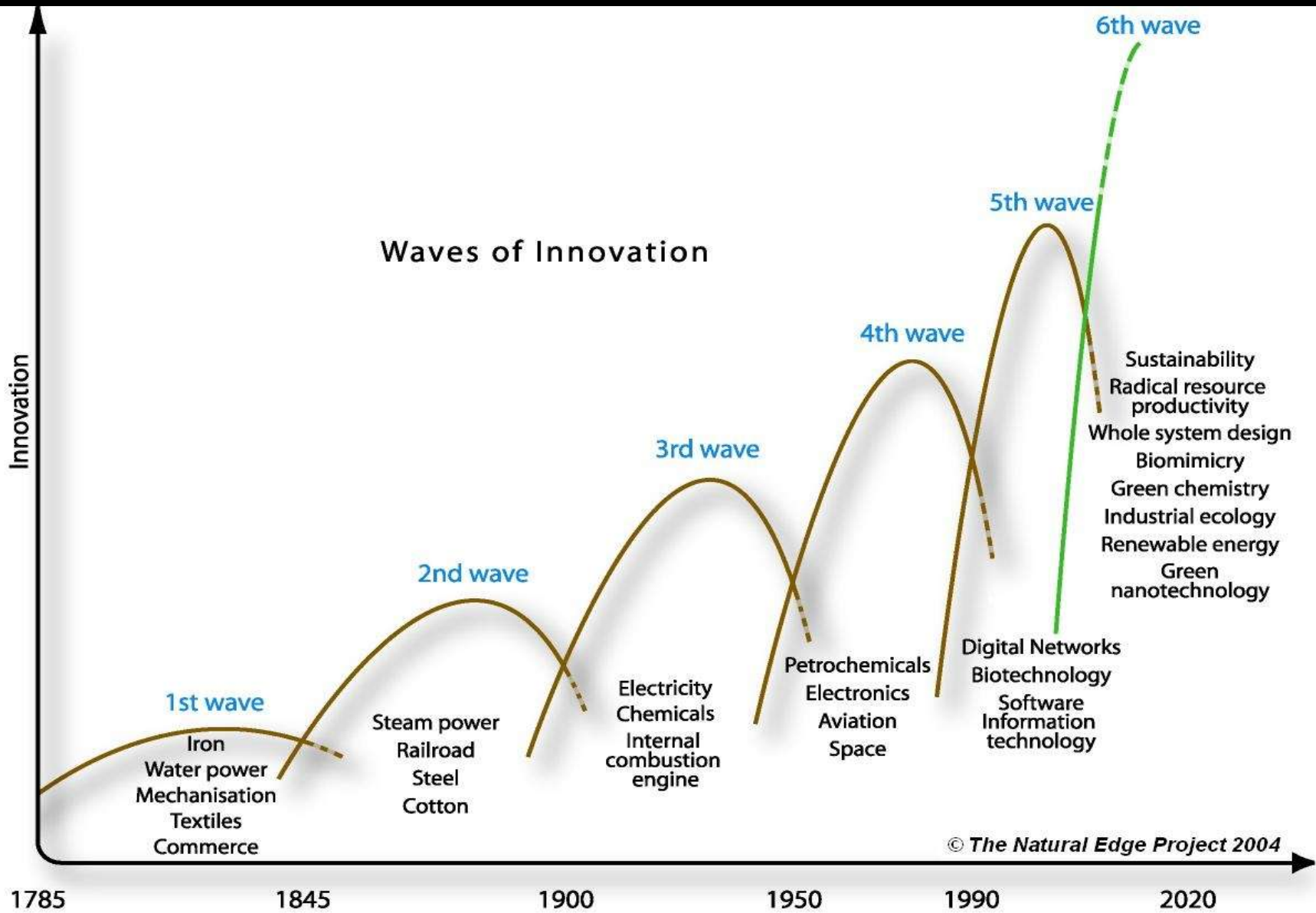


All of these responses are based on
fear.

Cities of fear are not resilient.

4. Resilient City

- Building a new economy in our cities which is more resilient...
- Positive Black Swans have happened before as new economies were created out of cities where the old confidence was replaced with the new.
- The City of Hope.



Resilient City includes...

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

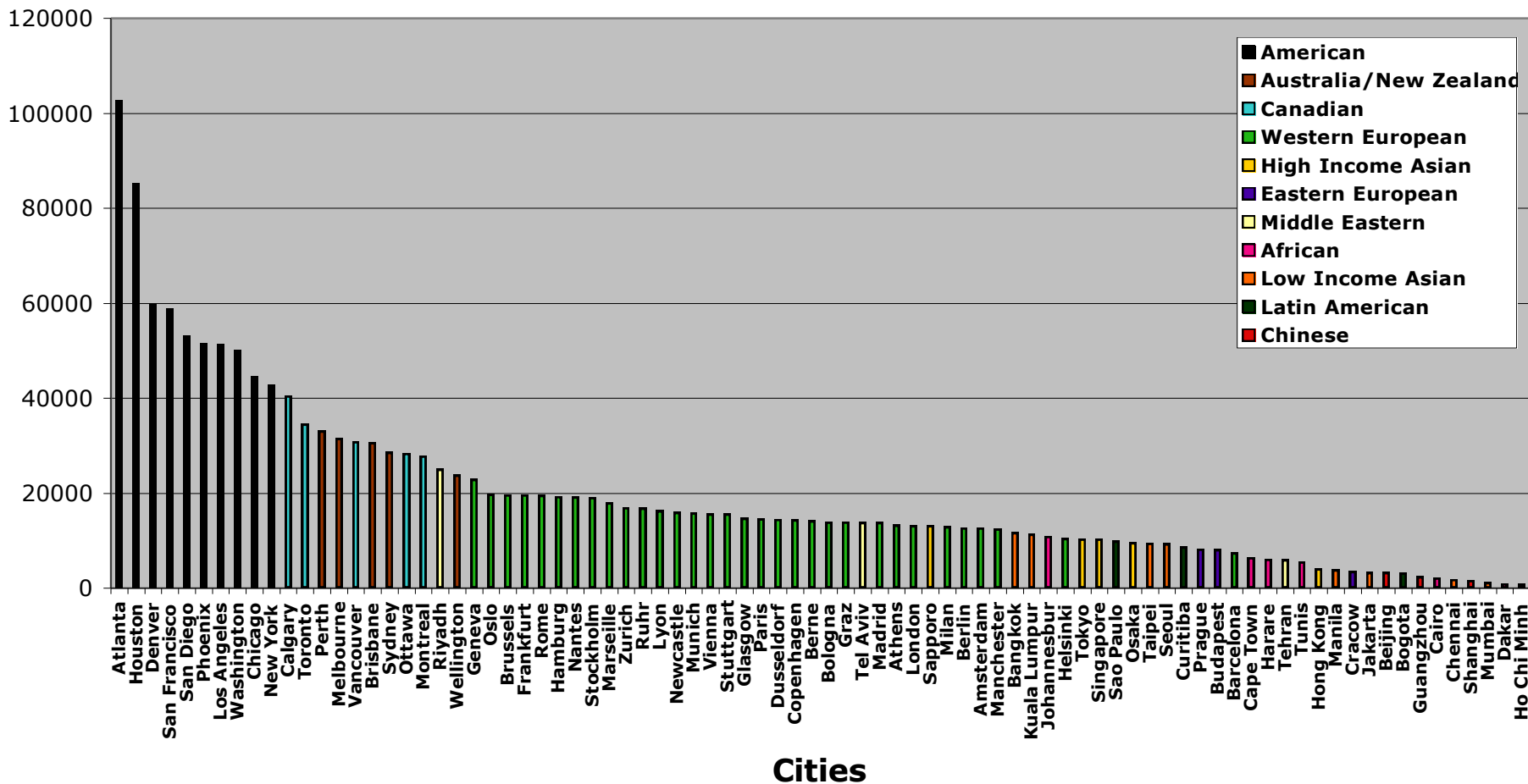
All combine the digital, smart technologies with the new technologies of sustainability.

The new Resilient City economy and Sustainable Transport....

