

# **Urban Transportation: The Big Picture**

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**Director, Strategic Planning and Policy**

**TransLink**

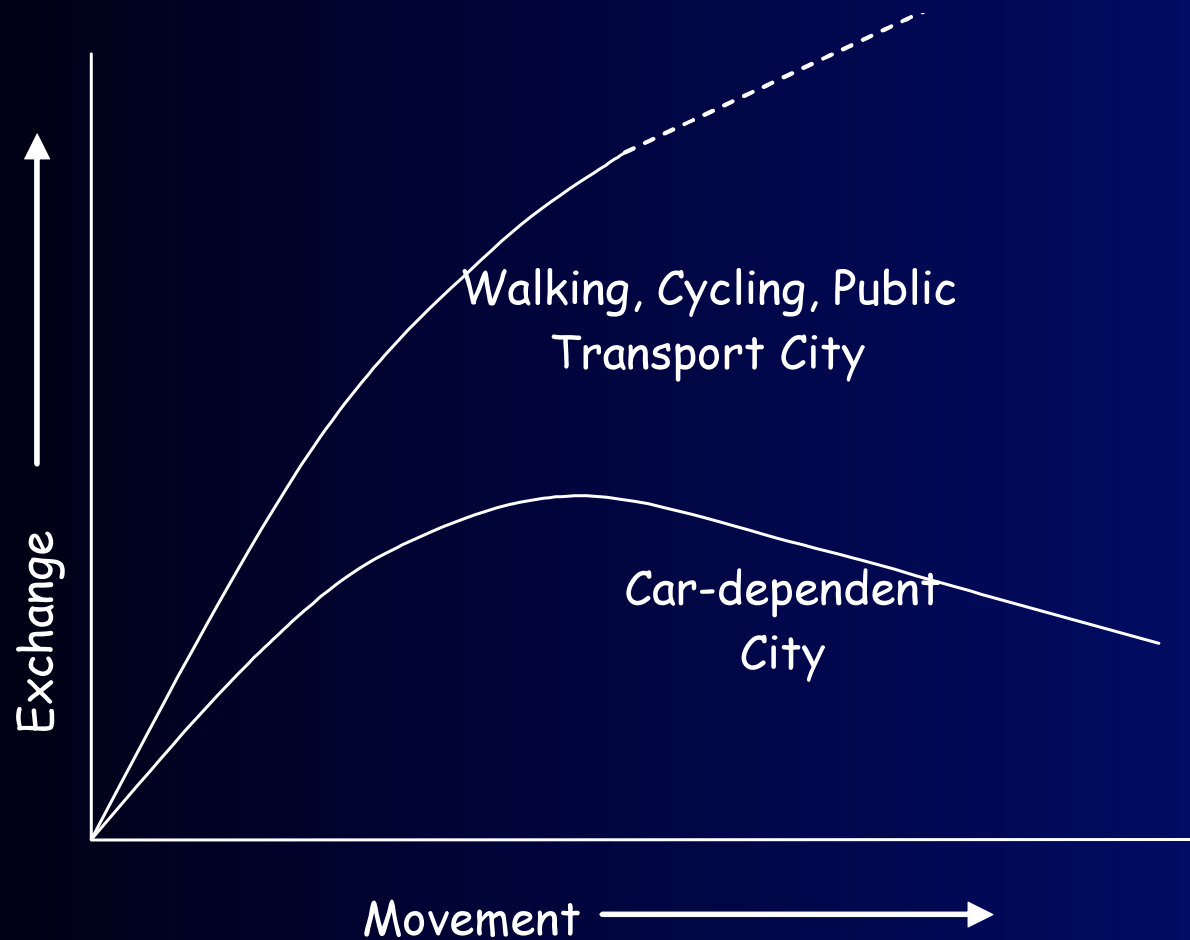
# What we'll talk about

- The Big Picture
  - Transportation's role in the city
  - Key Issues
  - Myths
- 6 Ds of Transit Oriented Communities



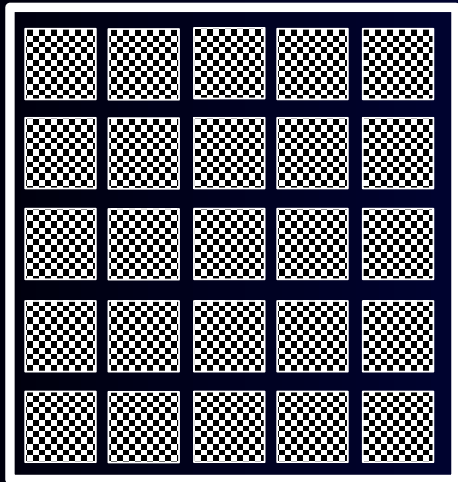
What did you just say?

# Access or Mobility?

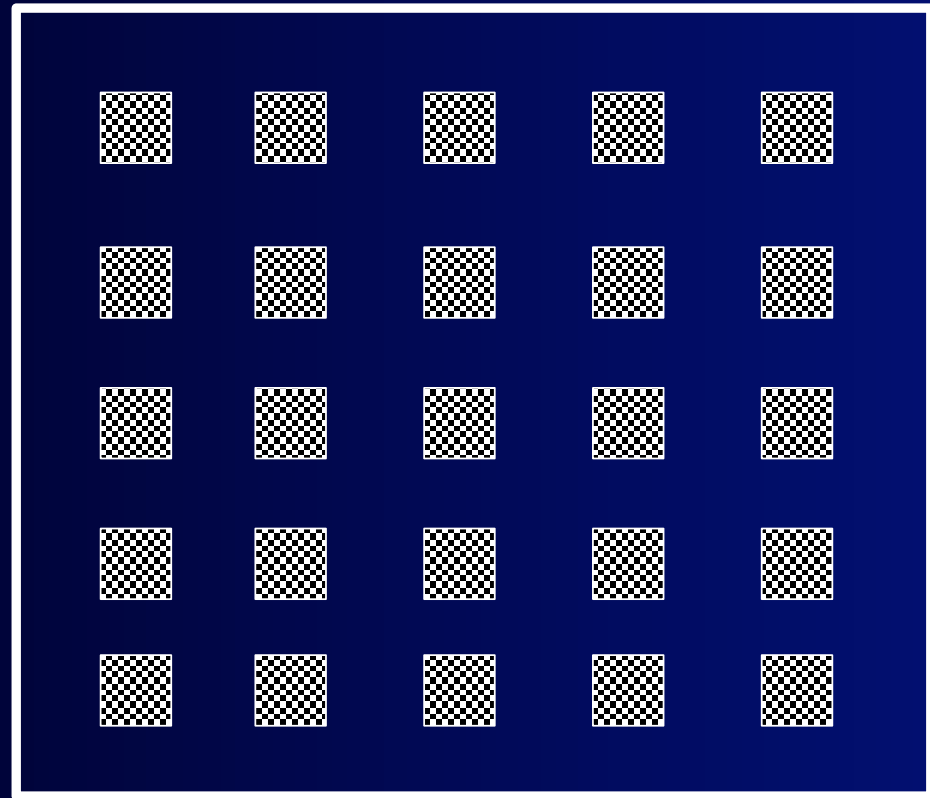


(Adapted from David Engwicht, 1993)



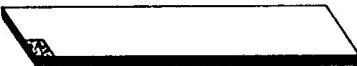









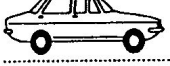


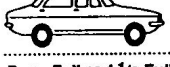






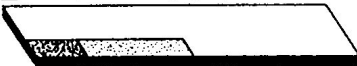










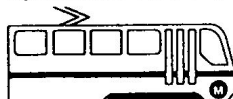




# Access City vs. Mobility City



**Walk Bike Transit**



**Automobiles**

Transport Mode	Speed	Space required per person
<b>Pedestrian</b> 		<b>0.8 M<sup>2</sup> per Person</b> 
<b>Cyclist</b> 		<b>3 M<sup>2</sup> per Person</b> 
<b>Fully Occupied Car</b> 		<b>6.2 M<sup>2</sup> per Person</b> 
<b>Fully Occupied Car</b> 		<b>20 M<sup>2</sup> per Person</b> 
<b>Car with 1 Person</b> 		<b>18.7 M<sup>2</sup> per Person</b> 
<b>Car with 1 Person</b> 		<b>60 M<sup>2</sup> per Person</b> 
<b>Bus - Full and 1/3 Full</b> 		<div> <div>  <b>3.1 M<sup>2</sup> per Person (full)</b> </div> <div>  <b>9.4 M<sup>2</sup> per Person (1/3full)</b> </div> </div> 
<b>Bus - Full and 1/3 Full</b> 		<div> <div>  <b>9.4 M<sup>2</sup> per Person (full)</b> </div> <div>  <b>28.1 M<sup>2</sup> per Person (1/3full)</b> </div> </div> 
<b>Light Rail/Metro - Full and 1/3 Full</b> 		<div> <div>  <b>1.5 M<sup>2</sup> per Person (full)</b> </div> <div>  <b>4.6 M<sup>2</sup> per Person (1/3full)</b> </div> </div> 
<b>Light Rail/Metro - Full and 1/3 Full</b> 		<div> <div>  <b>2.2 M<sup>2</sup> per Person (full)</b> </div> <div>  <b>6.9 M<sup>2</sup> per Person (1/3full)</b> </div> </div> 















































































# What's the problem with transportation?

In North America, typically auto dependence

- land use and transport conditions that leave people very few non-car options

Other city auto types

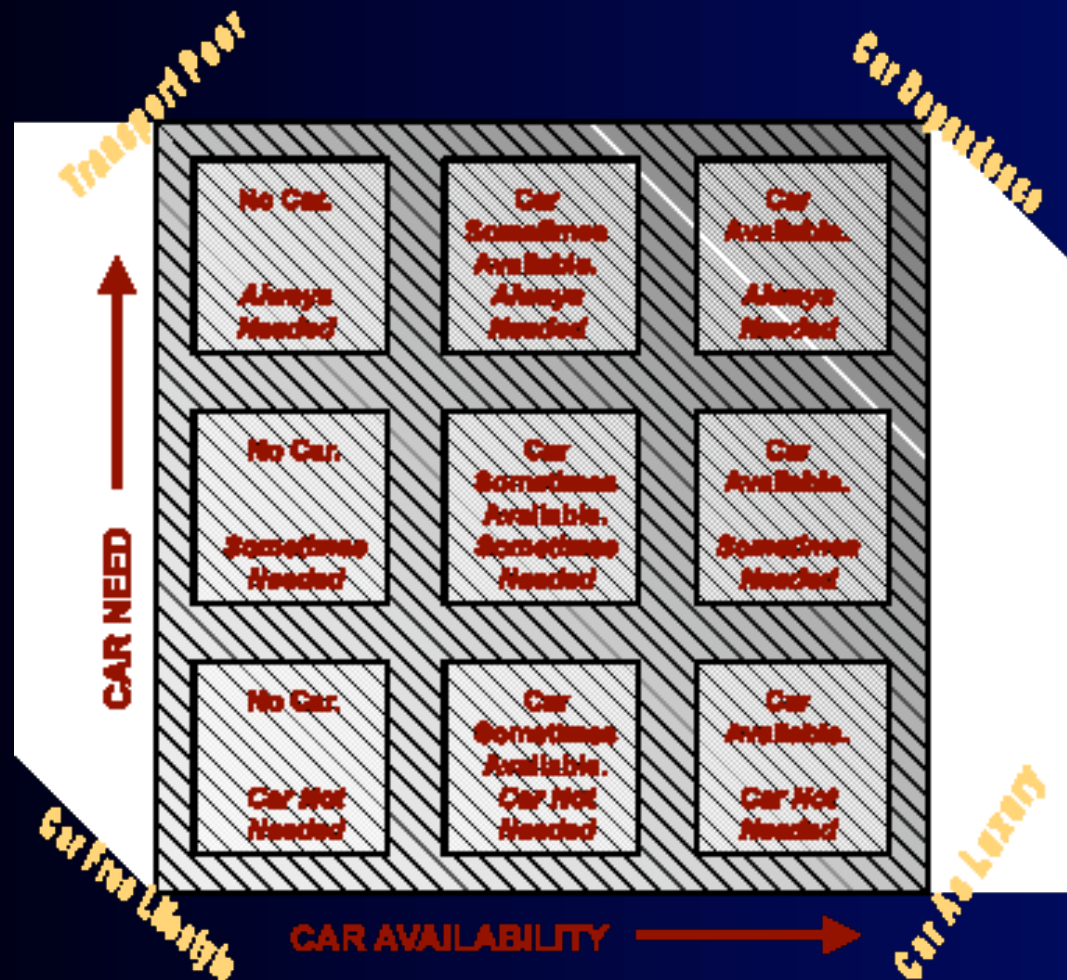
- traffic congested cities (e.g. London, Tokyo)
- traffic saturated cities (e.g. Bangkok, Mexico City)

Impacts

- Local and global environment
- Economy
- Livability
- Equity



# Degrees of Dependence



(Adapted from Pharoah, 1998)



Freedom to Choose?





Choice...





# Causes of Car Dependence

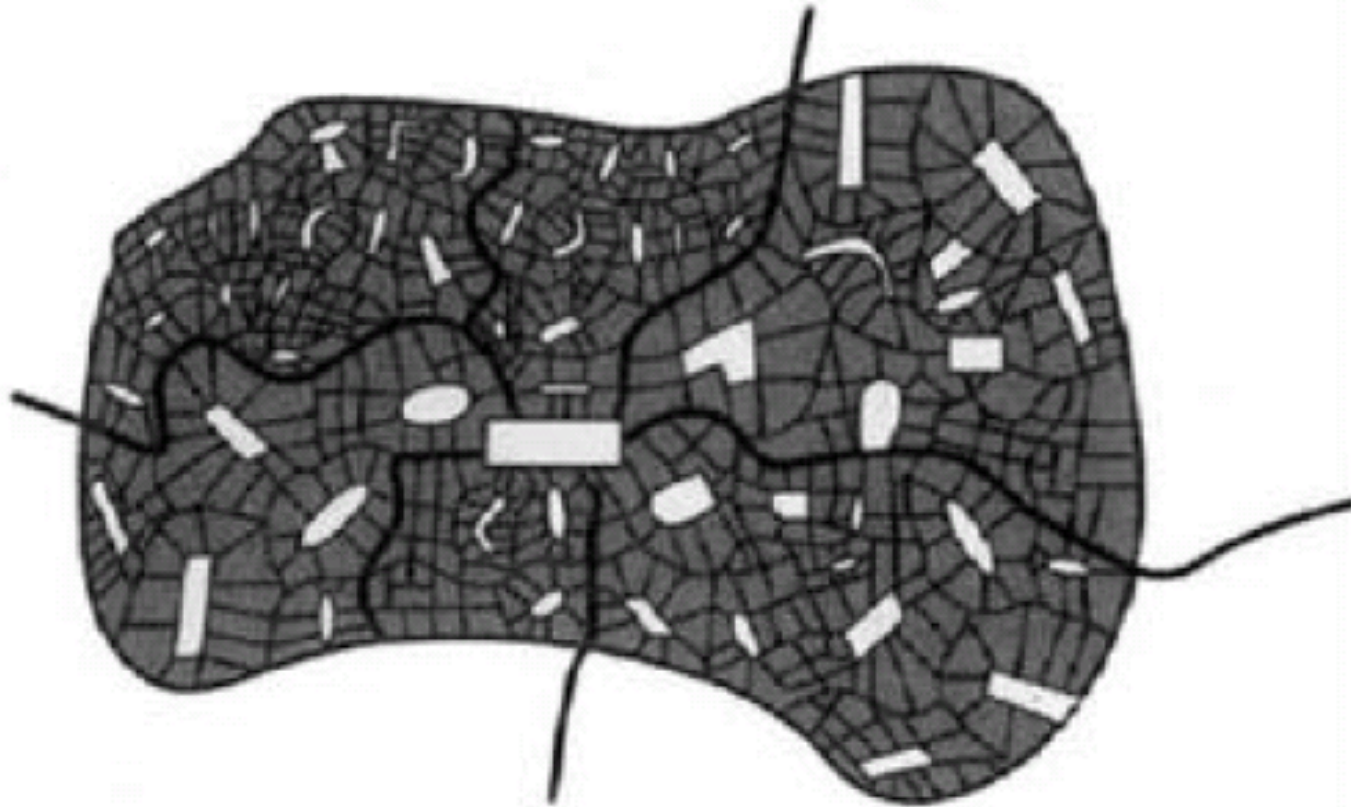
- Sprawl: proliferation of low density, single use, non-integrated suburbs
- Road building: freeways, arterials, left turn bays
- Transit decline: increased subsidies, decreased service and viability
- Subsidies: homes, hard infrastructure, soft infrastructure
- Degradation of public space: aesthetics, safety, less walk & cycle
- Community severance/barrier effects: roads, traffic domination
- Subsidized parking: cheap or free