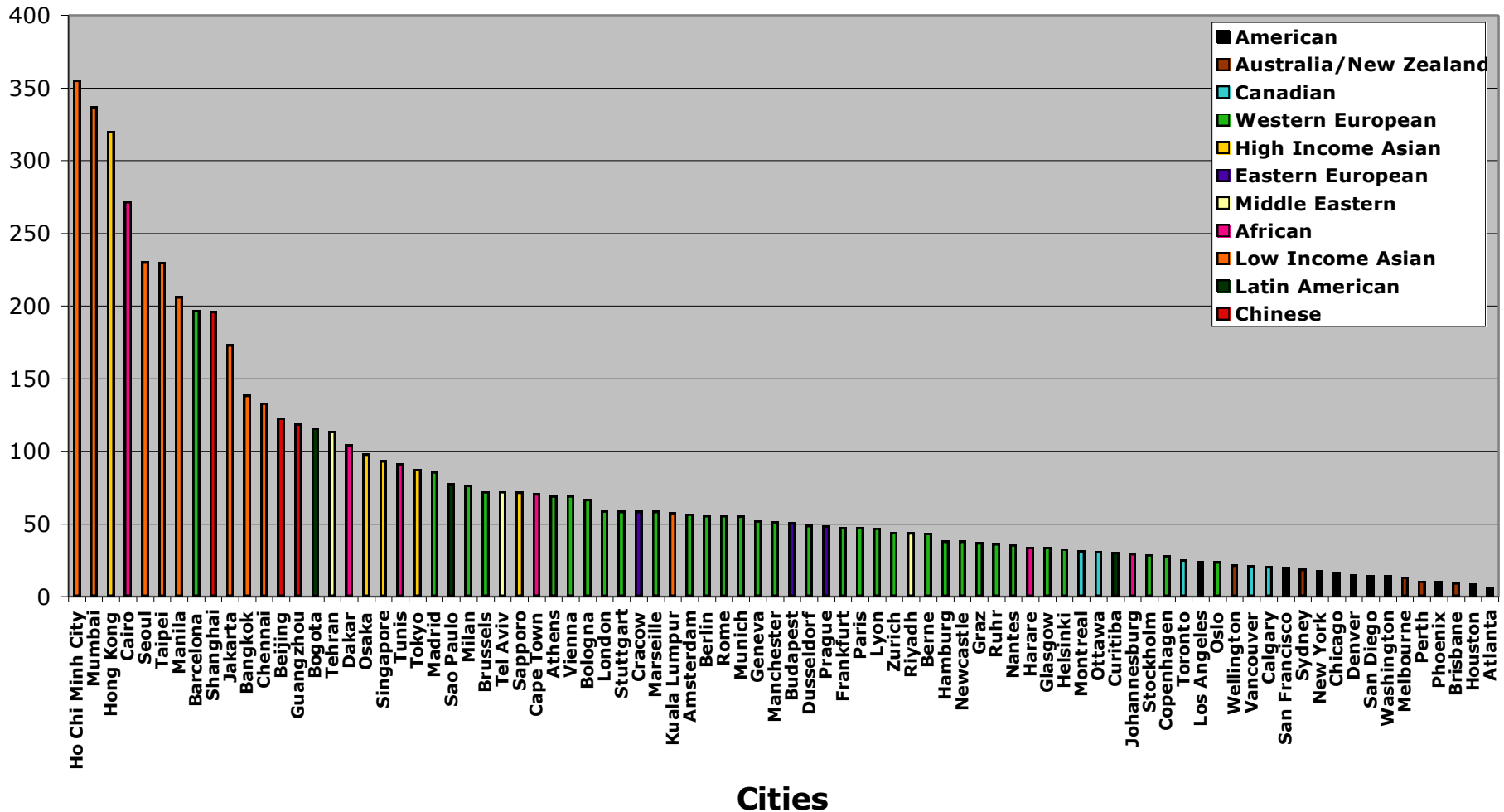
- **STOP building extra urban road capacity and urban scatter.** The US and the world cannot afford to consume the resources it takes. *BLUE economics....save money.*
- **START building electric renewable cities** with much greater localism in the economy and infrastructure. *GREEN economics....spend money.*

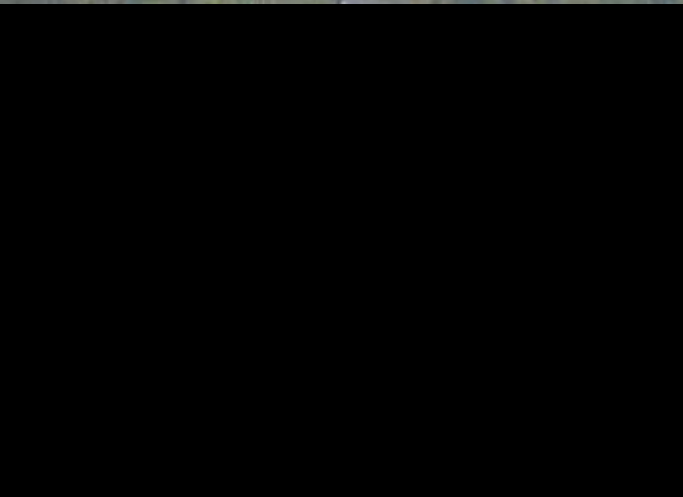
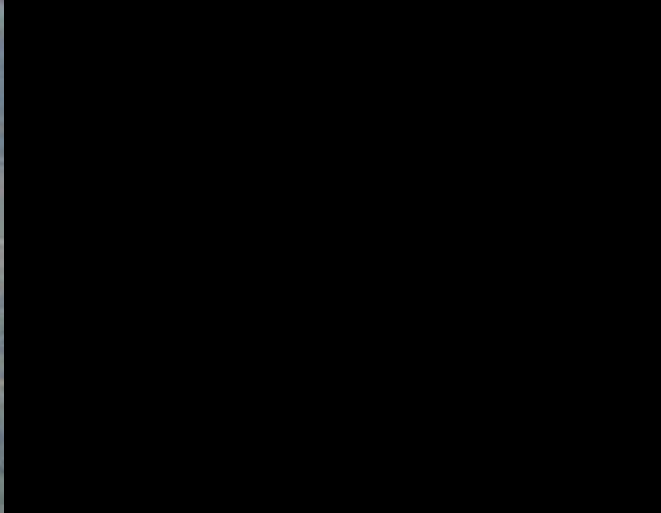
Who has to change the most?

Private Passenger Transport Energy Use per Person 1995



Urban Density, 1995 (Persons/Ha)





Barcelona

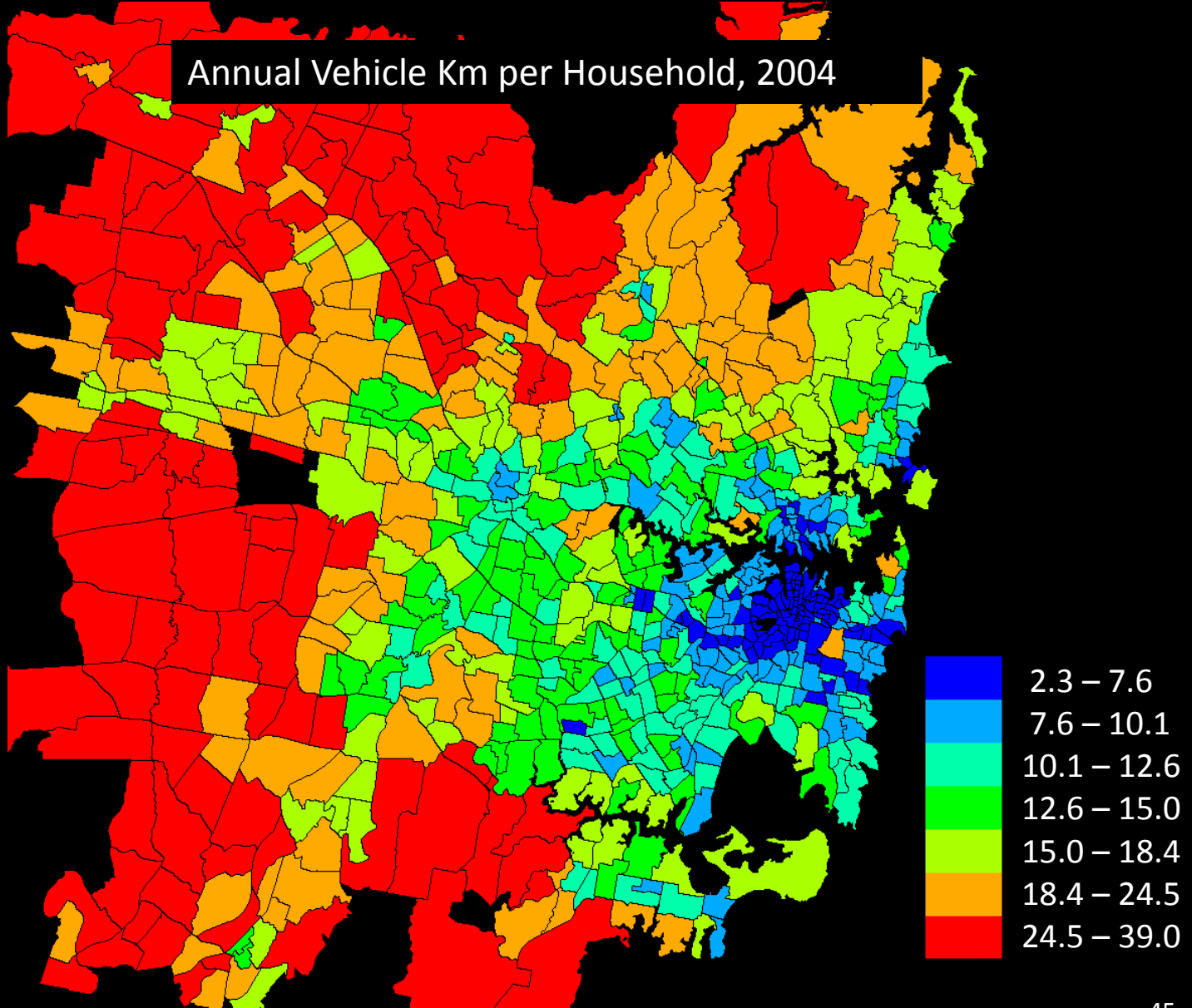


Urban scatter areas are vulnerable to peak oil and climate change economics.



Code Red for outer areas...Sydney

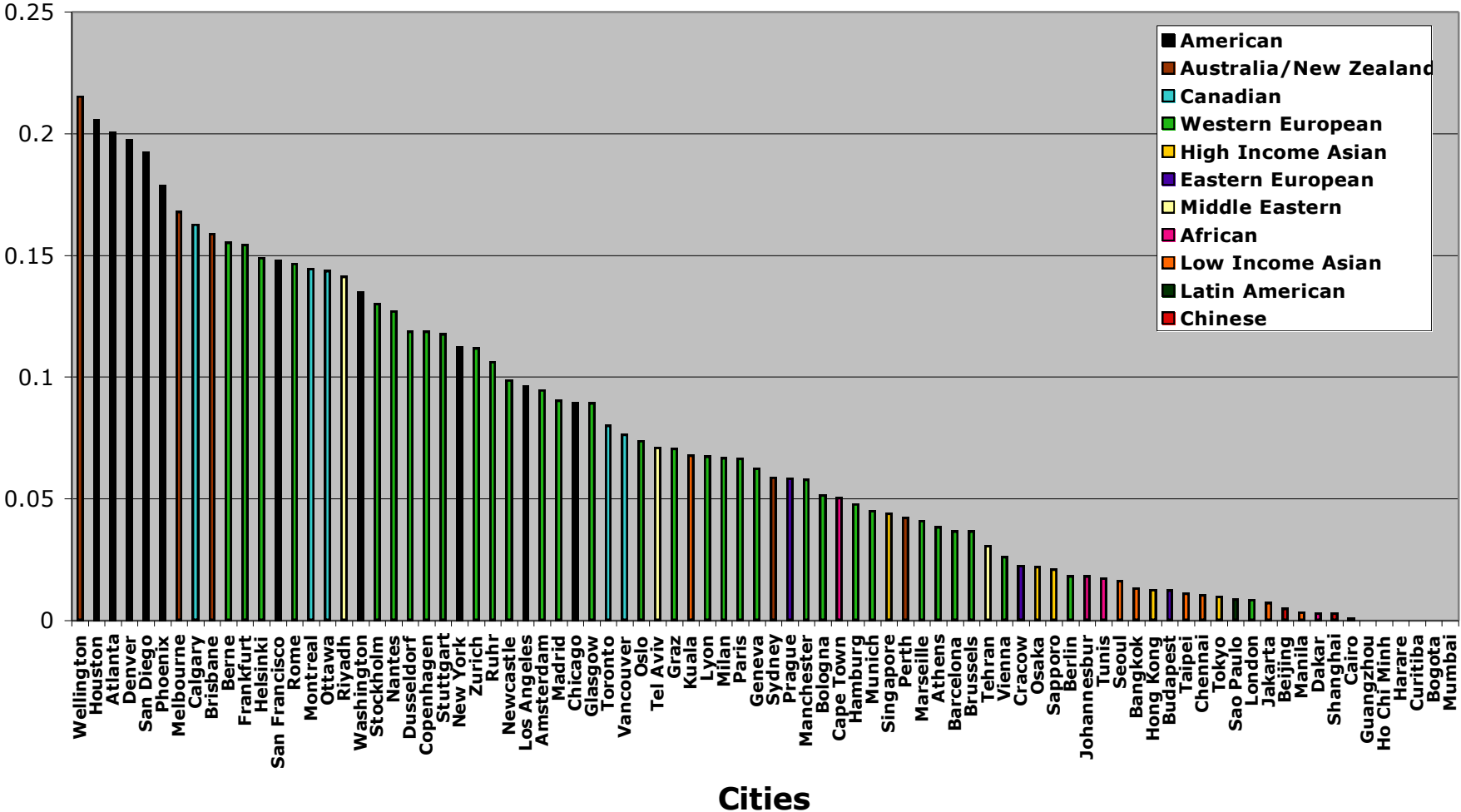
Annual Vehicle Km per Household, 2004



Outer suburbs residents, particularly those away from rail lines, drive much more than inner suburbs residents.

What has to stop most....

Length of Freeway per Capita, 1995 (metres)