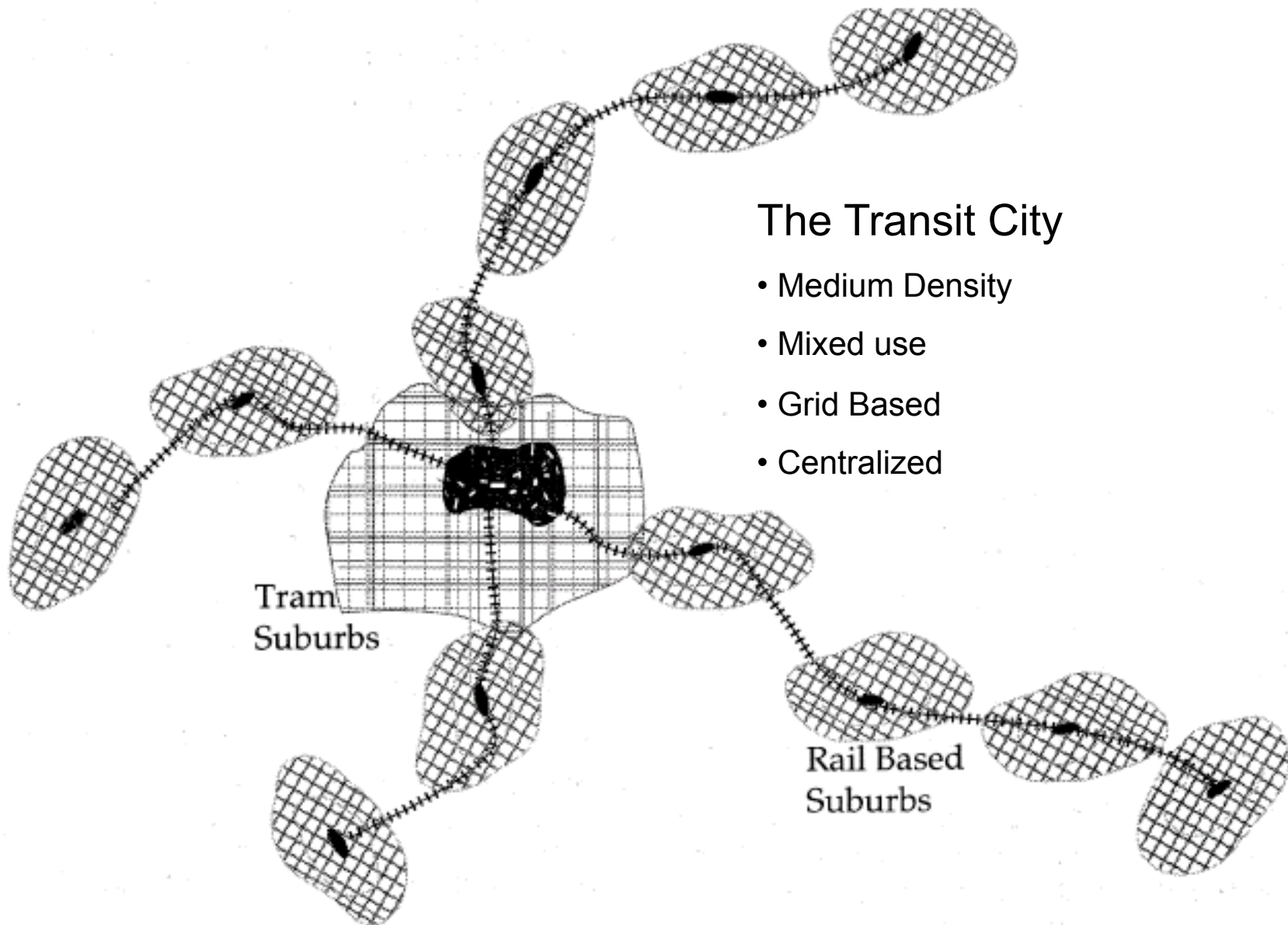


## Traditional Walking City

- High density
- Mixed use
- Organic



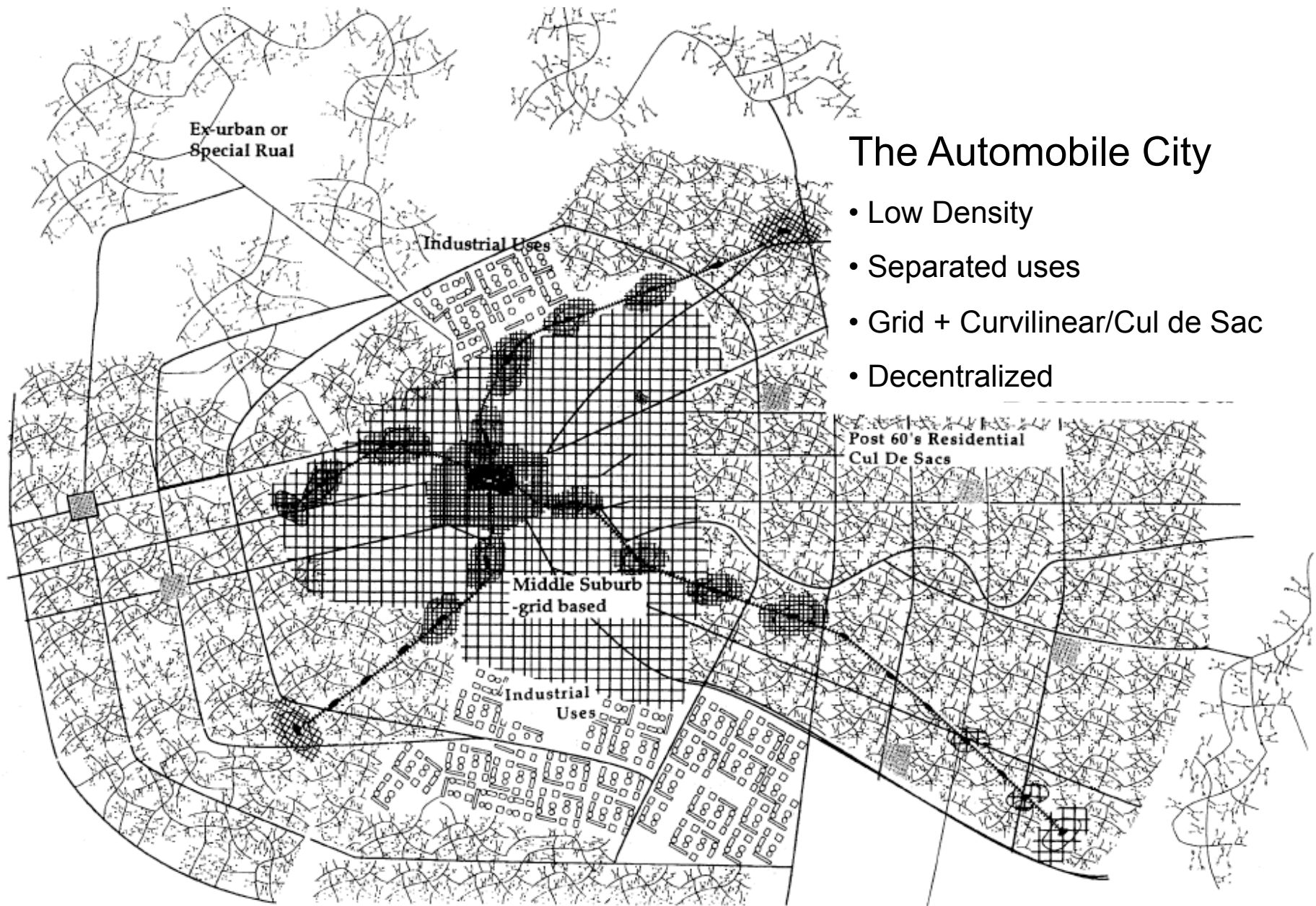




## The Transit City

- Medium Density
- Mixed use
- Grid Based
- Centralized





## The Automobile City

- Low Density
- Separated uses
- Grid + Curvilinear/Cul de Sac
- Decentralized





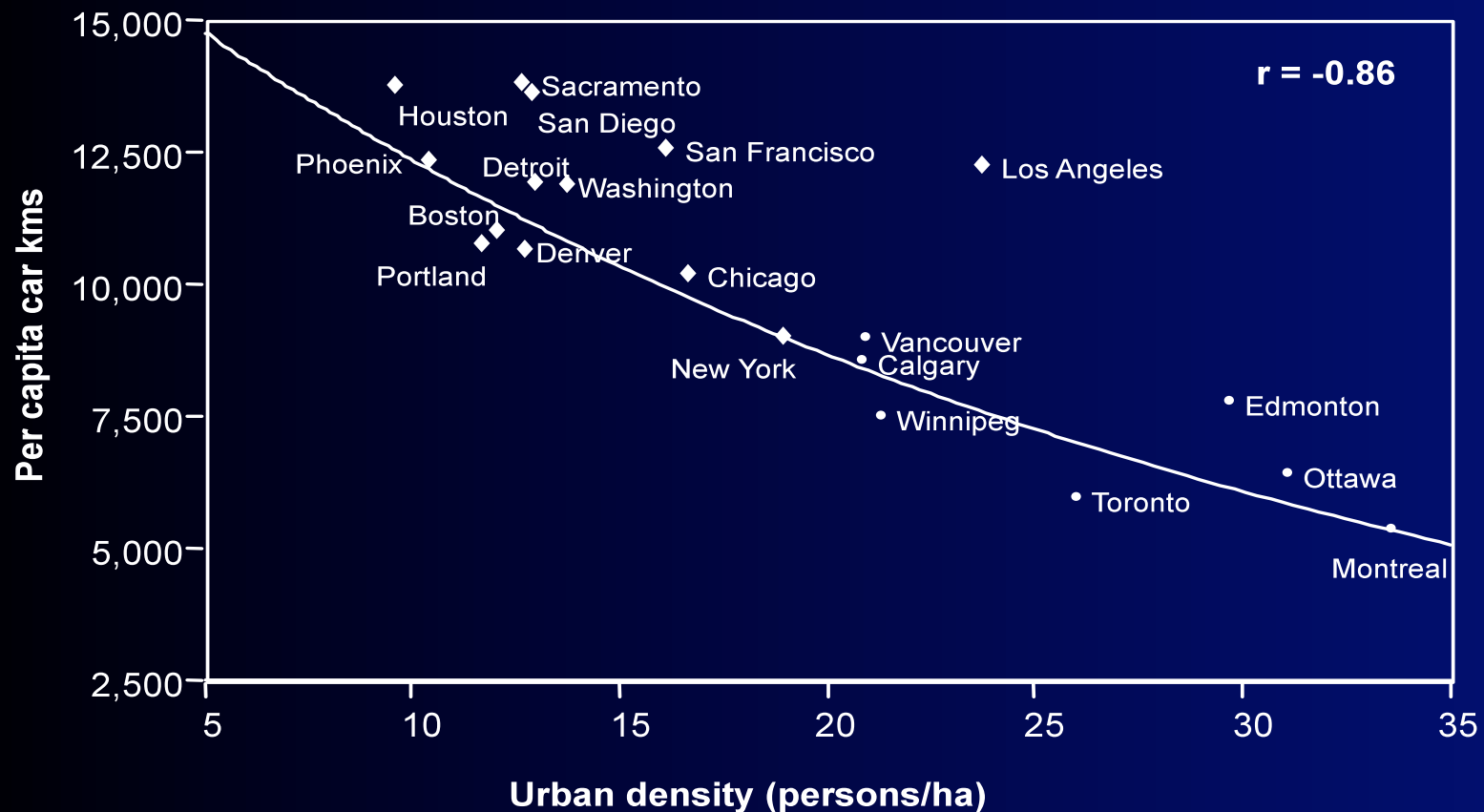






# Density and Car Use

## VKT/capita in Canadian and U.S. cities





# Automobile Dependence Feedback

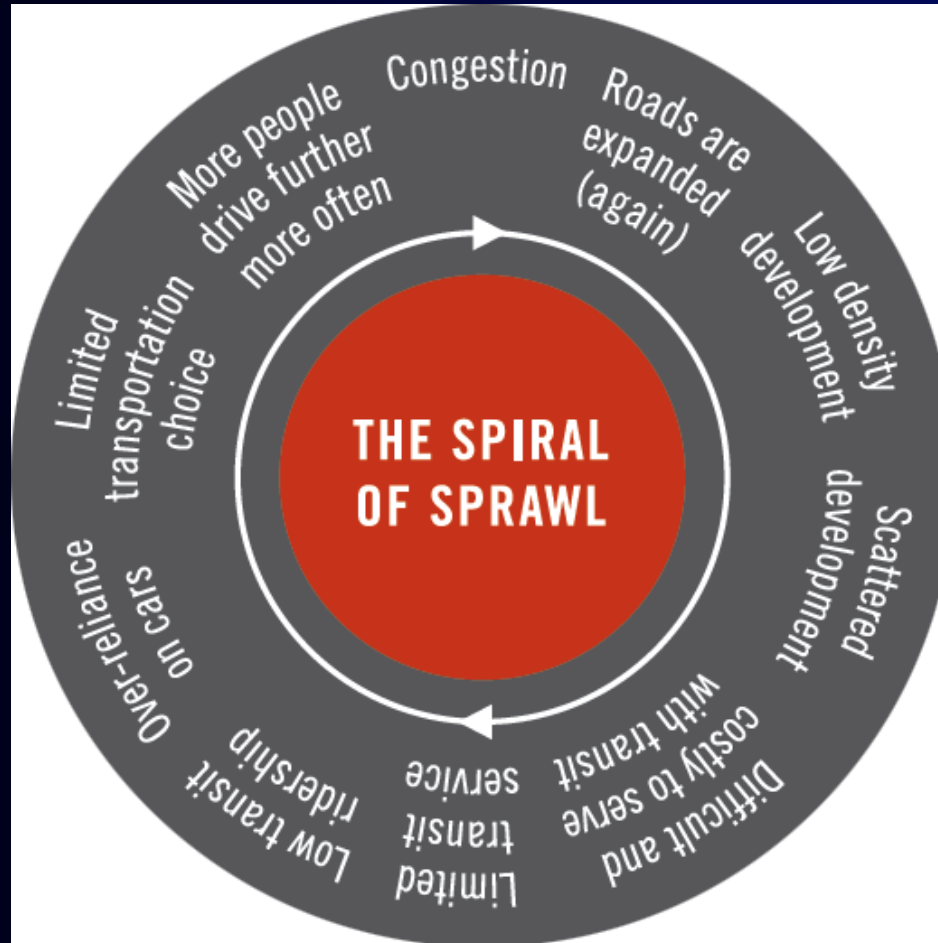
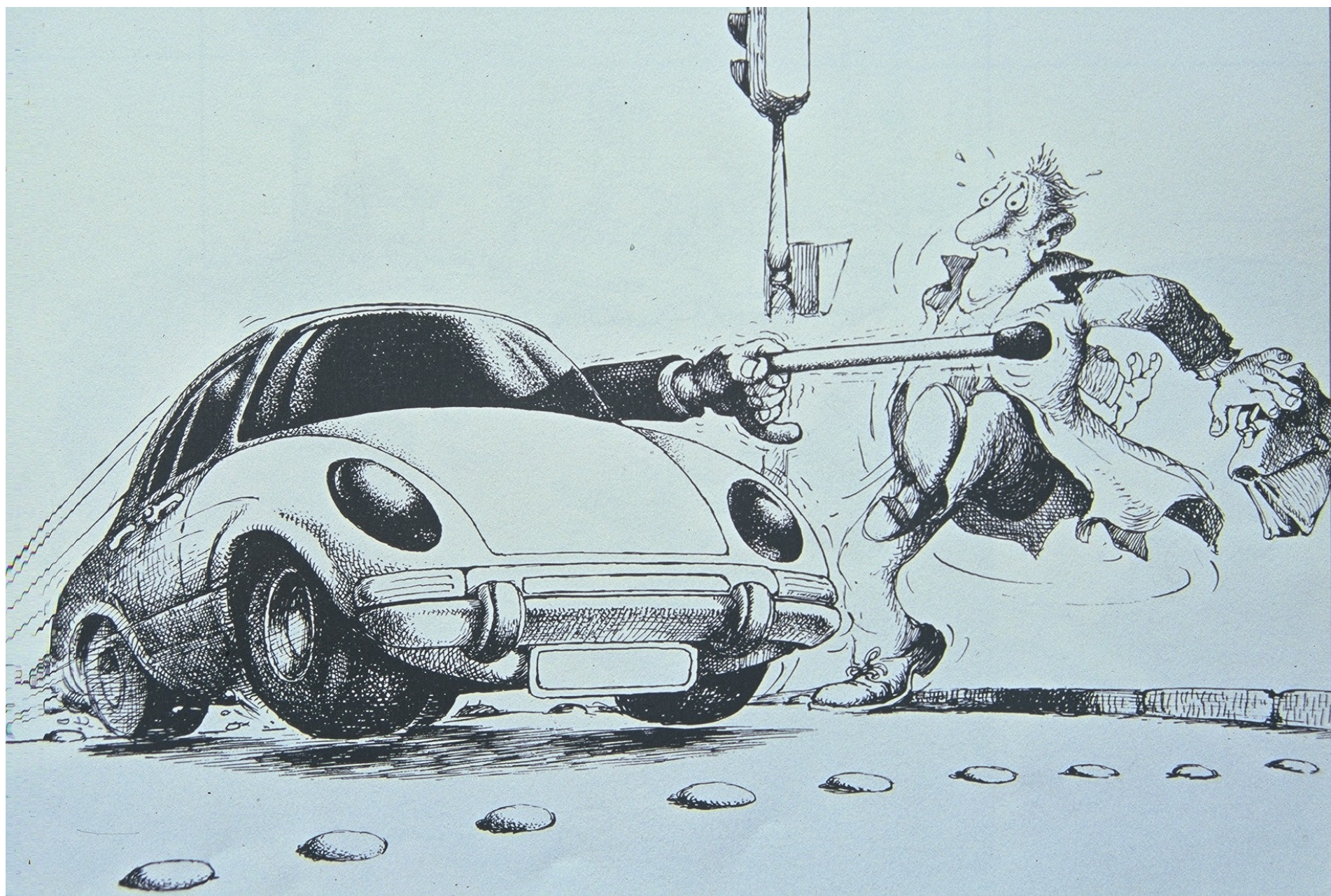