South San
Francisco
CITY LIMIT



South San
Francisco
CITY LIMIT

SFO LONG





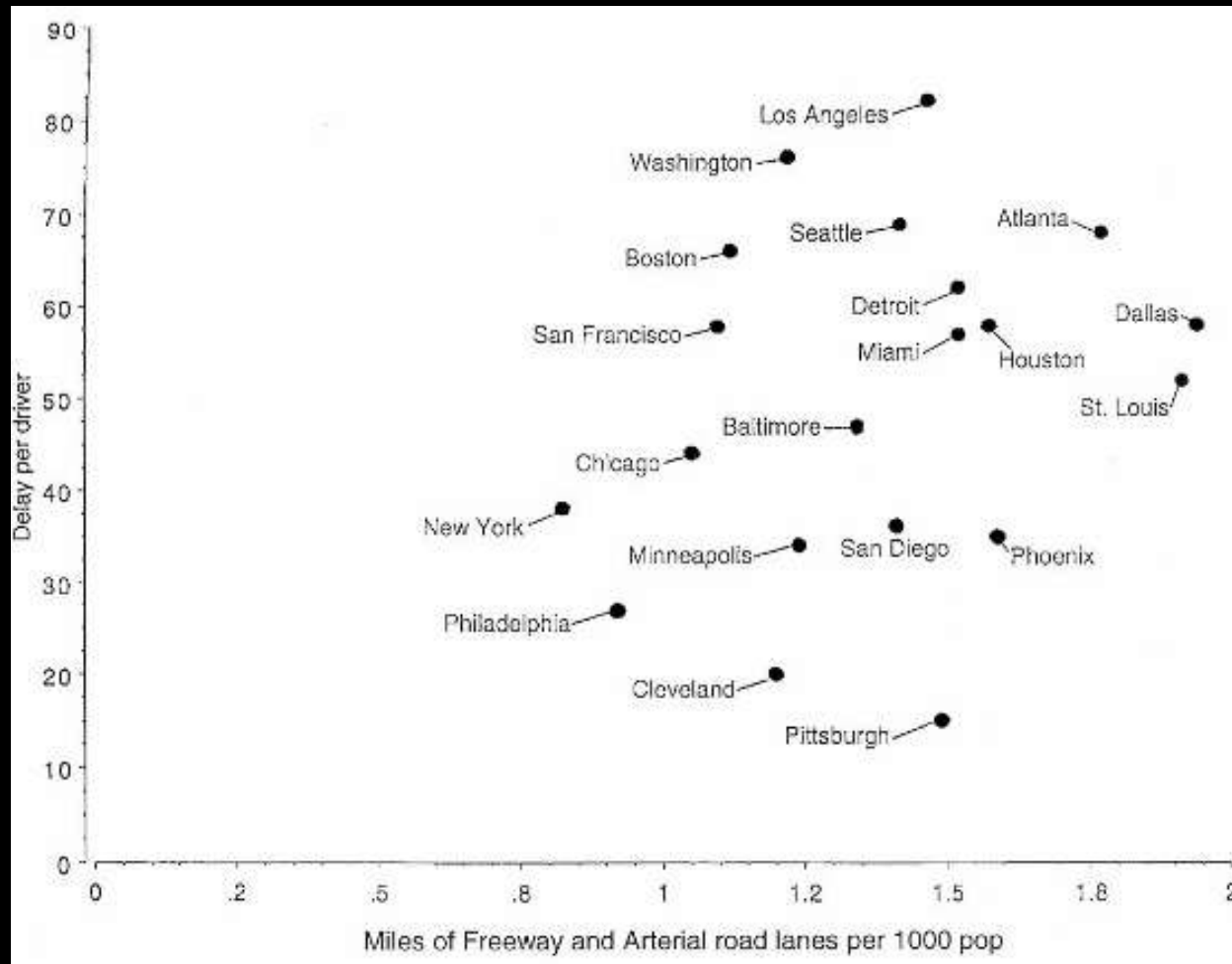






Impact of Road Building on Delay – America's 20 Biggest Cities – ZERO!

DELAY



Freeway Miles

The freeway is a failed technology...

- Cities adapt to the one-hour travel time budget no matter what infrastructure is provided.
- Freeways fail as public spaces.
- They are dinosaurs in a post Peak Oil world.
- Will save billions which is needed for the new economy.



Its impact
on cities is
not good
for
economies
or people

‘agglomeration
diseconomies’

Can these spaces be reclaimed and
rehabilitated...?



**ONE LANE -
people per hr**
Freeway 2,500
Busway 5000
LRT 10-20,000
Train 50,000



240 Persons travel
to work:

-- in 177 Cars

-- in 3 Busses

-- in 1 Tram



Land use follows transport...



Urban scatter... is expensive and unhealthy....



PB-CUSP paper on costs of urban development shows in Australian cities *each new block on the fringe cf redevelopment:*

1. Is subsidised by \$85,000 in infrastructure.
2. Costs \$250,000 extra in transport costs over 50 years.
3. Produces 4.4 tonnes/yr more in greenhouse gases, and health savings....

www.sustainability.curtin.edu.au



Multiple issues of car dependence...

'Battery hen' kids

or

'Free range' kids

Mayer Hillman, Policy Institute, London

Children who walk to school develop a sense of belonging, a sense of place, that gives them a freedom to relate to people in their community without fear. Children who are driven everywhere are suspicious of local community and become much more rigid and contained.

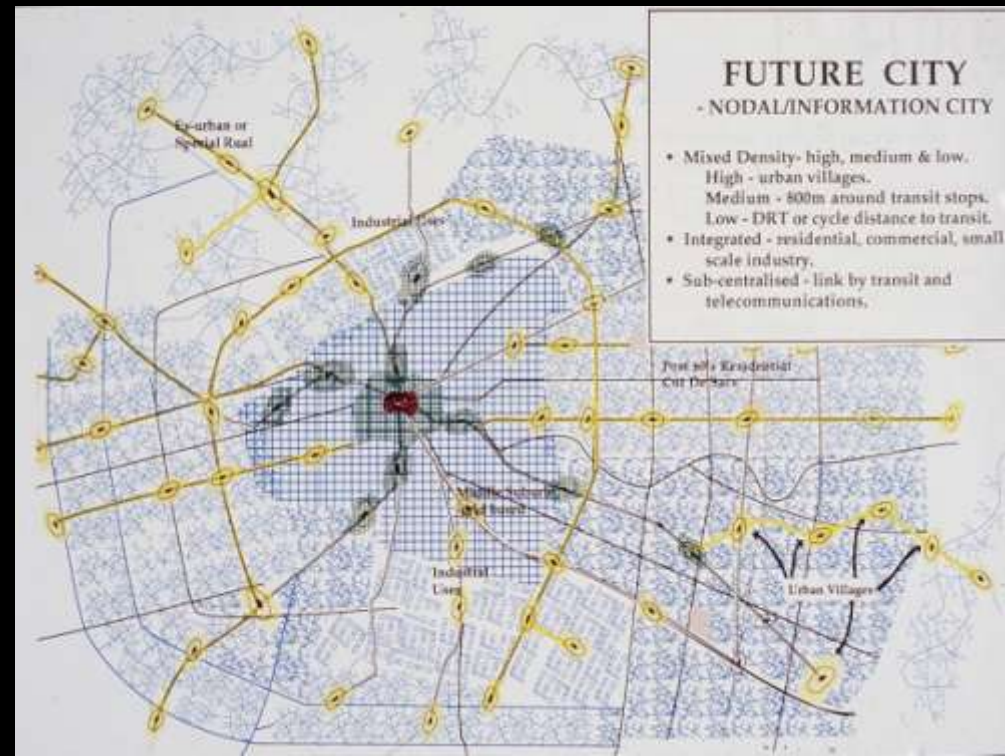
The Resilient City future is more green and
more urban...

What do we have to do?

- TOD
- POD
- BOD
- GOD
- PHEV
- EcoV
- TDM

1. Transit Oriented Development

- Build **electric transit** faster than the traffic, into and across the city.
- Build it with **land development partnerships.**



Ratio of Public to Private Transport Speed, 1995

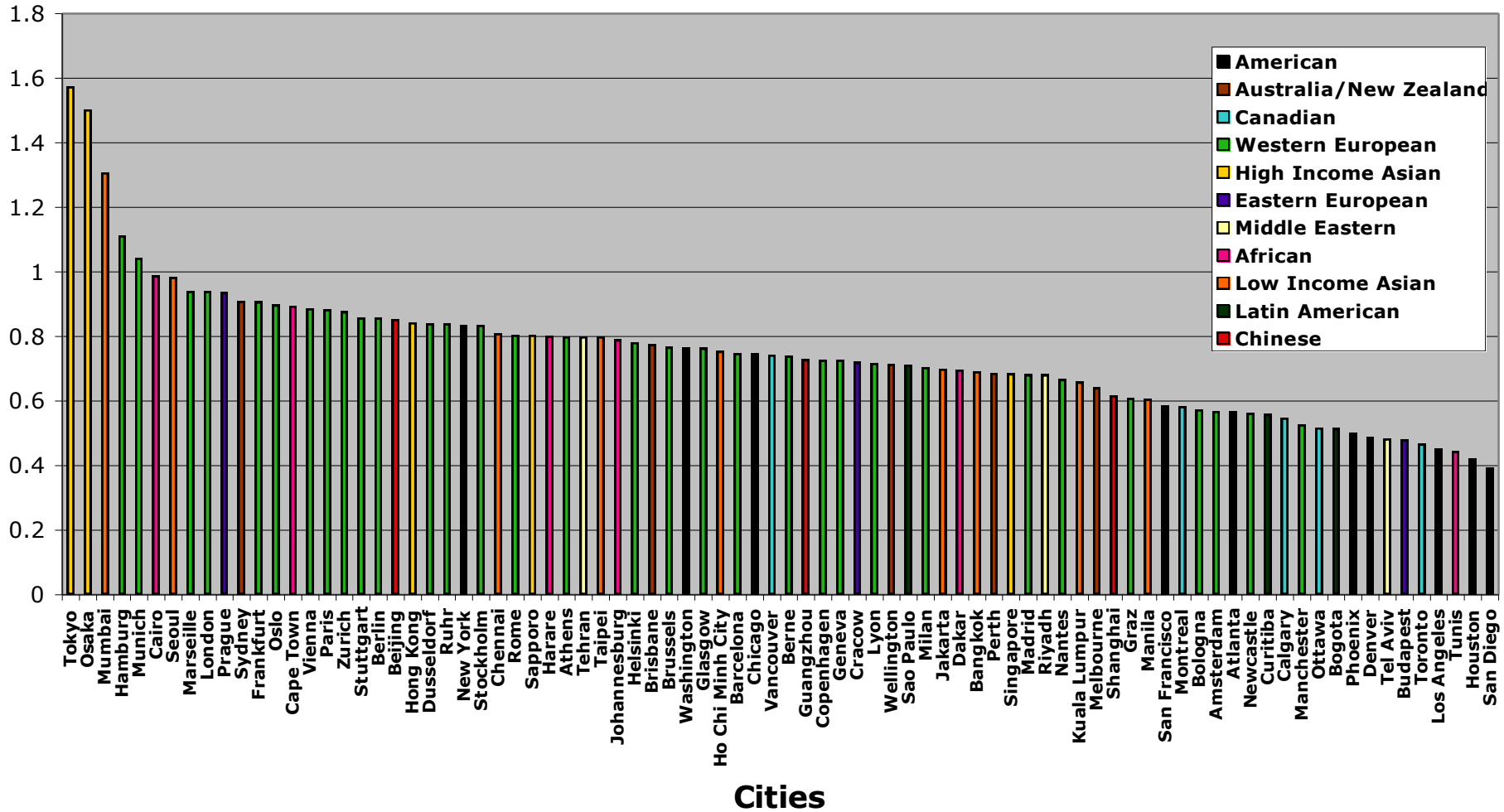
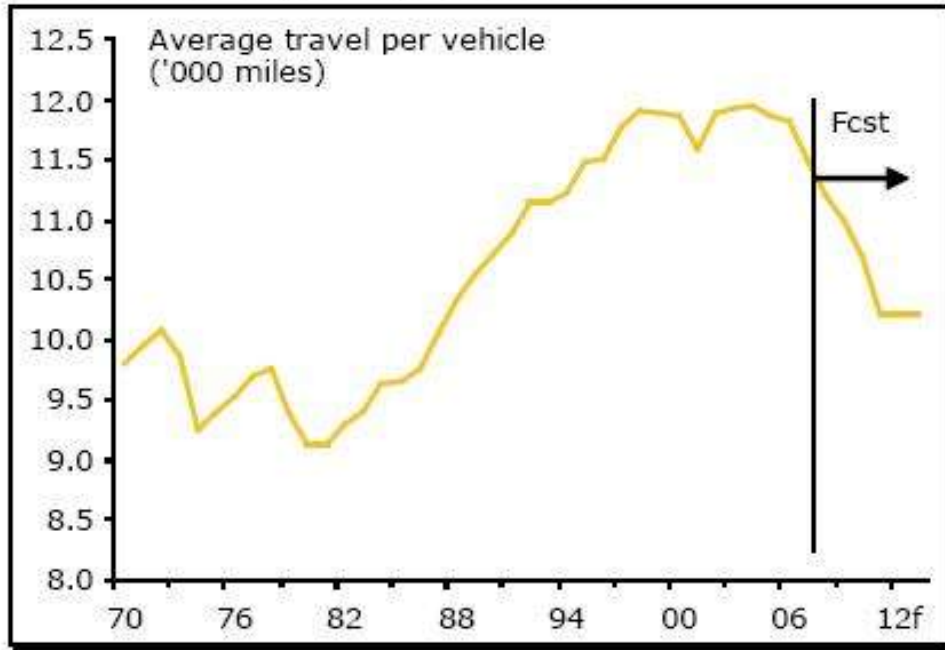


Chart 8

Americans Will Soon Drive Less



Source: Federal Highway Administration, CIBCWM

http://research.cibcwm.com/economic_public/download/sjun08.pdf

- Brookings report shows VMT decline since 2004.
- Dramatic increases in transit in US & Australian cities.
- Infrastructure Australia set up to fund major capacity increases.

Pass Kms on Australian city Transit

1997-2007 **25.4%**

2002-2007 **13.1%**

Population growth

1997-2007 **13.9%**

2002-2007 **7.0%**

Public transport patronage growth

	1997-2007	2002-2007
Sydney	2.7	1.4
Melbourne	32.6	17.3
Brisbane	40.9	38.3
Adelaide	8.5	11.1
Perth	39.6	19.2
Australia	16.9	10.8

Perth's rail revival began as a political movement in 1979



Opening of new Southern Railway
90% approval ratings and already paid off.
Carrying 50,000 per day cf 14,000 on buses.



**Perth Southern Rail runs down freeway
and other road reserves to outer
suburbs, 80kms. \$30 mill per km.**



Car dependent cities can begin to reclaim freeways through transit...