Image: City of Burnaby















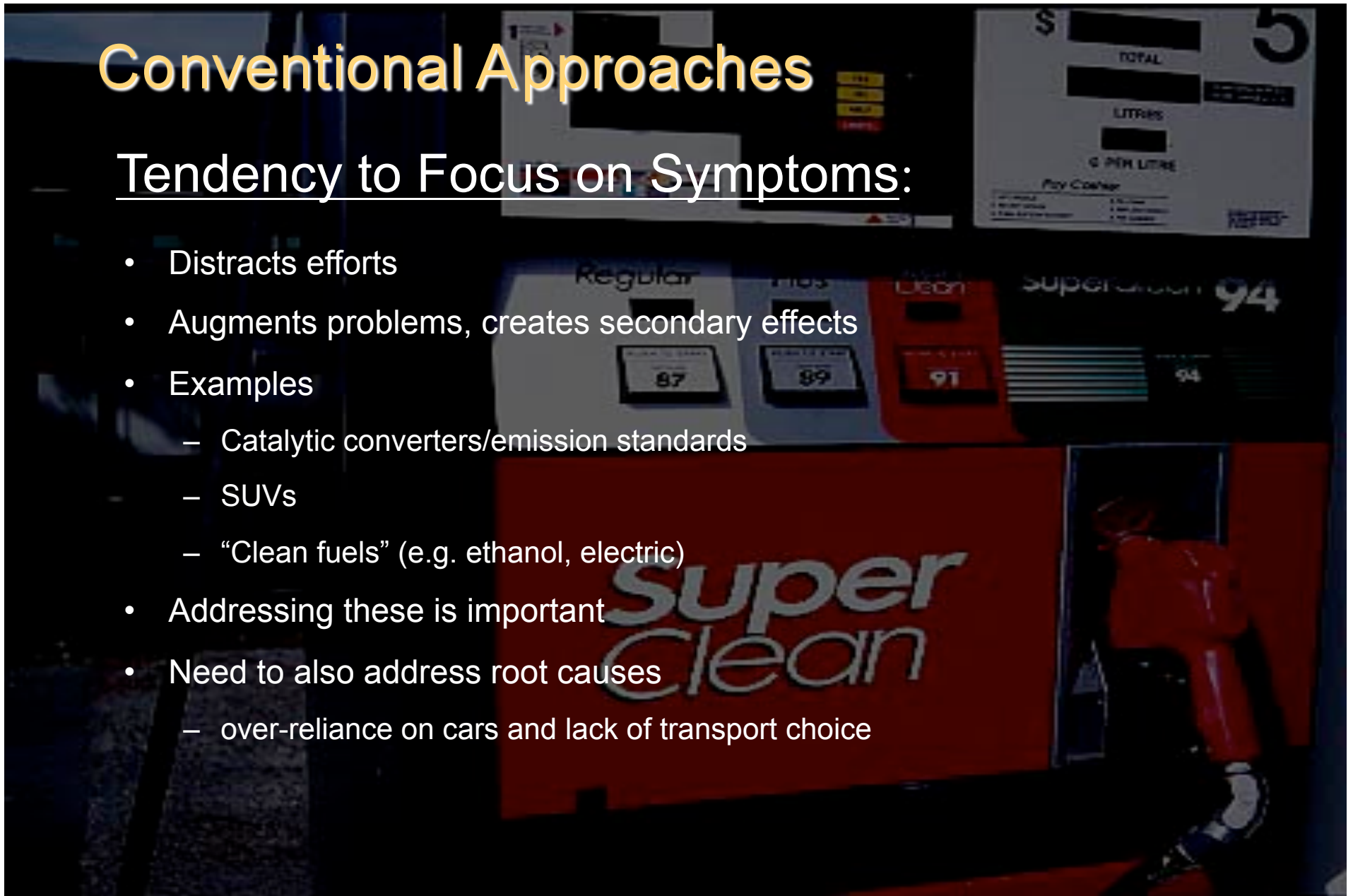




# Conventional Approaches

## Tendency to Focus on Symptoms:

- Distracts efforts
- Augments problems, creates secondary effects
- Examples
  - Catalytic converters/emission standards
  - SUVs
  - “Clean fuels” (e.g. ethanol, electric)
- Addressing these is important
- Need to also address root causes
  - over-reliance on cars and lack of transport choice









APPROVED AUTO  
REPAIR SERVICES



AirCare®  
Repair Centre

NEON PRODUCTS LTD



# Transportation Impacts



# Cars Are Convenient

## Private Vehicle

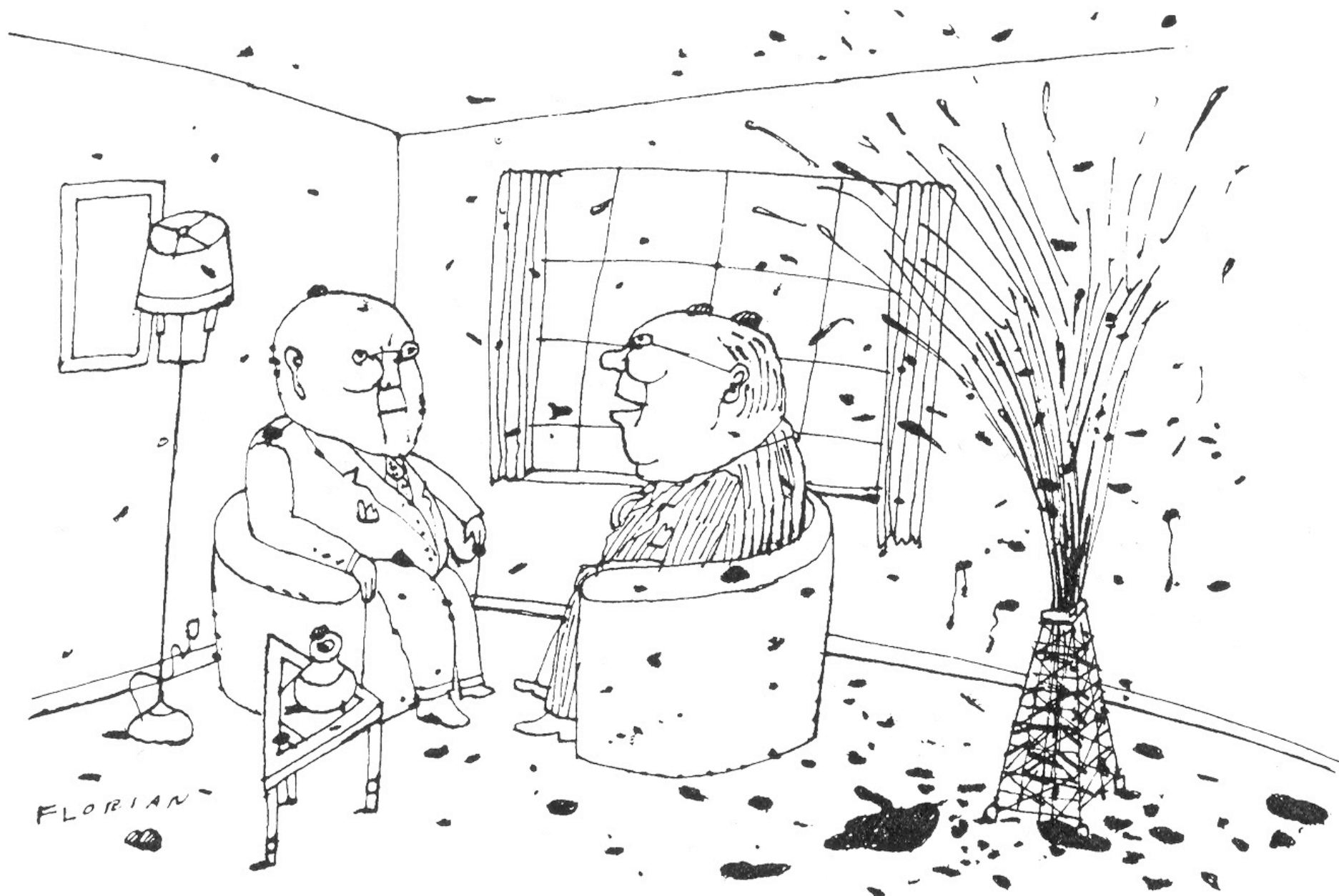
- Ready when you are
- Private and seen as safe
- Convenient
- Comfortable
- Cost of each trip not visible

## Transit

- Captive to schedule
- Less private
- May be less convenient
- Lower comfort
- Fare paid each trip

*Transit can be made more attractive*



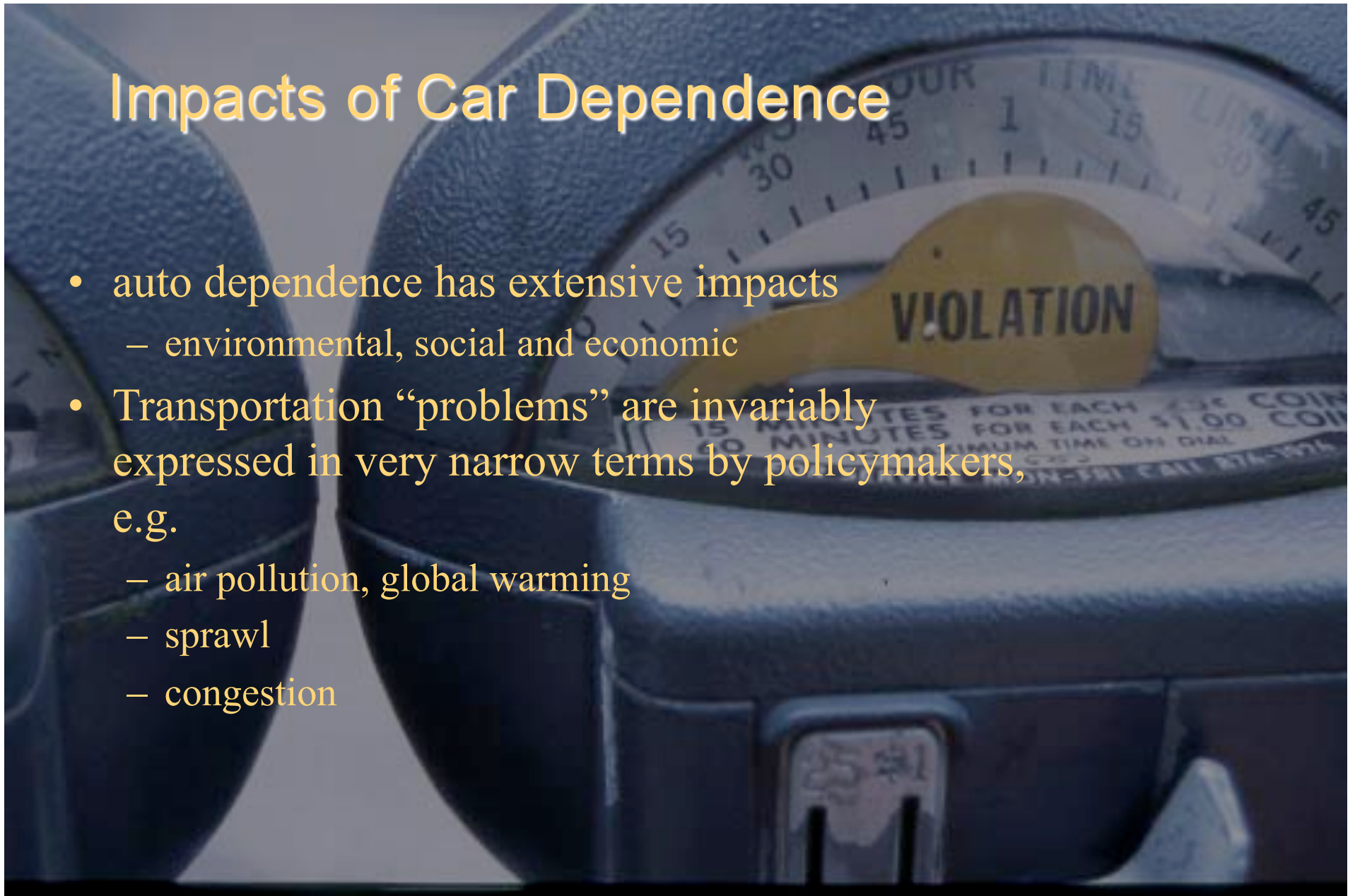


*"It's a mixed blessing."*



# Impacts of Car Dependence

- auto dependence has extensive impacts
  - environmental, social and economic
- Transportation “problems” are invariably expressed in very narrow terms by policymakers, e.g.
  - air pollution, global warming
  - sprawl
  - congestion





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Page last updated at 02:18 GMT, Tuesday, 10 March 2009

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## 'More bad news' on climate change

Matt McGrath

BBC environment reporter

**More bad news on climate change is expected as more than 2,000 climate scientists gather in Copenhagen.**

They will be trying to pull together the latest research on global warming ahead of political negotiations later in the year.

The scientists are concerned that the 2007 reports of the Intergovernmental Panel on Climate Change (IPCC) are already out of date.

Their data suggests greater rises in sea levels this century.

For the scientists gathering in the Danish capital, this meeting is about removing as much wriggle room as possible from the political negotiations on a new global climate treaty taking place in December.

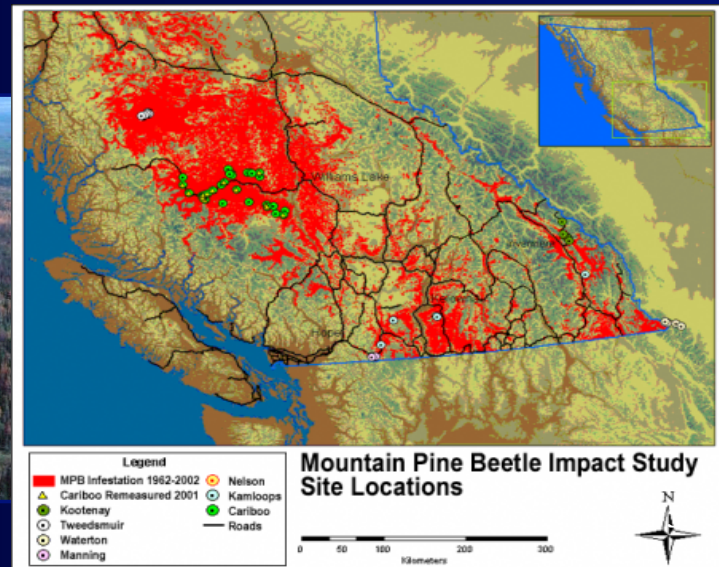
While the IPCC reports of 2007 were praised for their recognition of the causes of global warming, the slow, consensus-based nature of the process, meant more recent data was not included.



AFP

Scientists will present the most recent data on sea level rise

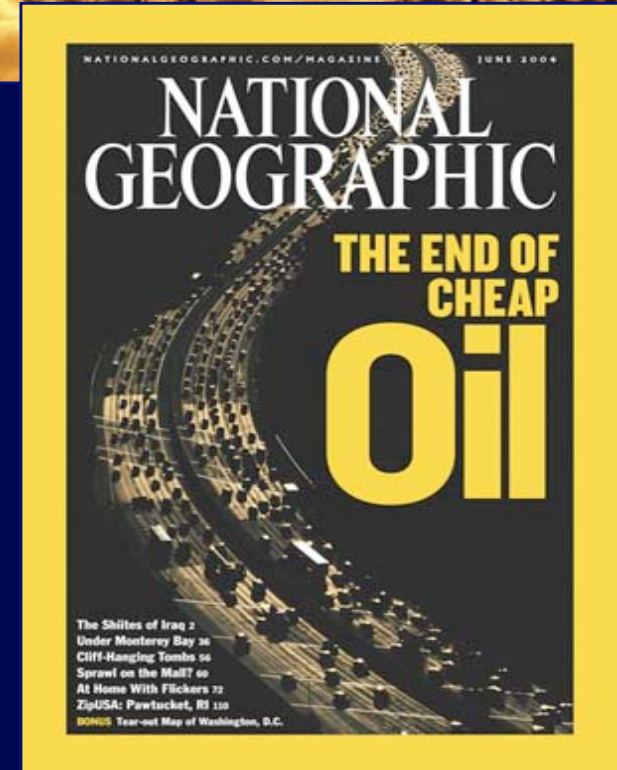
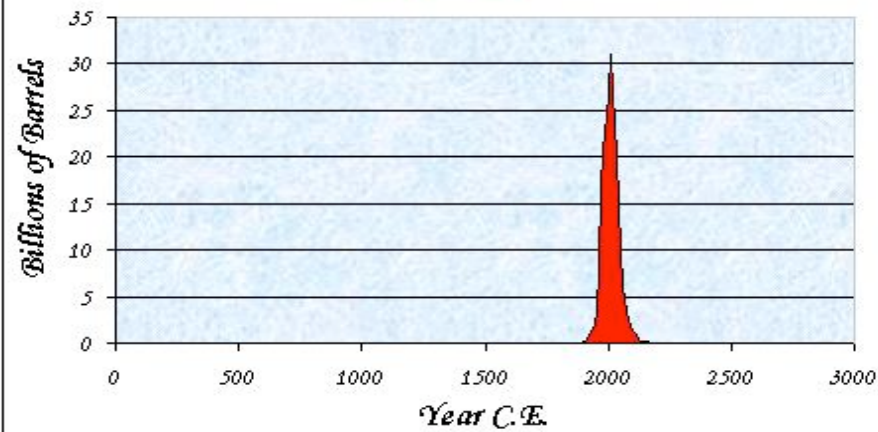




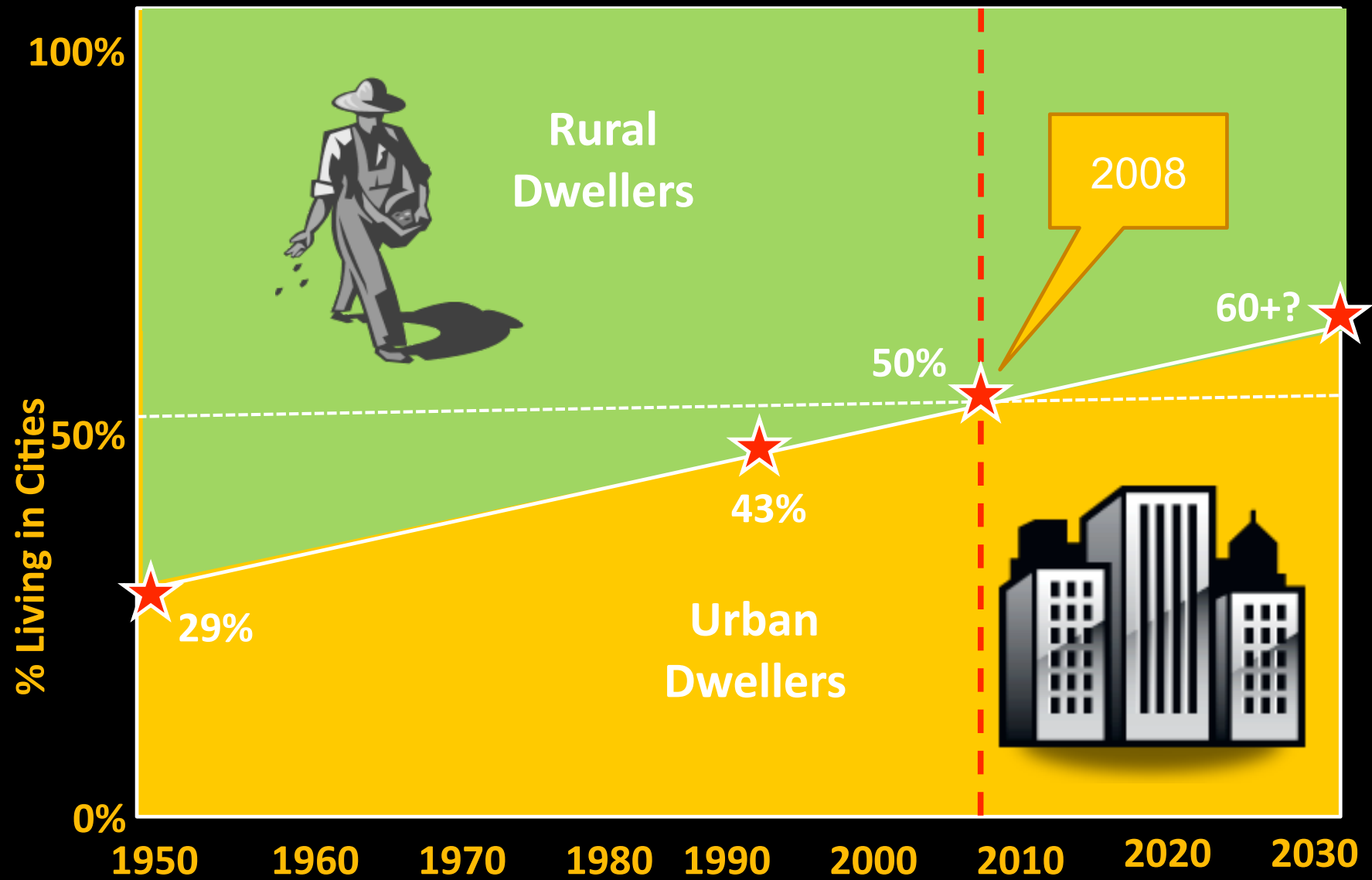




## *The Age of Oil*





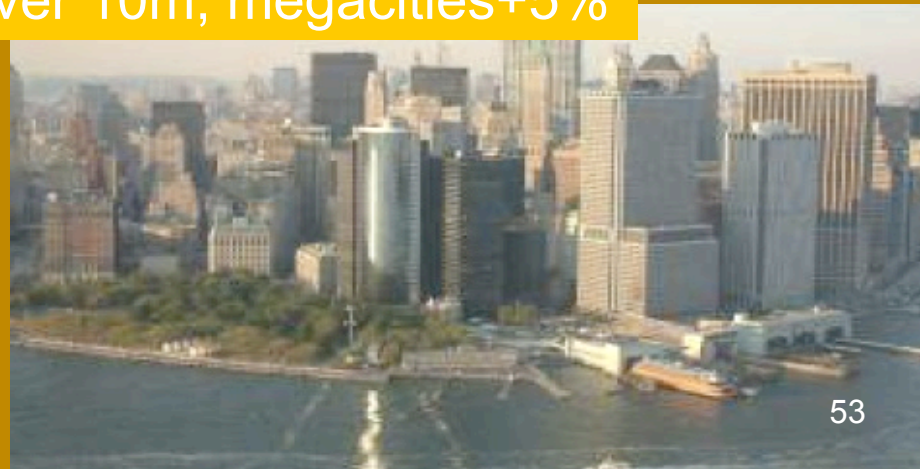




## Scale and Size



400 Over 1m, 23 over 10m, megacities+5%





# Introducing the Nano



- \$2,000
- 500 kg
- 3.8 L/100km







**Sao Paulo**

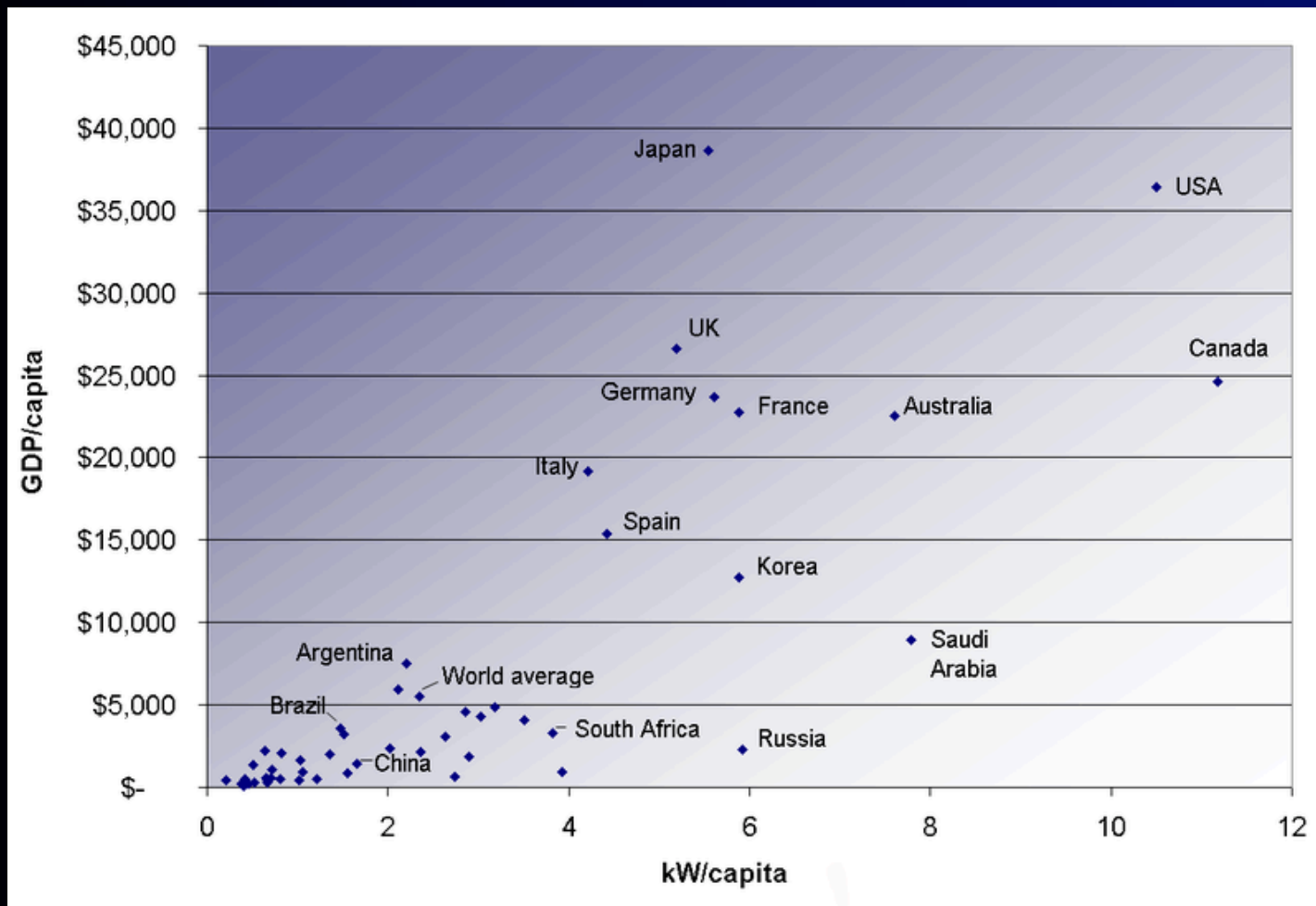
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**Australia**



# Where's the problem?





# Where's the problem?

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## Copenhagen climate summit

December 7-18

### Canada's image lies in tatters. It is now to climate what Japan is to whaling

The tar barons have held the nation to ransom. This thuggish petro-state is today the greatest obstacle to a deal in Copenhagen



**George Monbiot**

[guardian.co.uk](http://guardian.co.uk), Monday 30 November 2009 19.30 GMT

[Article history](#)

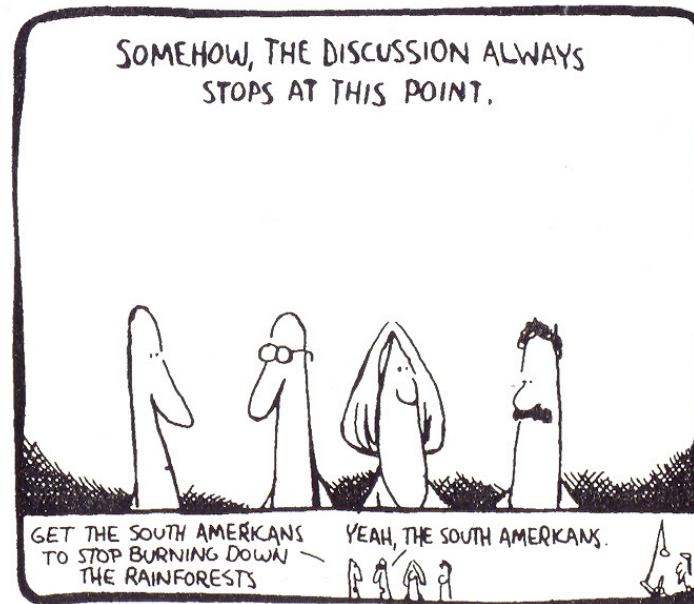
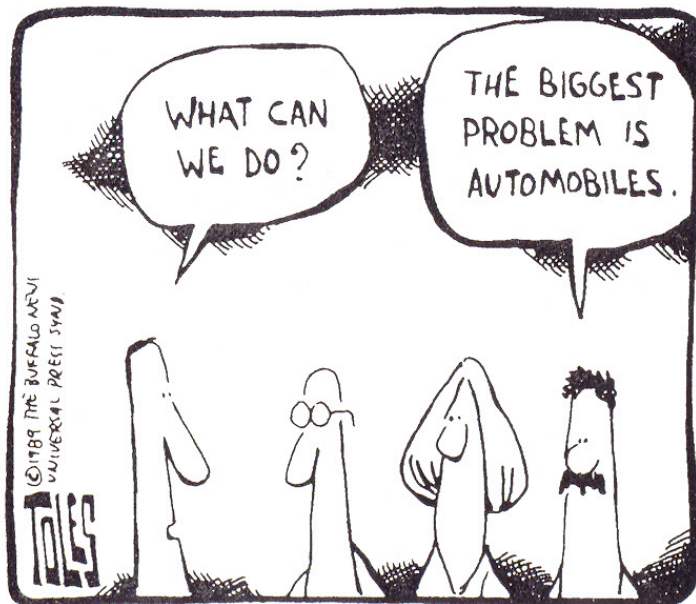
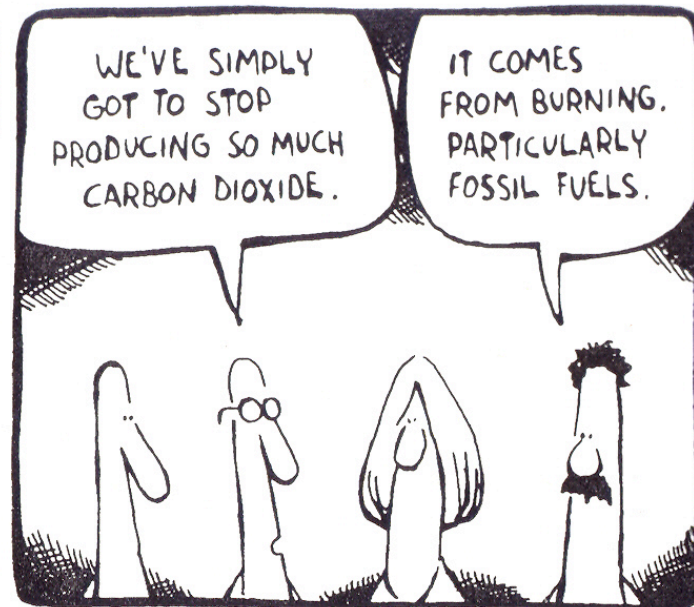


Syncrude Oil Sands, Mine and Refinery, the world's largest oil sand operation producing crude oil at Fort McMurray, Alberta, Canada, October 20, 2001.

Photograph: Greg Smith/Corbis

When you think of Canada, which qualities come to mind? The world's peacekeeper, the friendly nation, a liberal counterweight to the harsher