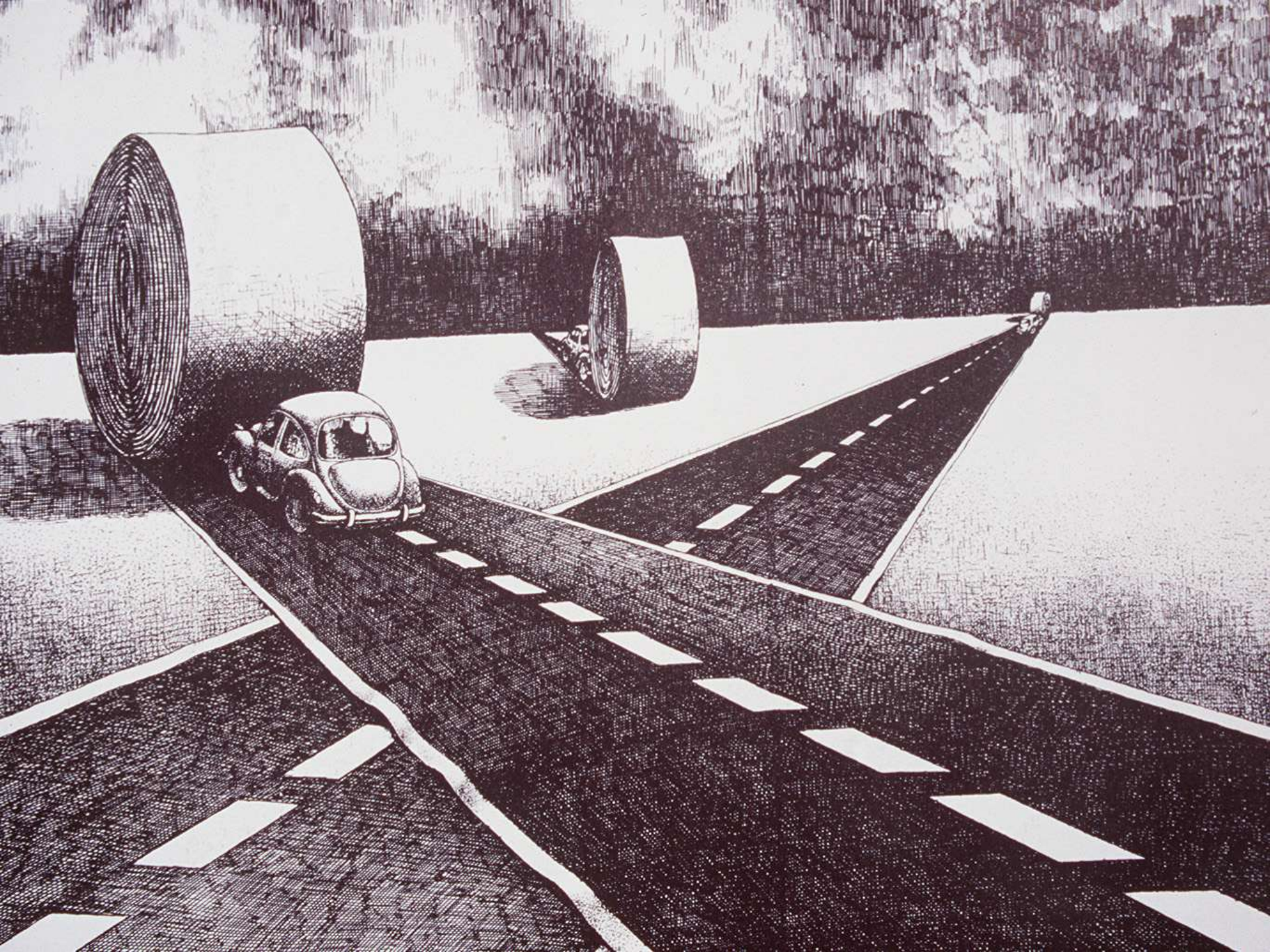




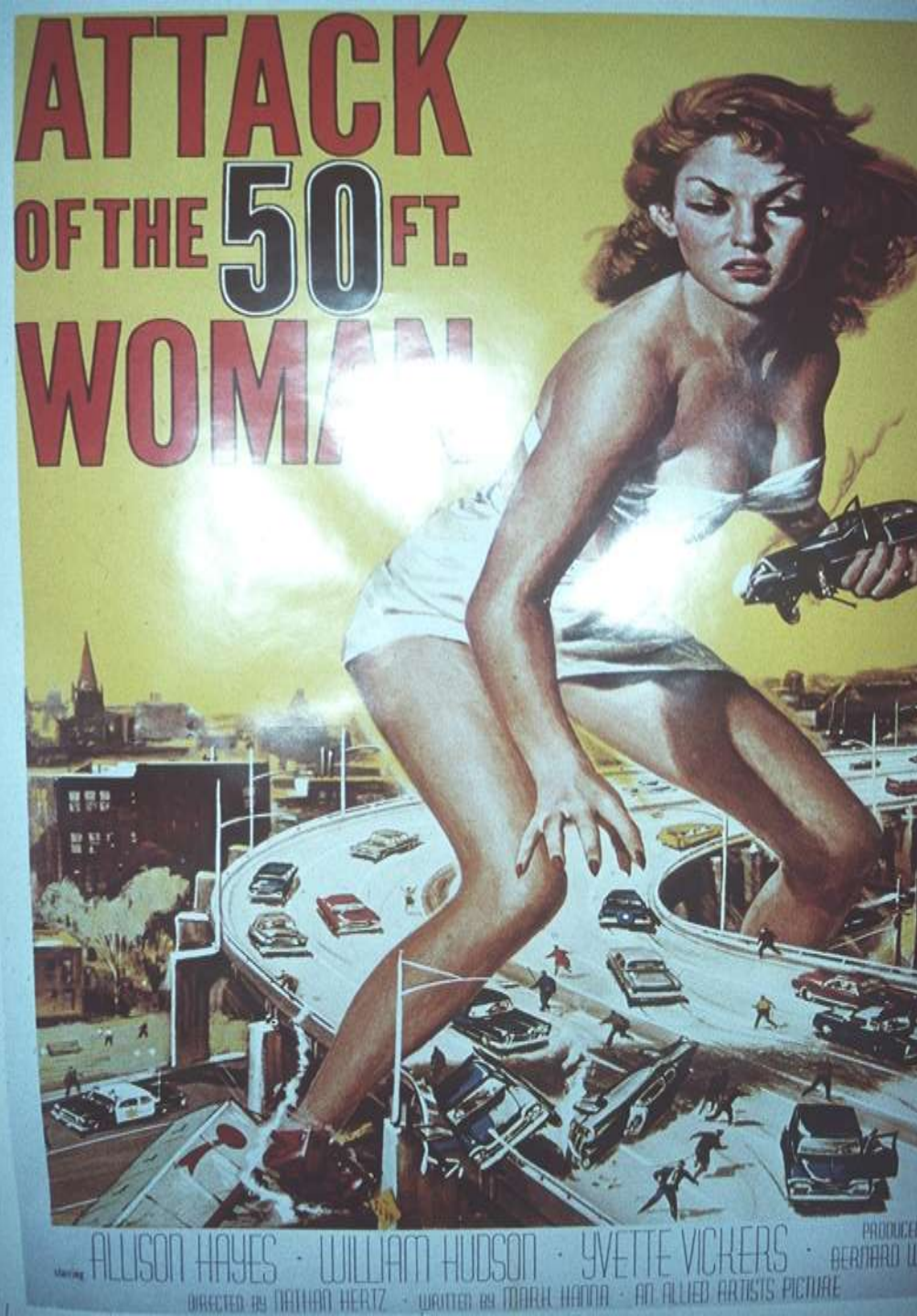
Houston, like many US cities, has a network of 180 miles of HOVs...

- Can they be converted to rail and increase their capacity by over ten times?
- Potentially cheap transit solution.
- Can build around and over freeway for a TOD.
- Reclaiming freeways as public space...





Political leadership
is everything...
Perth \$5 : \$1 on
roads : rail
reversed



Transit is driving move to TODs...

- People living in TODs have 50% less car use and save 20% of their household income due to one less car.
- Value retained in down times and good in up times.

PB PLACEMAKING...



Tysons Corner – three TODs replacing an Edge City car-based development





Perth 20 TODs... eg Esplanade Station





New TOD for
central Perth...
Or is it Dubai.



Subiaco TOD – value of land increased 5 times cf to non-rail areas.





ULTRADATA



Lifestyle Complex Coming Soon.

Register your interest today.
Call 9419 6222 or visit
www.thevillageatwellard.com.au



PEET
PROPERTY EXPERTS

THE VILLAGE AT
WELLARD





JOONDALUP
CENTRO

GRAND

BOAS

GRAN

313 30

13 13 30

Ally Bank

Ally Bank



Be seated before the train arrives at the platform.
Please do not stand on the edge of the platform.
Do not lean against the train or the platform.
Do not use mobile phones while on the train.
Do not drink or eat on the train.
Do not smoke on the train.
Do not use alcohol on the train.
Do not use drugs on the train.
Do not use weapons on the train.
Do not use firearms on the train.
Do not use explosives on the train.
Do not use incendiary devices on the train.
Do not use toxic substances on the train.
Do not use radioactive materials on the train.
Do not use biological weapons on the train.
Do not use chemical weapons on the train.
Do not use nuclear weapons on the train.
Do not use weapons of mass destruction on the train.

34
Down

Chatswood in Sydney built new station as part of a 'Value Transfer PPP'...



- Similarly Portland streetcar partnership





City of Vancouver in the 90's

31,000 fewer car trips per day.

107,000 more walk/bike trips per day.

**By 2006 30% of trips by walking (and cycling) -
doubled in 15 years....**

How did they do it?

Not by transport but by land use...



**Mostly by high rise residential estates
attractive to families.**

How is this done?

- High quality design requirements
- Requiring 15% social housing (either public or co-op housing)
- Requiring 5% of the value of a development to be *social infrastructure*...landscaped open space, public art, community centres, schools, arts facilities...

**An
example
Coal
Harbour**







New urban
fabric for the
post oil city –
tough life in
Coal
Harbour....





New lifestyle for the peak oil city - tough life on the '100 mile' menu...



2. Pedestrian Oriented Development and Bicycle Oriented Development

- Walkability makes cities competitive and sustainable.
- Bike schemes proliferating.
- Need to extend to every centre.



Jan Gehl the walkability magician...

GOP GIVES DEMS FLOOR ON CHENEY OUSTER p/04

Sports

The world's largest global newspaper

GMs claim no A-Rod interest
p/19



metr

NEW YORK • WEDNESDAY, NOVEMBER 7, 2007

Entertainment

Winter arts guide
p/12



In the news



Political donor probed in false identifications

Journalist There was a time when it paid to be friends with Mauricio Celis, who roamed up, down and across the state swagging trial lawyers and contributed generously to Democratic candidates, including Hillary Clinton. But now, Celis' friends are running for cover.

The luxury-loving Corpus Christi businessman is under investigation on suspicion of impersonating a lawyer and a sheriff's deputy.