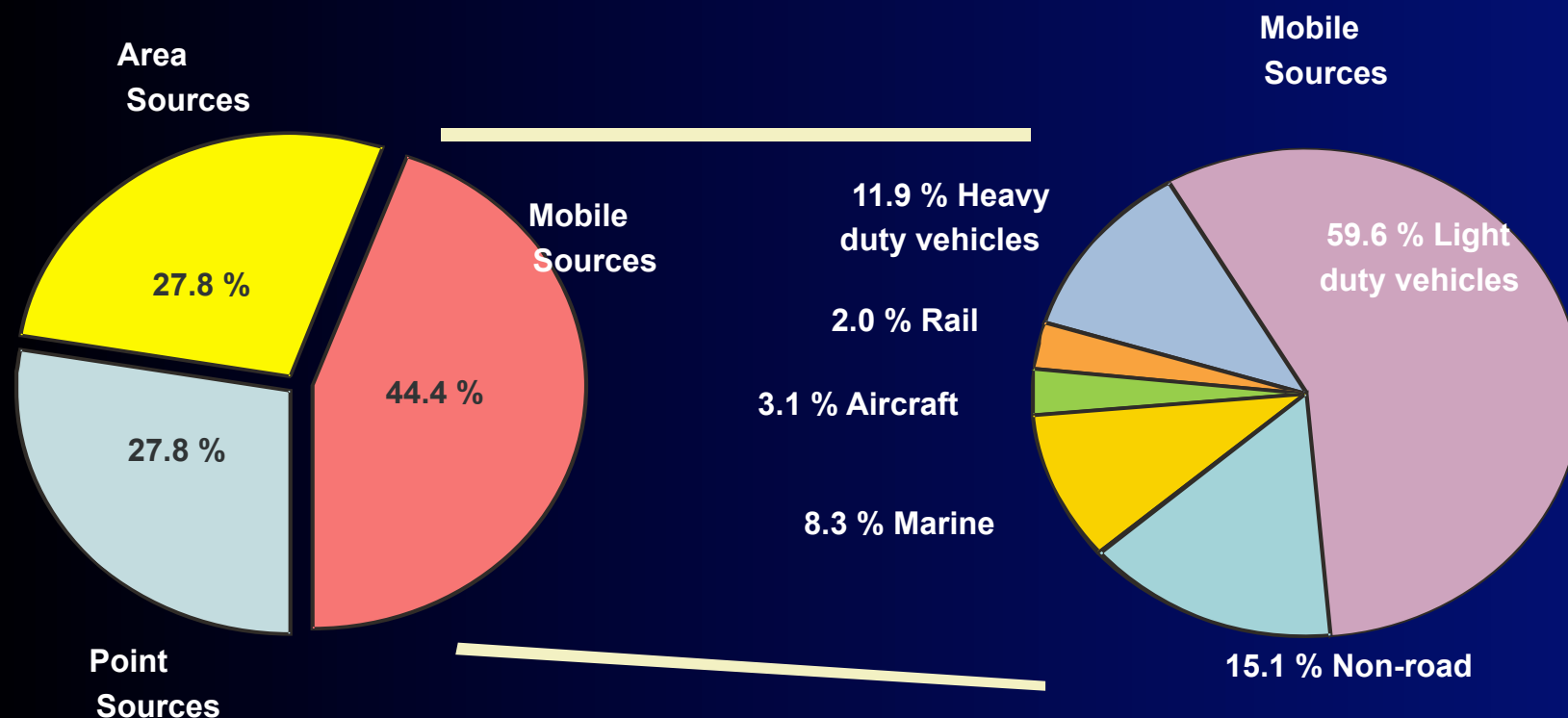


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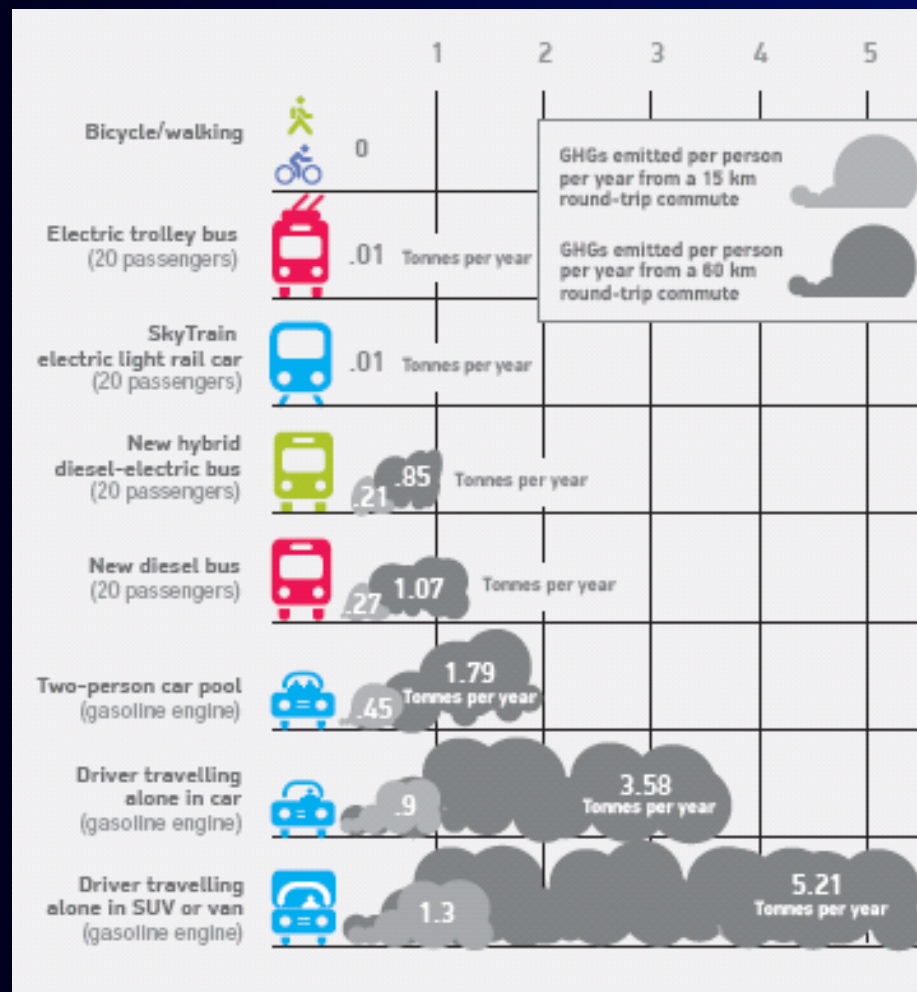


# Vancouver Region GHG Emissions



**Mobile sources 44% here, 25% in other Canadian regions**

# Modes and GhGs – Metro Vancouver





















**Transportation is Expensive**





# Congestion





# Slow, unreliable bus service



The background of the slide is a photograph of the interior of a bus. It shows several rows of empty, brown, padded seats. Metal handrails are visible above the seats. Large windows on the right side of the bus provide a view of a suburban landscape with trees and buildings under a clear sky. The text is overlaid on the lower-left portion of the image.

## **Transit Operating Cost Recovery**

<b>GVRD</b>	<b>55%</b>
<b>Outer suburbs</b>	<b>10-40%</b>
<b>Middle suburbs</b>	<b>40-60%</b>
<b>Urban routes</b>	<b>70-100%</b>















It commands a certain amount of respect.

**Fleet Change (2000-2005)**

- Cars -1%
- Light Trucks +26%

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The 2000 Excursion.  
**Ford**  
No Boundaries.



# Chevy Print Ad

*'Creeps and Weirdos'*

*'Luckily there's an affordable alternative'*

28 CREEPS & WEIRDOS

LUCKILY, THERE'S AN AFFORDABLE ALTERNATIVE.

**Chevrolet Cavalier VL Sedan**  
\$12,998 - 0% - \$178/mo.  
\$1,000

**Features:**  
• 1.6L 105-hp V-6 engine  
• 4-speed automatic transmission  
• 16-valve V-6 engine  
• 5-speed manual transmission  
• 16-valve V-6 engine  
• 5-speed manual transmission  
• 16-valve V-6 engine  
• 5-speed manual transmission

© 1997 GM Corp. All rights reserved. Chevrolet and Cavalier are registered trademarks of GM Corp. Buckle up, America!



# Automobile Impact Inventory

Environmental			Economic			Social		
	Impact Type			Impact Type			Impact Type	
	Own	Use		Own	Use		Own	Use
Foodlands loss	✓	✓	Sprawl	✓	✓	Health	✓	✓
Wetland loss	✓	✓	Housing affordability	✓	✓	Noise		✓
Wildlife loss/disrupt'n	✓	✓	Congestion (time)		✓	Accessibility		✓
Sprawl	✓	✓	Vehicle ownership	✓		Liveability	✓	✓
Severance	✓	✓	Vehicle operating		✓	Equity	✓	
Water (hydrology)	✓		Parking	✓	✓	Isolation		
Water (runoff)		✓	Road facilities	✓		Dysfunction		✓
Smog		✓	Opportunity cost	✓		Public realm	✓	✓
Acid rain	✓	✓	Accidents		✓	Safety		✓
Air pollution	✓	✓	Property loss		✓			
Global warming	✓	✓	Public services	✓	✓			
Energy use	✓	✓	Other ext. non-mkt	✓	✓			
Resource extract'n	✓	✓						
Vehicle disposal	✓							



# Some transport planning lessons and principles

# Common Transportation Myths

- Reclaiming road space will cause traffic chaos
- Bigger roads move traffic better
- More roads are bad for cities + environment
- Transit is too expensive
- Transit -- best way to get people out of cars
- People won't walk/cycle in...(fill in city here)



**Cannot Build Your Way  
Out of Congestion**







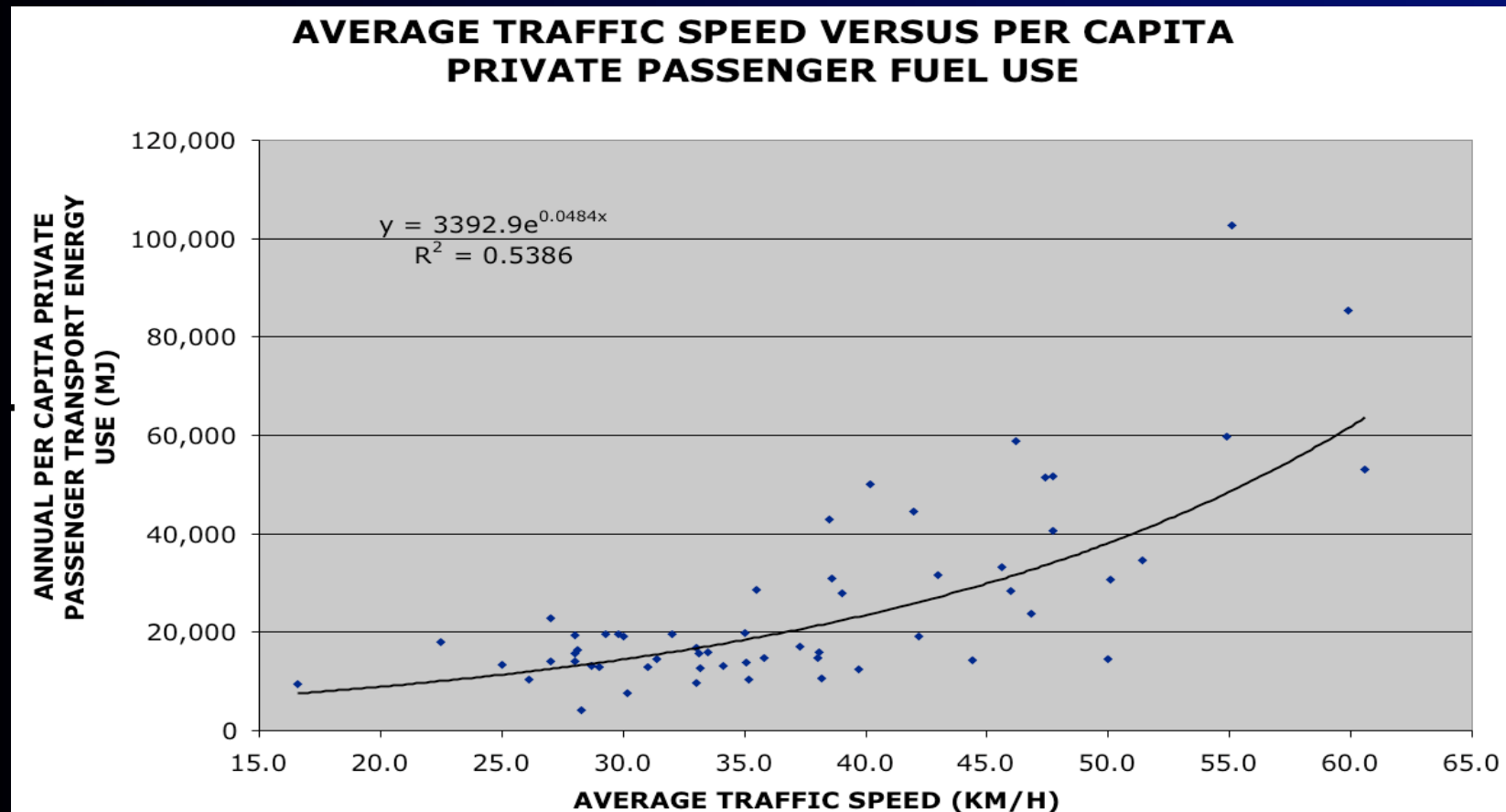


AND YET TRAFFIC STILL  
SEEMS NOT TO BE MOVING.  
WITH CANADA AND MEXICO  
WE COULD ADD A FEW MORE  
LANES IN EACH DIRECTION.

TOLES  
UNIVERSAL  
PAPER STAMP  
& © 1991 THE  
BUFFALO NEWS

NOW WHERE WAS IT  
WE WERE GOING? 

# Fuel Efficient City v. Fuel Efficient Traffic



Source: Kenworthy, Jeffrey. Millennium Cities Database



# Congestion – A Planner's Friend?

**Cities with higher levels of 'congestion' have:**

- **Lower**
  - car use
  - public transport trip times
  - spending overall for the city on passenger transport
  - fuel use
  - urban sprawl
  - transport emission rates per capita
  - transport death rates per capita
- **More transit, walking, cycling use**
- **Shorter travel distances**

# Wider Roads Not Always Most Efficient





# Question “Improvements”



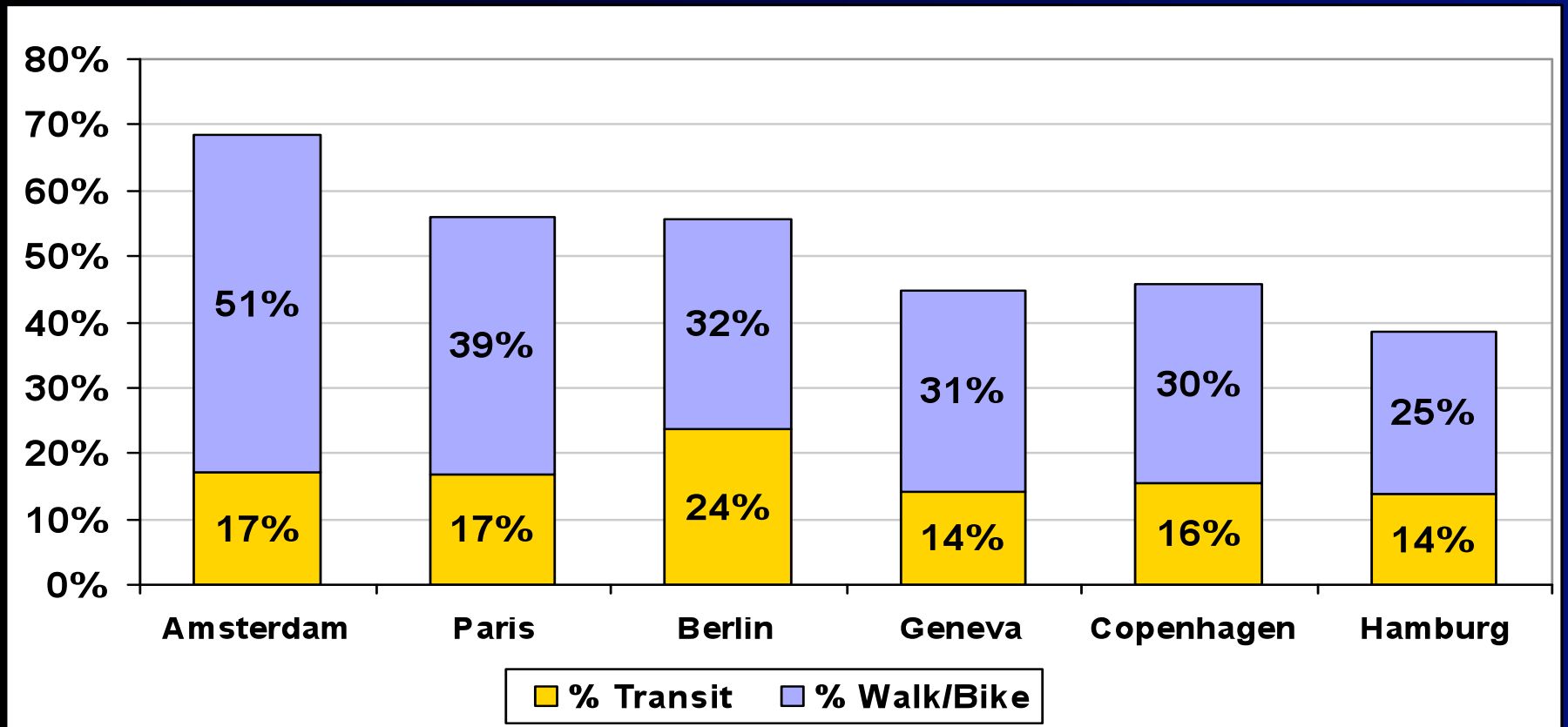


# Quality of Development Not Just Quantity





# Walking and Cycling - Critical to Transit



# Green Location v. Green Buildings

- Transport greater source of energy consumption than buildings
  - in Canada, 4 to 5 times greater
- Typical building central location
  - 200 tonnes in GHGs for transport to it
  - Increases 60 tonnes if not central
- Typical building
  - 50 tonnes in GHGs for building operations
  - Can reduce by 25 tonnes if made green
- Biggest impact is to have green location
- Best to have green building in green location





# An Auto City is Space Hungry



Photo: The Texas Department of Transportation

*Heavy traffic on I-610 (the West Loop) at Westheimer.*







# Technology Important But Not the Only Solution



# Work Trips - Only Part of the Problem

- Commute to Work – 25%
- Everything Else – 75%



**WORLD'S HIGHEST STANDARD OF LIVING**

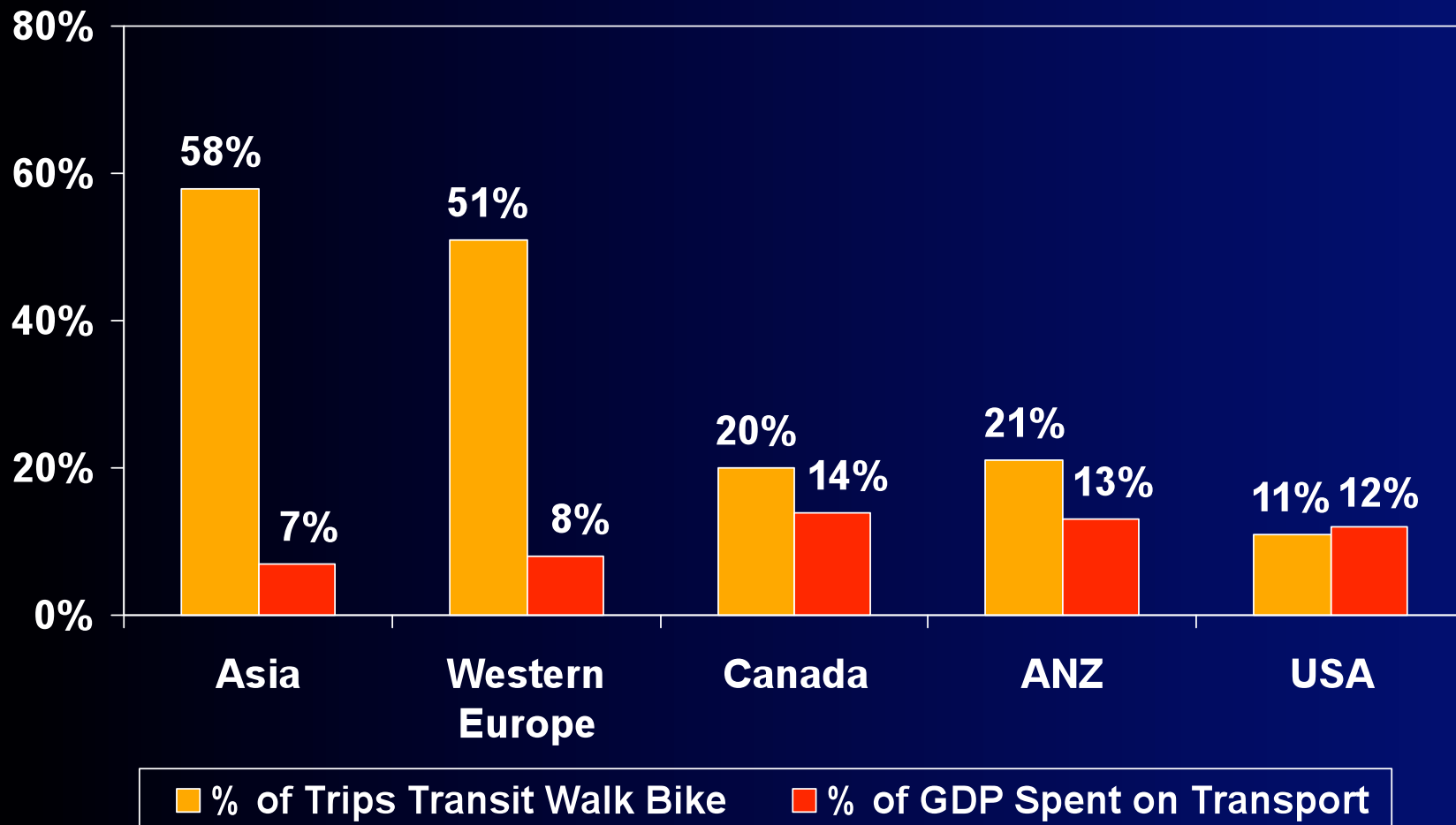


*There's no way  
like the  
American Way*



# Green Regions More Economic

## Regional Mode Share and Regional GDP Spent on Transport



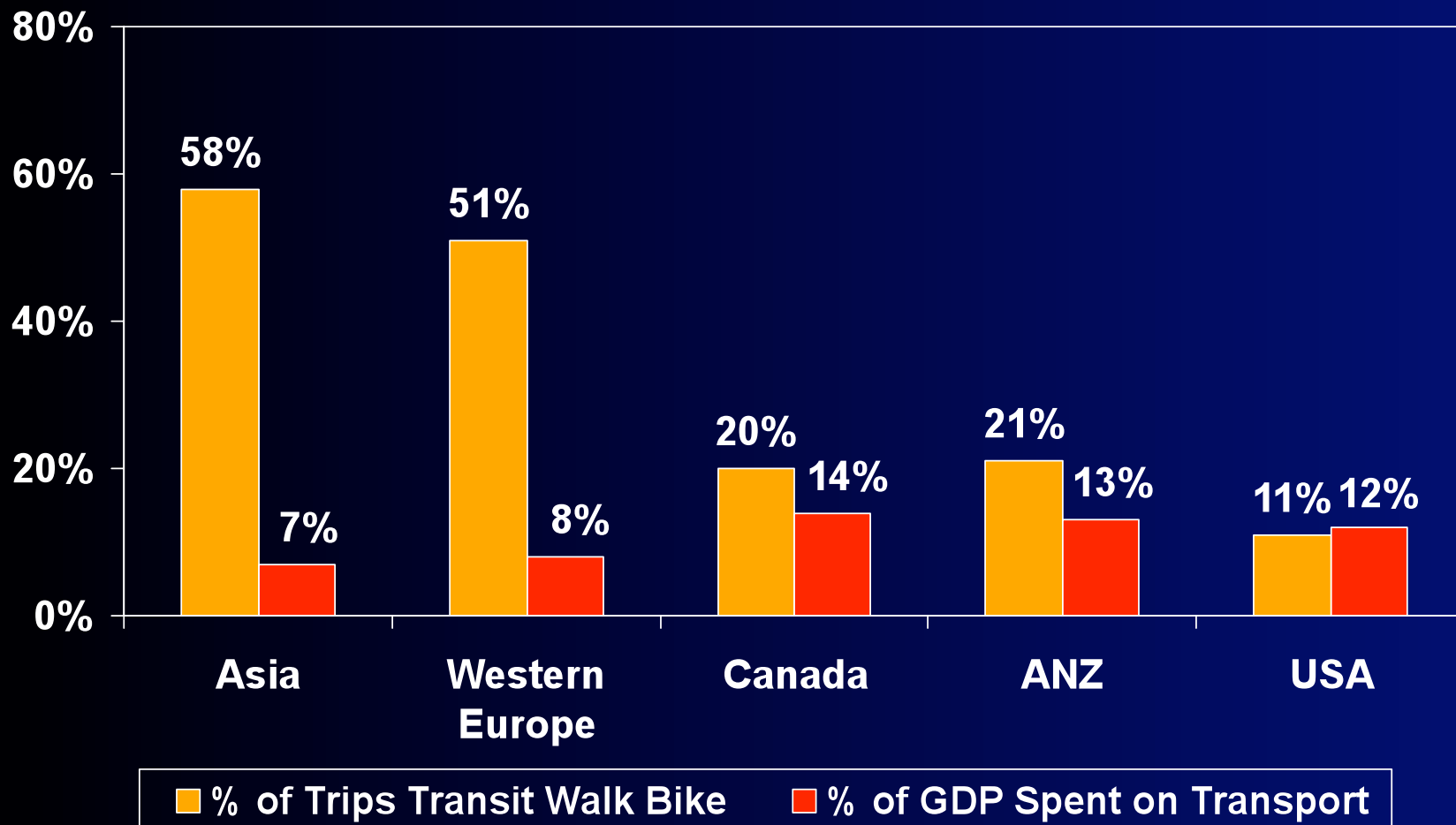


# Greater Automobile Orientation Not Required for Healthy Economy

	Beijing	Tokyo	Vancouver	Los Angeles	Amsterdam	Copenhagen
2007 GDP per capita	\$ 2,000	\$ 45,000	\$ 26,000	\$ 28,000	\$ 28,000	\$ 37,000
Private auto	24.3%	32.0%	75.0%	88.2%	31.3%	54.3%

# Green Regions More Efficient

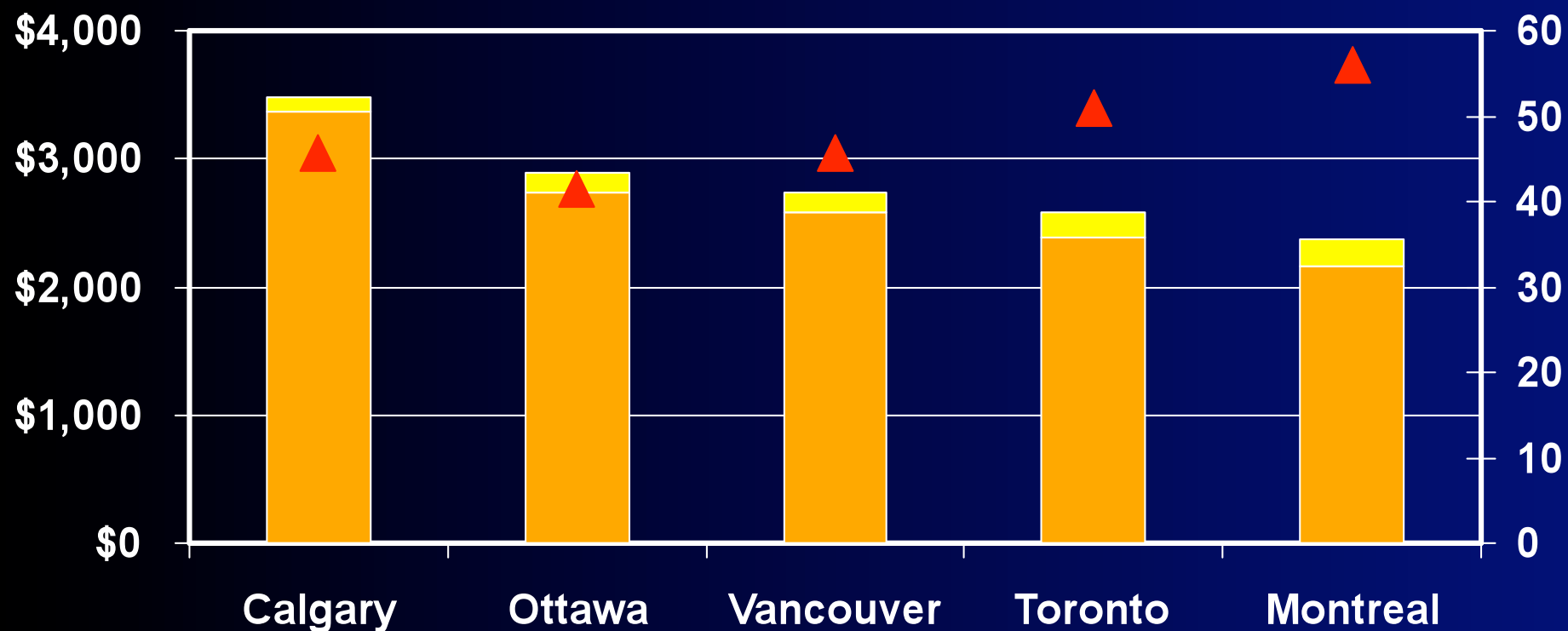
Regional Mode Share and Regional GDP Spent on Transport





# Transit Cities Spend Less on Transport

Total Transport Expenditures and Transit Service Levels



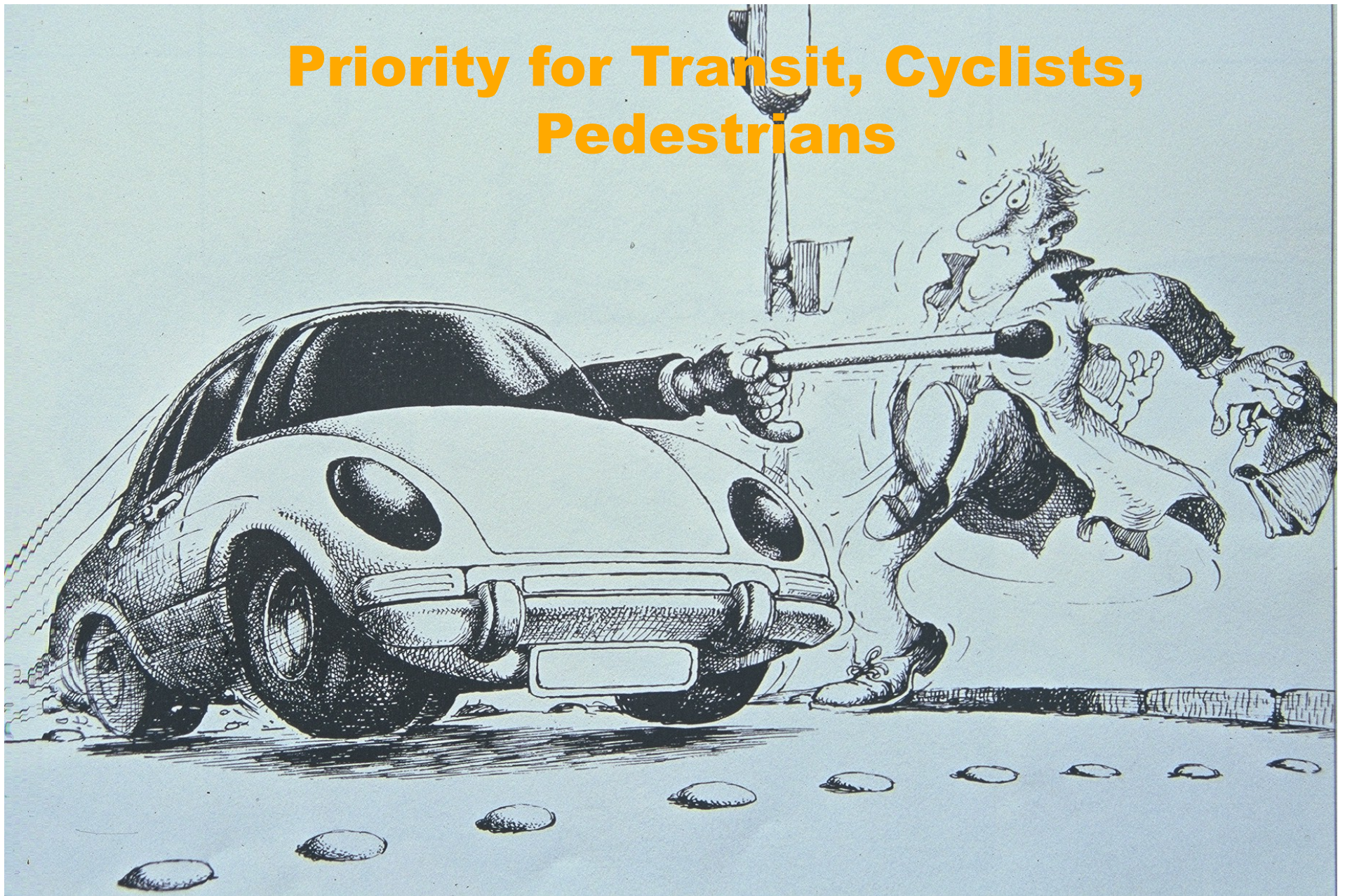
■ Private transport cost per capita ■ Public transport cost per capita  
▲ Transit service VKT/capita

# Streets Can Change





# Priority for Transit, Cyclists, Pedestrians

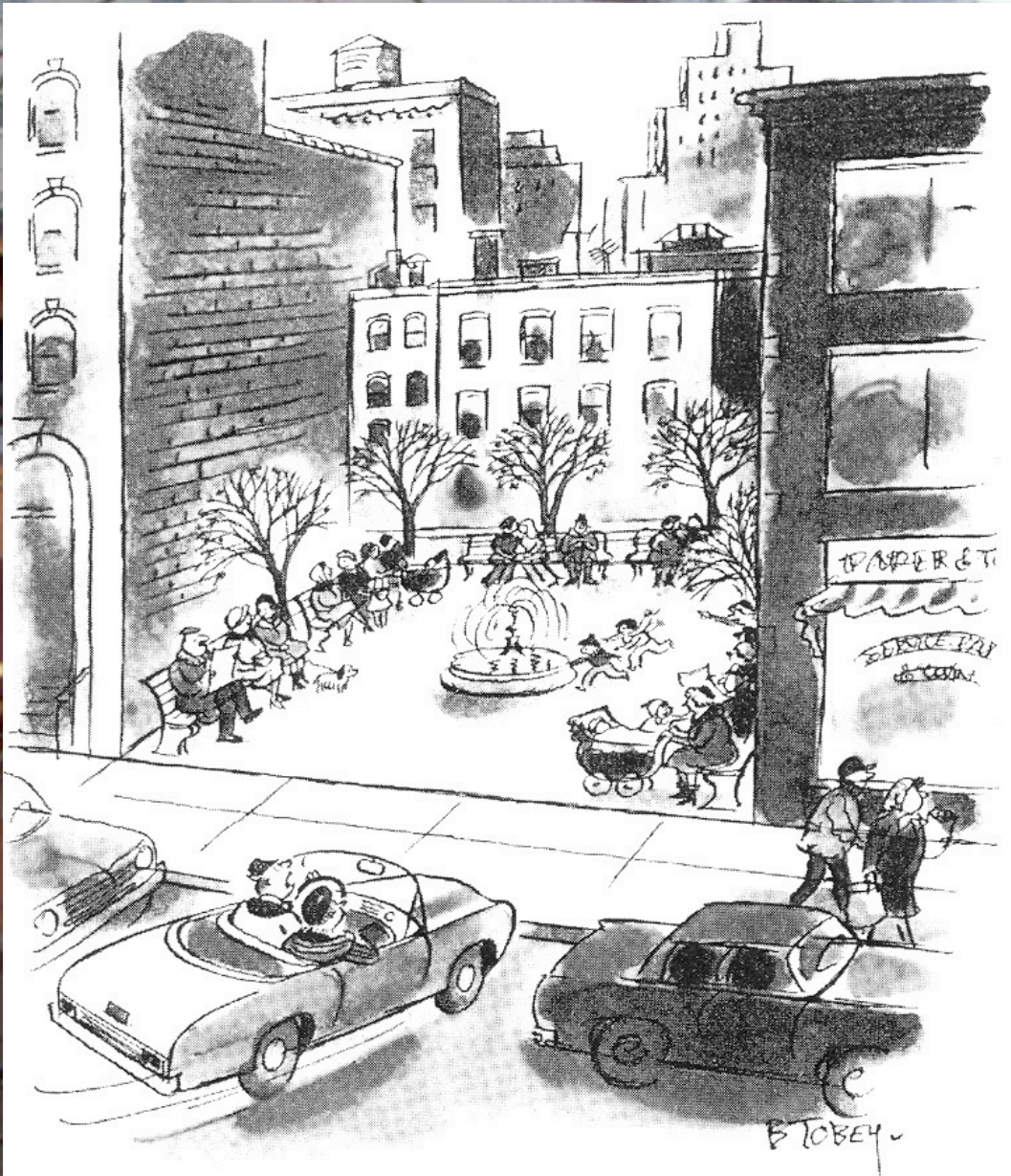




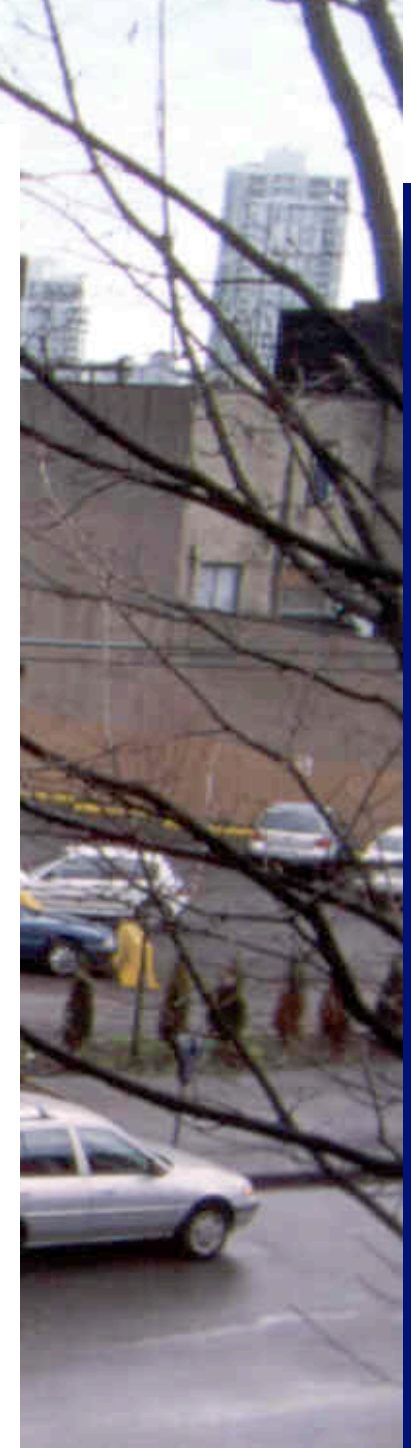
# Directions for Sustainable Transport

- Balance of modes
- Technology important, but as part of integrated strategy
- Regulate demand: price and supply of transport
- Land use: density, contiguous, mix of uses
- Quality of urban design
- Walking and cycling critical
- Priority for transit
  - Investment
  - Road priority for buses



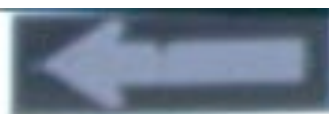


"This city is going to hell! That used to be a parking lot."