The Republican state attorney general is suing Celis, claiming he has practiced law without a license.

Walk this way



"Every city I start working in says, 'This won't work here. People are more attached to their automobiles. And there's always a reason — it's too cold, it's too hot, it's too steep.'" Gehl said. But 10 years down the road, cities can't even remember how things were before. "If you want to change it back, people say no. They'll have a revolution."

Planner points city, groups toward an unclogged New York

ART ZIMMER
my.zimmer@metr.com

UPPER WEST SIDE Jan Gehl isn't a household name, but the 71-year-old Danish urban planner is the go-to person for cities looking to calm traffic and create more livable streets.

He's been working with the Dept. of Transportation to design streets that are safer, easier and more enjoyable for pedestrians and cyclists. But yesterday Gehl gave a media tour here for another project he's working on with the Upper West Side Streets Renaissance Campaign to make the neighborhood the most walkable and bike-friendly in the nation. "Everyone wants to have a more lively, attractive, healthy and sustainable city," Gehl said. New York has "traffic ideas that



A vision of a car-free Broadway from the Open Planning Project, one of the groups in the Upper West Side Streets Renaissance Campaign.

are 30 to 40 years old, that when there's a square meter, give it to the traffic."

The campaign wants New Yorkers to think about broadened sidewalks, protected bike lanes and a car-free Broadway.

Broadway "creates a lot of traffic problems because it crosses the avenues. One can wonder what is the role of Broadway?" asked Gehl.

He stopped photos of cars double-parked on 76th Street between Amsterdam and Columbus — avenues he envisions as Parisian boulevards with medians, benches and a canopy of trees.

"We noticed in New York, a number of parking meters, but there are many streets where it's free to park. One should be more careful with parking," Gehl said.

"It should cost a fortune because [avenues] are the best public space you have and you rent it out."

Burling Adler, president of the Columbus Avenue Business Improvement District, would like sidewalks with more greenery, bike racks, benches and even water fountains.

Will it happen?

"A lot of it depends on whether the DOT wants to have Columbus Avenue as a model," Adler said. Gehl would not comment on his work with the BICD, but his teams have been counting pedestrians.

"We look at places where people think they must stop here to look in a window, talk to a friend or sit on a bench," he said. "When they stop walking, [it] is a signal of good public space. In New York, it's about getting from A to B and not enjoying the space so much."

New York page C2

MTA readies for text alerts

Travel page 17

Your guide to York, U.K.

Voices page 10

Eltahawy: Thank you, Musharraf (yeah, right)

We work here

Explore exciting career opportunities, job growth and employment trends in a variety of exciting fields. Come see how we can prepare you to be a part of it.

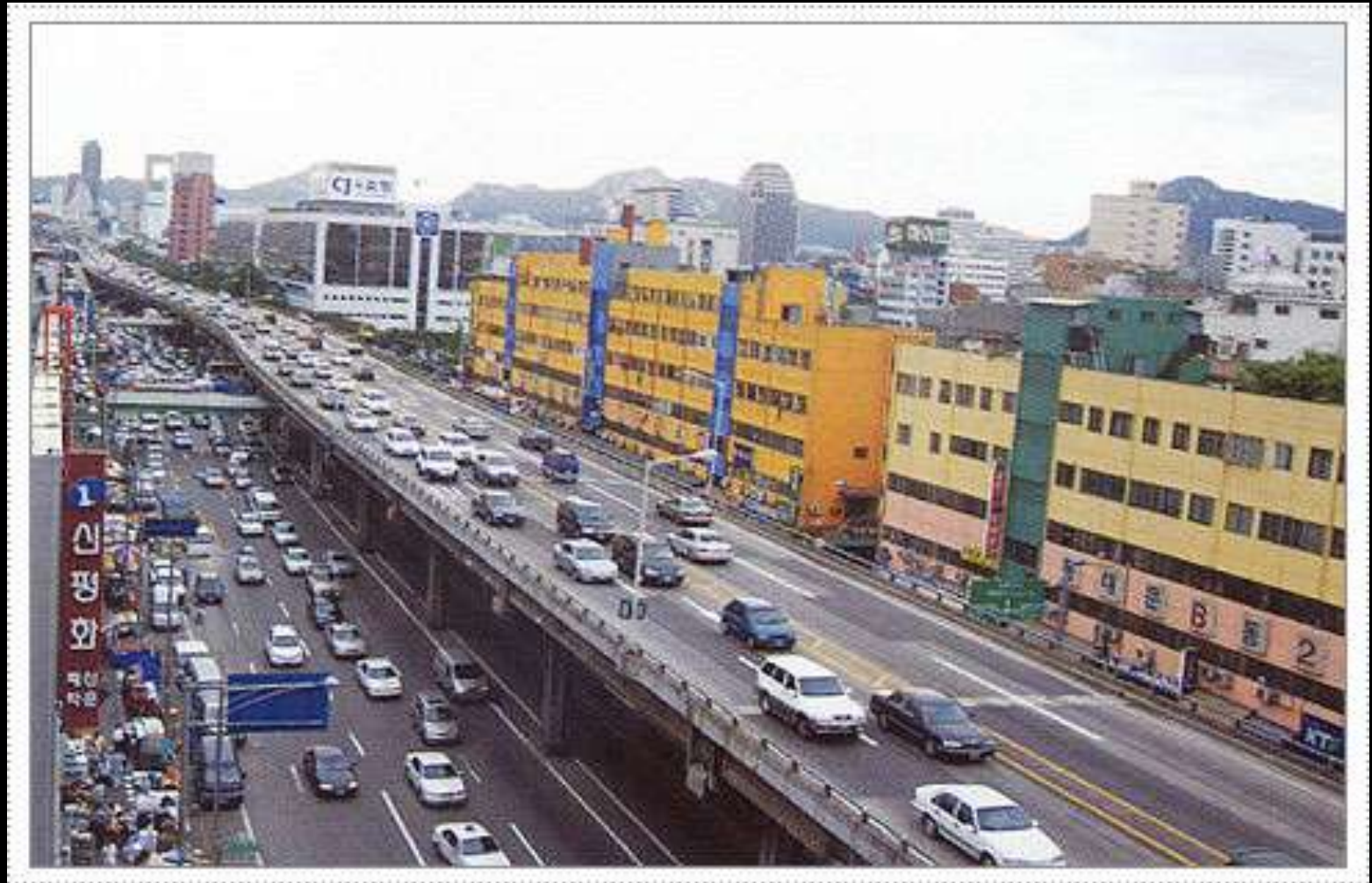
OPEN HOUSE
Undergraduate and Graduate Information Sessions
Tuesday, November 13th thru Friday, November 16th, 5pm-7pm
more@umccny.edu • 1 800 333 TRUMP ext. 5001 • 431 Canal St. 10th floor

METROPOLITAN COLLEGE OF NEW YORK



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/>)



The re-opening of Aarhus River 1996 - 1998







'Naked Streets' ...



'Complete Streets'....can remove freeways and create mobility corridors

- **Milwaukee - helped revive city center.**
- **San Francisco - Embarcadero now a tree lined boulevard suitable for all modes.**



Imagine the Possibilities



Transformation of a city...

Velib Paris
20,000 bikes at 1450 locations,
370 kms cycle lanes.



**Boulder - Vision of 30% sust modes –
so took 30% of transport budget.
Bicycle routes lace the town**





Boulder now a 'healthy' city

Copenhagen

30 year campaign to create people-oriented streets. Reduced car parking 2%/year





Copenhagen's contribution to the world....

- **Wealthy and resilient...**

2003 data shows j to wk:

bicycles 36%,

cars 27%,

transit 33%,

walking 5%.

Bikes up from 32% in 2001.

3. Green Oriented Development

- Ensure every new building and development is green.

Treasure Island Eco-City



The 'Governator' is demanding sustainability...



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



New York City - Green buildings and renewed transit with a Sustainability Plan to reduce 30% ghg by 2030



Millennium Towers



Freedom Tower



Bank of America Tower



The Solaire

No, its Seattle...