# Holistic Directions





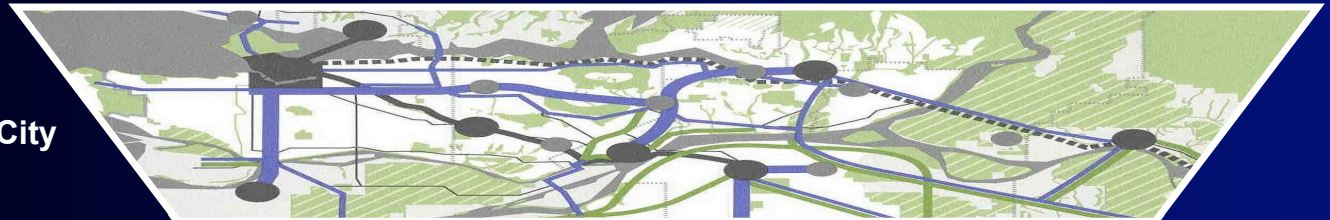
## Holistic Directions

Holistic transportation policy needs to:

- **Promote exchange and access over mobility and speed**
- **Reduce the need for car ownership and use**

CITY  
↑  
↓  
VEHICLE

**Level 4 - Whole City**  
(urban planning)



**Level 3 - Zones of City**  
(transport planning)



**Level 2 - Vehicle to Vehicle**  
(traffic engineering)



**Level 1 - Within Vehicle**  
(mechanical engineering)



Adapted from Newman and Kenworthy, 1989



An aerial photograph of Copenhagen, Denmark, showing a dense urban landscape with numerous buildings, streets, and green spaces. The city is situated along a waterfront, with a large body of water visible on the left side. The word "Copenhagen" is overlaid in large, bold, black letters across the center of the image.

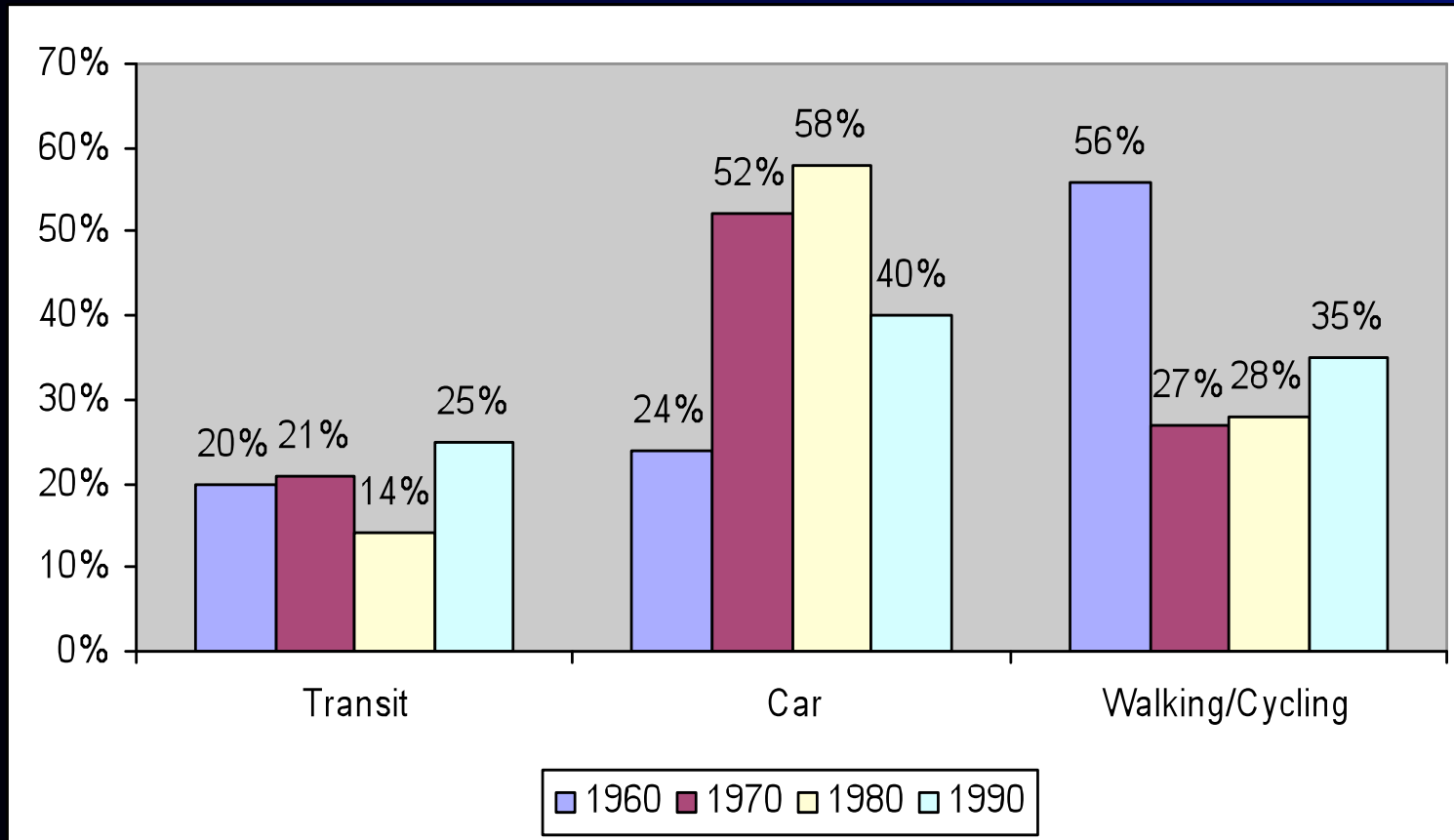
# Copenhagen

Reduced central area parking 2-3%/year

Created network of pedestrian streets

- business boomed
- massive shift to walking, cycling, public transport

## Change in Amsterdam Mode Shares, 1960-1990





# City of Vancouver



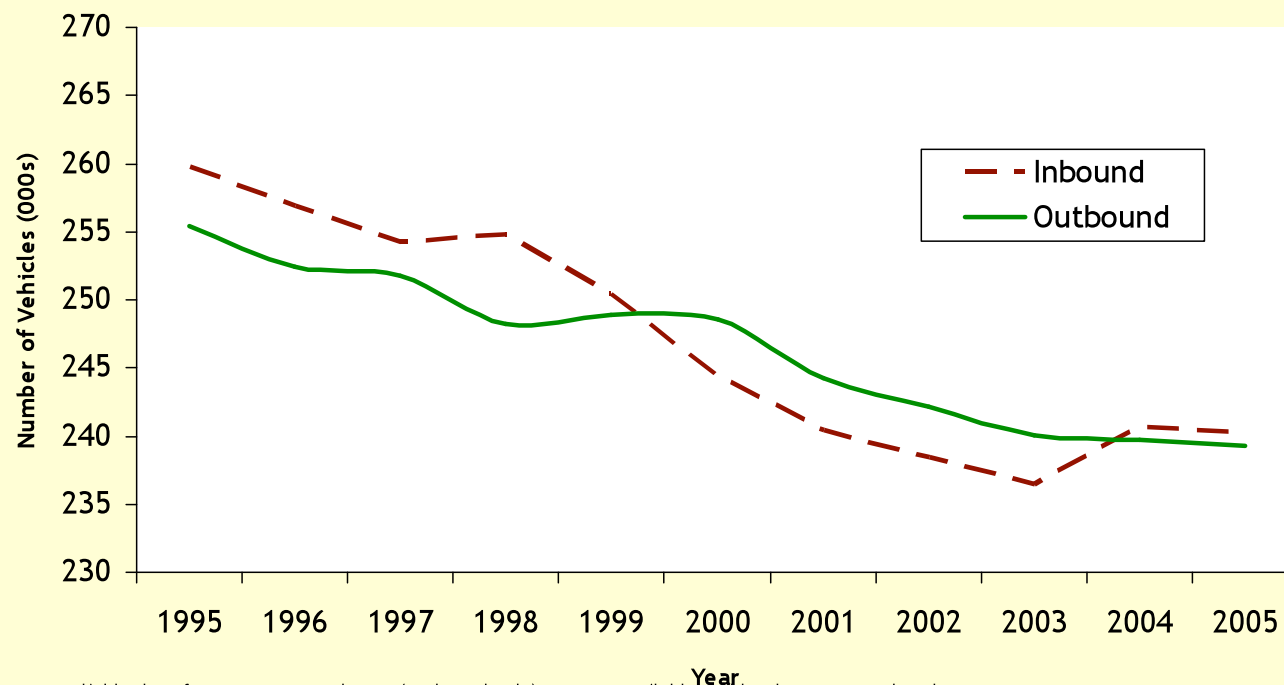
## Regional Travel Survey, 1994-2004

- auto mode share dropped from 46% to 39%
- transit dropped from 32% to 28%
- walk and bike increased from 22% to 33%

Corresponds to massive increase in downtown population.

# City of Vancouver

Vehicles entering/leaving Central Business District  
(CBD) in a 24 hour period



Note: Reliable data for 2001, 2002 and 2004 (outbound only) was not available and has been extrapolated.

Source: City of Vancouver Annual Cordon Count Program

Source: City of Vancouver



# Seoul: Restoration of Cheonggyecheon



# Restoration of Cheonggyecheon

Decrease of car-traffic volume : 125,000 veh/day





**Passenger Car-traffic (2002) : 200,000 veh/day**



# 1960s: Covering the Cheonggye-cheon



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Member of Japan Professional Photographers Society



December 2001





July 1, 2003





# Dec 1, 2005: Opening

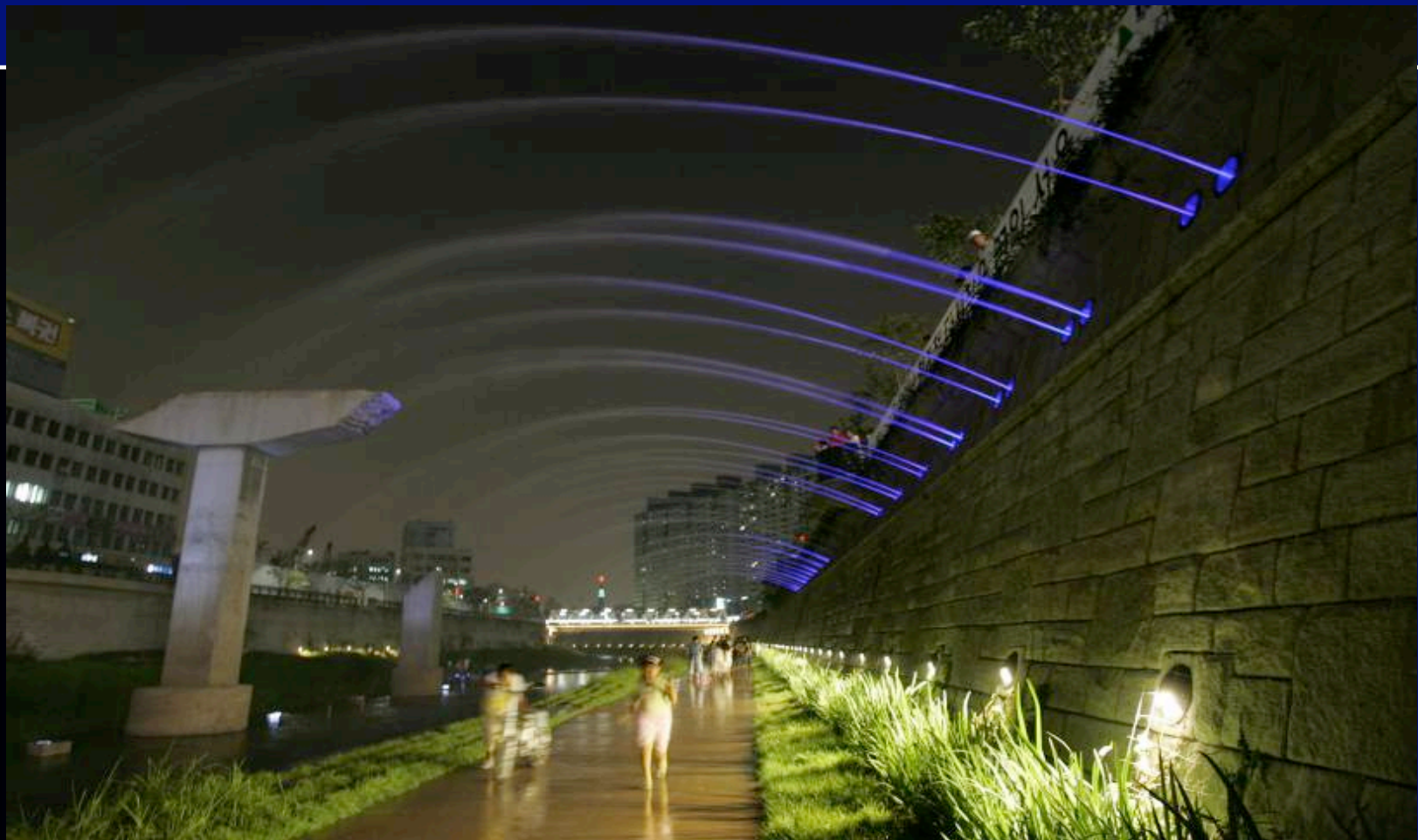


# Starts at Waterfall





# Fun in Downtown Seoul





# Fun in Downtown Seoul





# Nature in Downtown Seoul



15 Species of Fish

## Nature in Downtown Seoul



34 Species of Bird



# Traffic

- Car Trips

1.56M  $\Rightarrow$  1.27M (-18.6%)