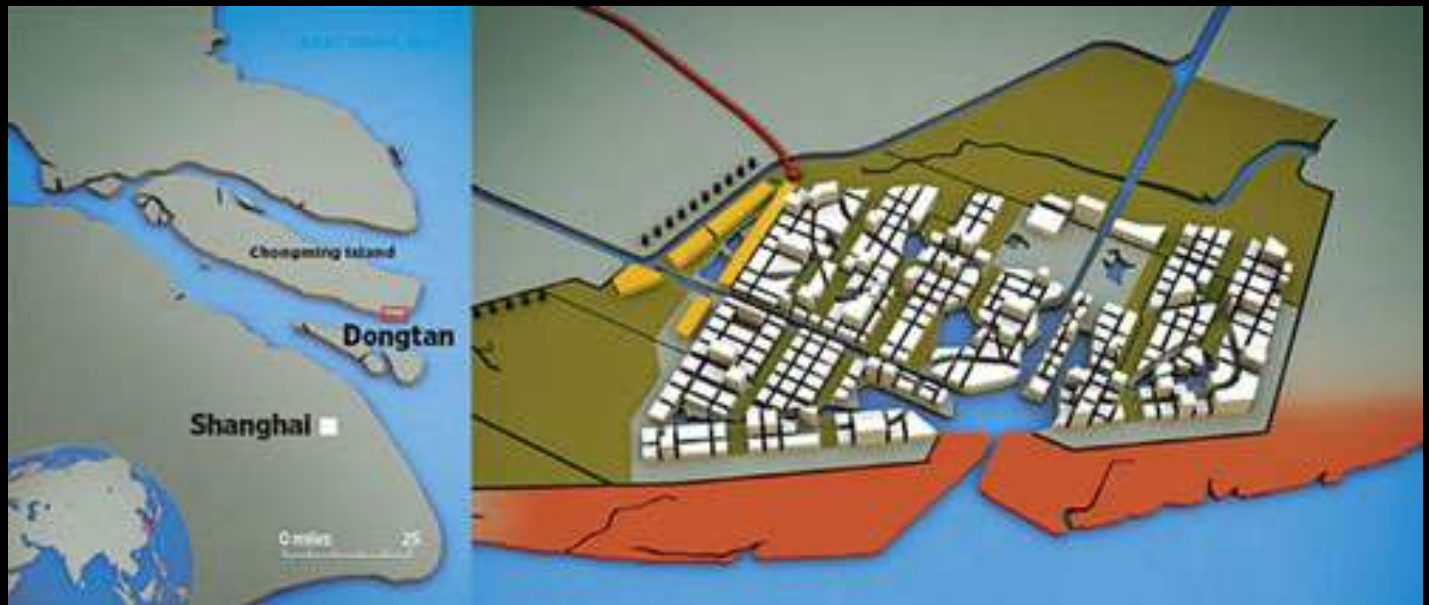




Rizhao Solar City, China

Dongtan

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



Masdar City

130MW Solar

20MW Wind

Geothermal heat pumps
for cooling



for further information:

Masdar
T +971 (0)2 698 8000
F +971 (0)2 698 8001
E info@masdar.ae
www.masdar.ae

Printed on recycled paper



Vauban

Car free; exports renewable power



Power Production as Urban Design



Vastra Hamnen, Malmö

Beddington Zero-Energy Development, London



30 The Bond, Australia's first 5 star green building



Photo by John Collings



CH2 the first 6 star building... Melbourne City Council, government leadership at its best...



Carbon neutral, mining the sewer for water recycling, healthy natural lighting, local materials...

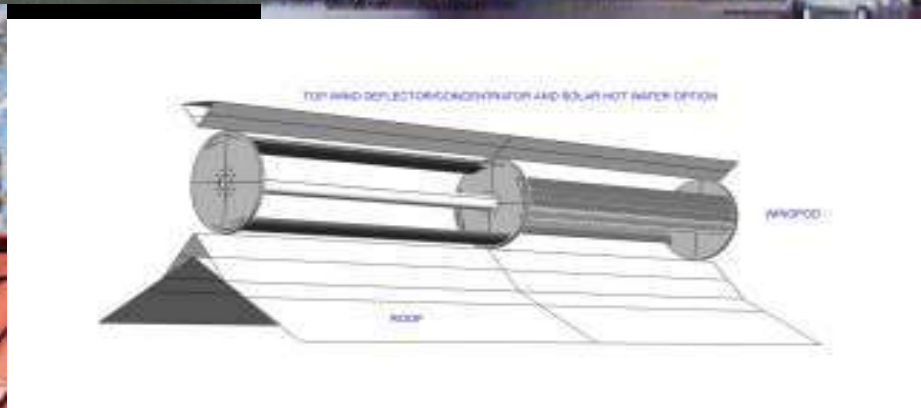
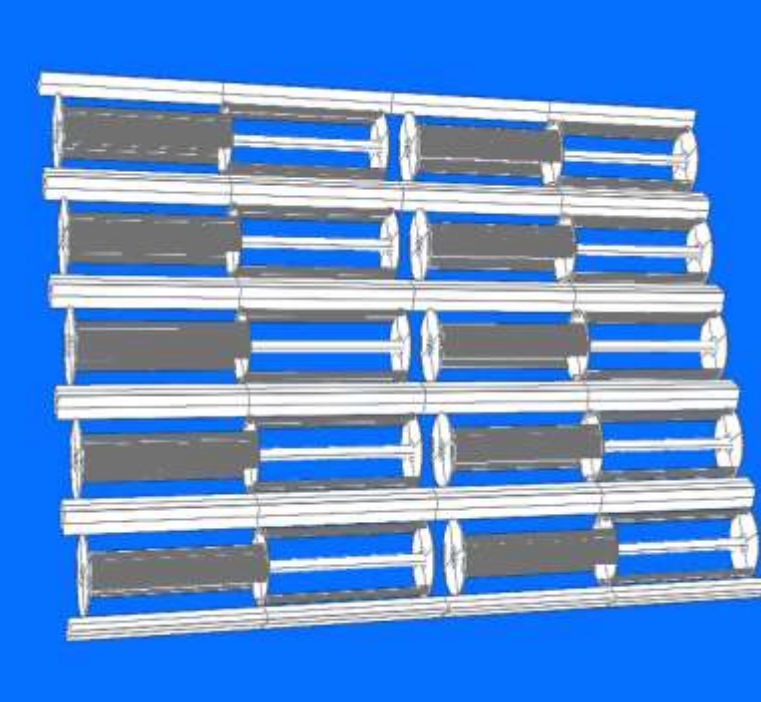
4. ELECTRIC VEHICLES

How to adapt to the other 50% of car use and move to 100% renewables
- at the same time.

- V2G and **PHEV** with a Smart Grid...
- Better Place project.



PV Solar growing at 40% per year



Roof mounted wind systems eg Windpods

How do you store renewables?



Link renewables into a Smart Grid *and store in electric vehicles* *(Li-Ion batteries)*



Can now make 100% renewable city...

Two way flow with electric vehicles provides the breakthrough for a resilient renewably-powered grid.

Israel, Denmark and three Australian cities starting.

'Renewable Transport'

www.sustainability.curtin.edu.au



North Port Quay - Perth
Carbon-free development based
on renewables, Smart Grid and
electric vehicles.

What about the fringe and the dying
middle suburbs?

5. Eco-villages colonising the fringe.



Ecovillages can be....

- Built with own water, power, sewerage infrastructure,
- Be relatively self sufficient in economy and transport
- Provide the social support in a village context many are looking for.



7. Travel demand management

Telepresence...live HD



TravelSmart





Don't know you get there that counts

TRAVEL SMART

- Creating a more resilient transport culture....

- Developed from German Werner Brog, applied first in Perth, then UK now US.....
- Individualised marketing based on *direct intervention with householders* receiving educational materials on alternatives to the car.
- Bikers and bus drivers become eco-coaches... 15% reductions found.

'Free range kids...' over 200 walking school buses in Auckland.





Vauban freedom...







What do we need?

- **Imagination** – Black Swans for sustainability.
- **Post Oil Strategies** for each area and region.
- **Partnerships...and investment in Post Oil demonstrations.** RC and GUDU stories...
- **HOPE in our cities**



www.resilientcitiesbook.org