## Transit Ridership

- Bus: + 6~10 %
- Subway: + 6~9 %



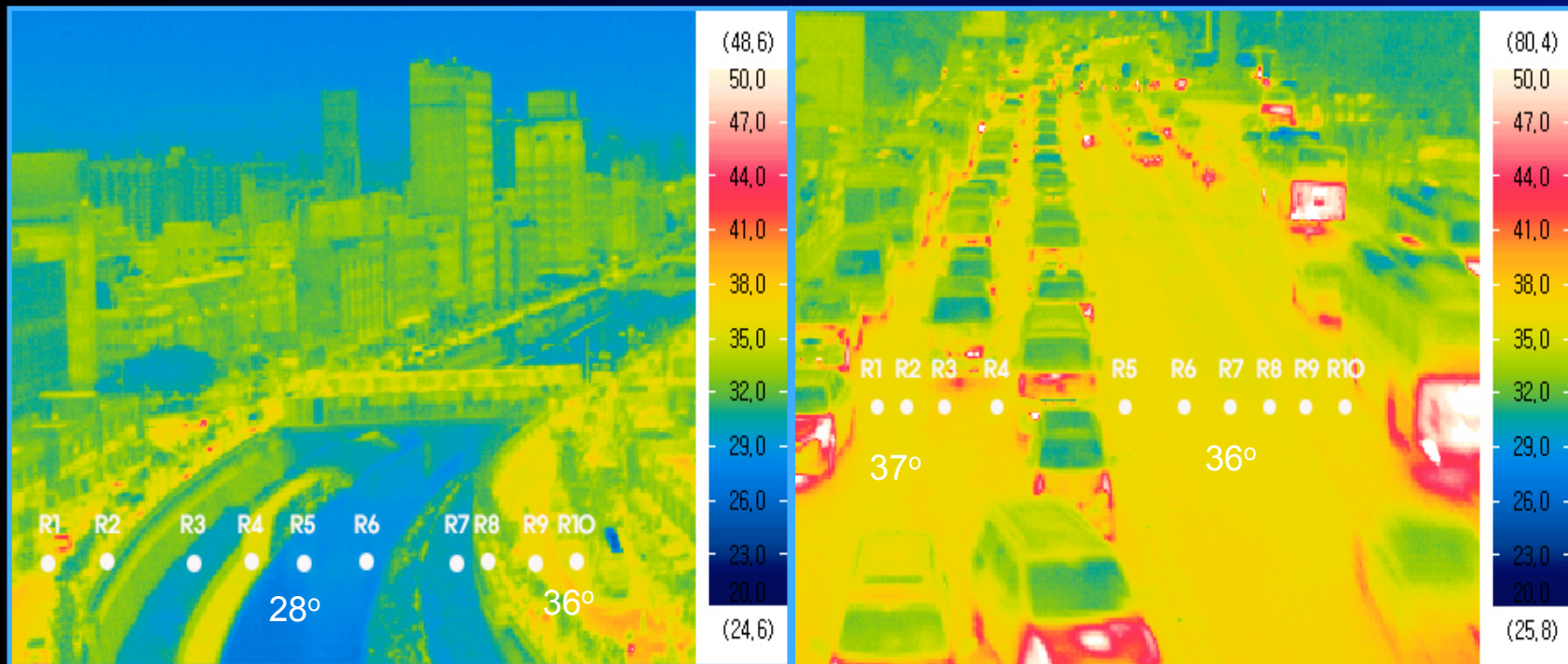
## Environmental Effects

- Air Quality
  - $\text{No}_2$ : 69.7  $\Rightarrow$  46.0 ppb (-34%)
  - PM10: 74.0  $\Rightarrow$  60.0  $\mu\text{g}/\text{m}^3$  (-19%)
- Water quality
  - BOD: 100~250  $\Rightarrow$  1~2 ppm
- Noise level reduced
- Heat island effect relieved
- Wind corridor created



# Cooling Effect

Thermal Image  
27 July 2005



Average 32.7°C  
Cheong Gye Cheon

-3.6°C

Average 36.3°C  
Nearby street

# Passenger-car Reduction Policy

Reform of Seoul Plaza

2004/ 5 Open → Restrain Traffic Flow → Ped. Square



Before



After(May 2004)







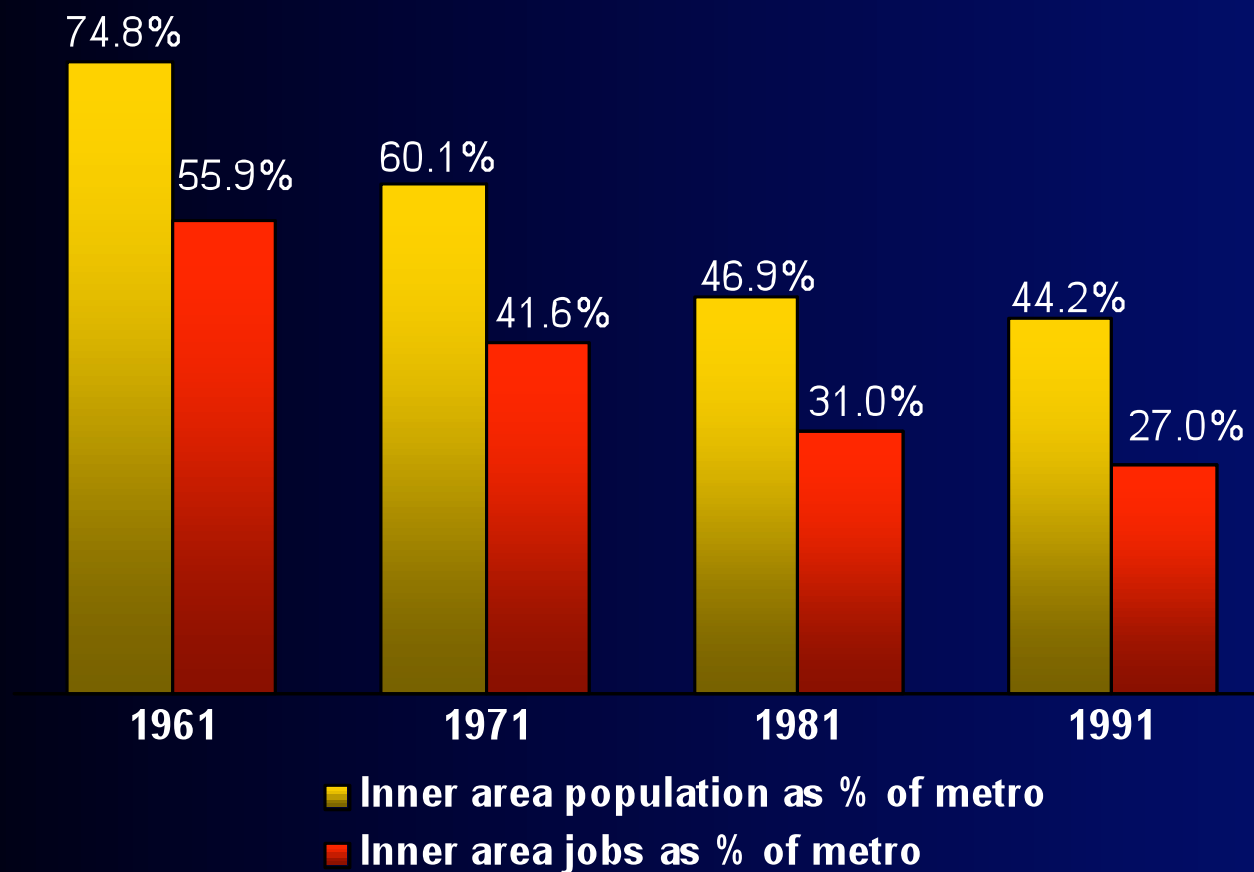




# Some Trends and Patterns in Canada

# Inner Area Importance

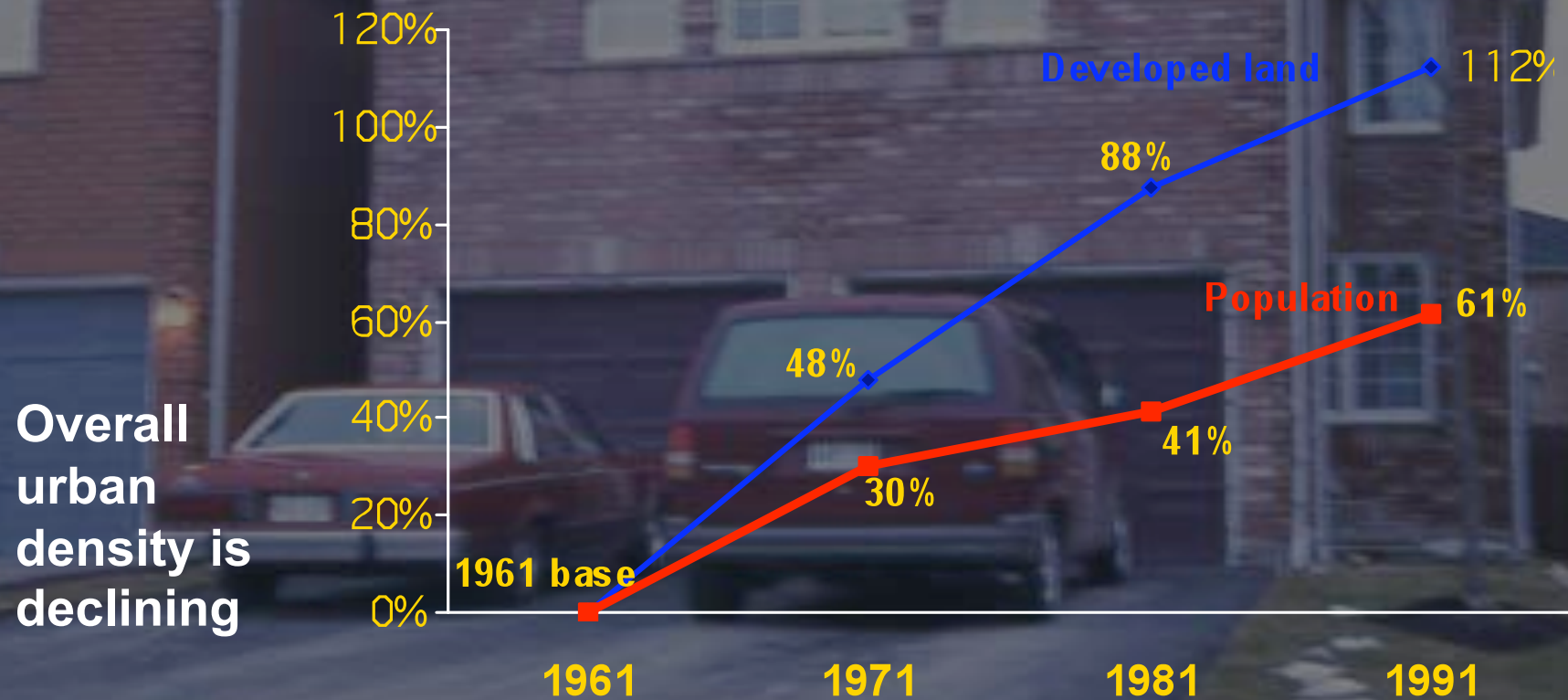
Share of population and jobs in Canada, 1961-1991





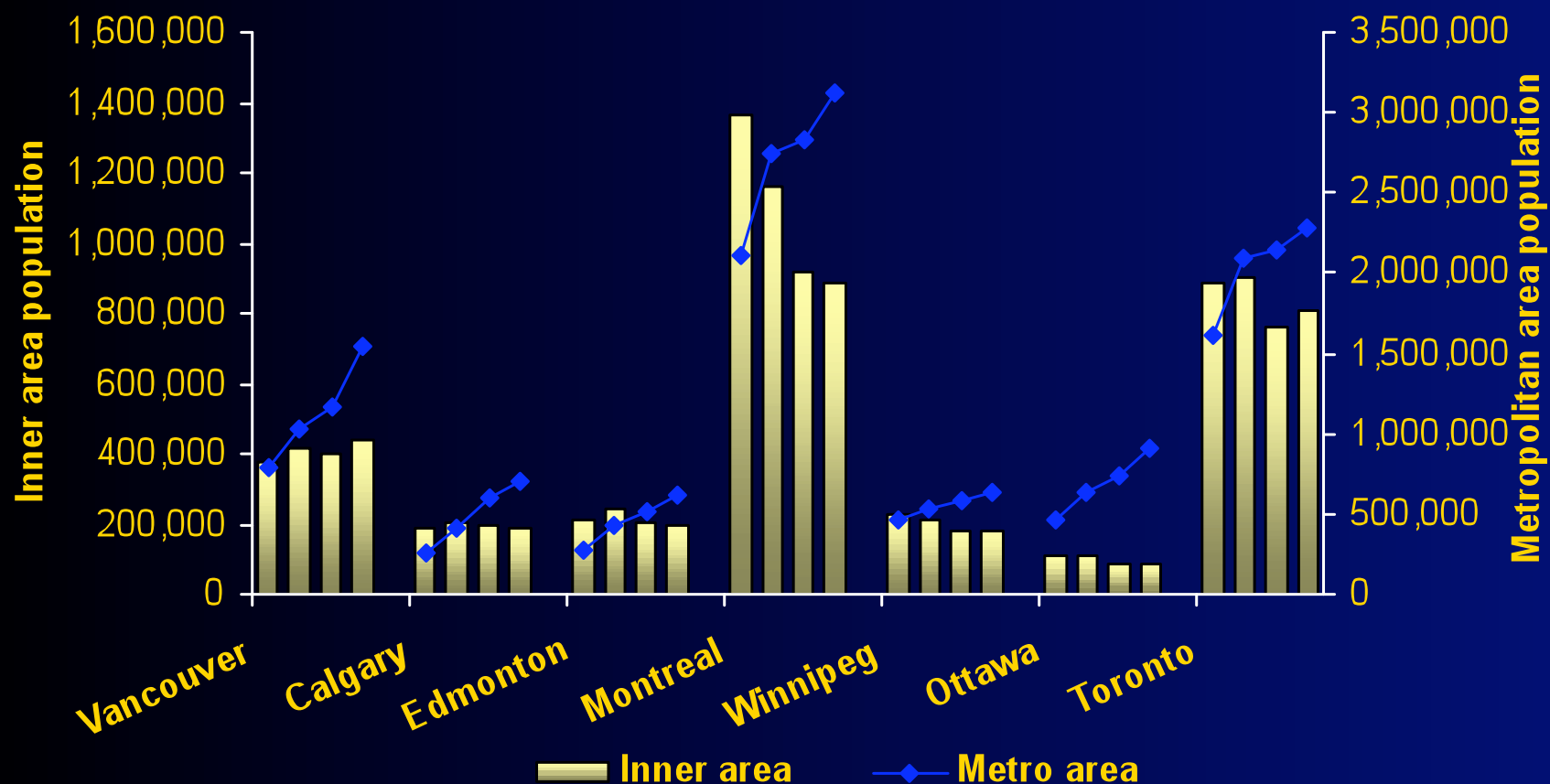
# Growth in Urban Land vs. Population

Six Canadian cities, 1961-1991



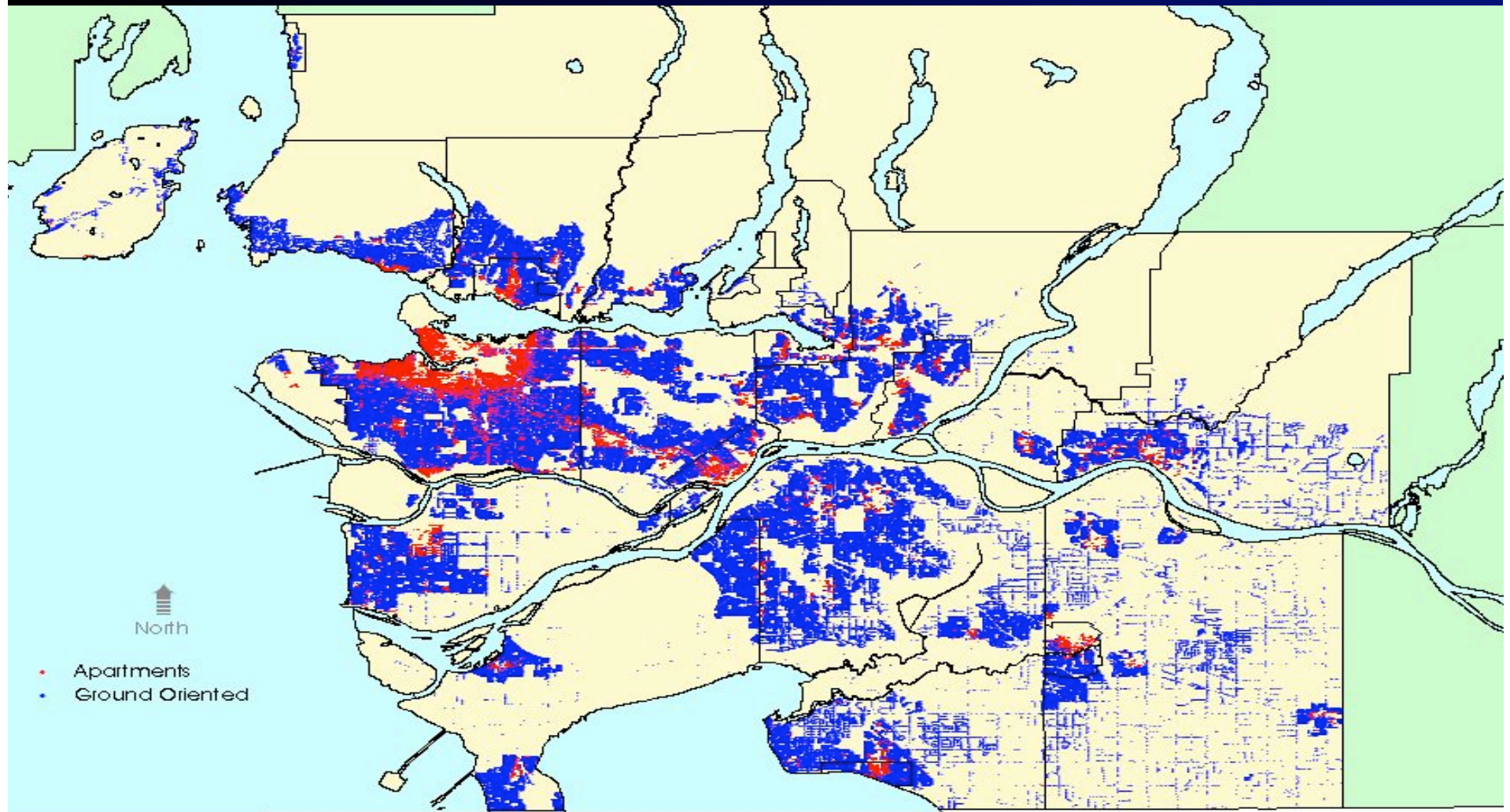
# Population Growth

Canadian Metro and Inner Areas, 1961-1991



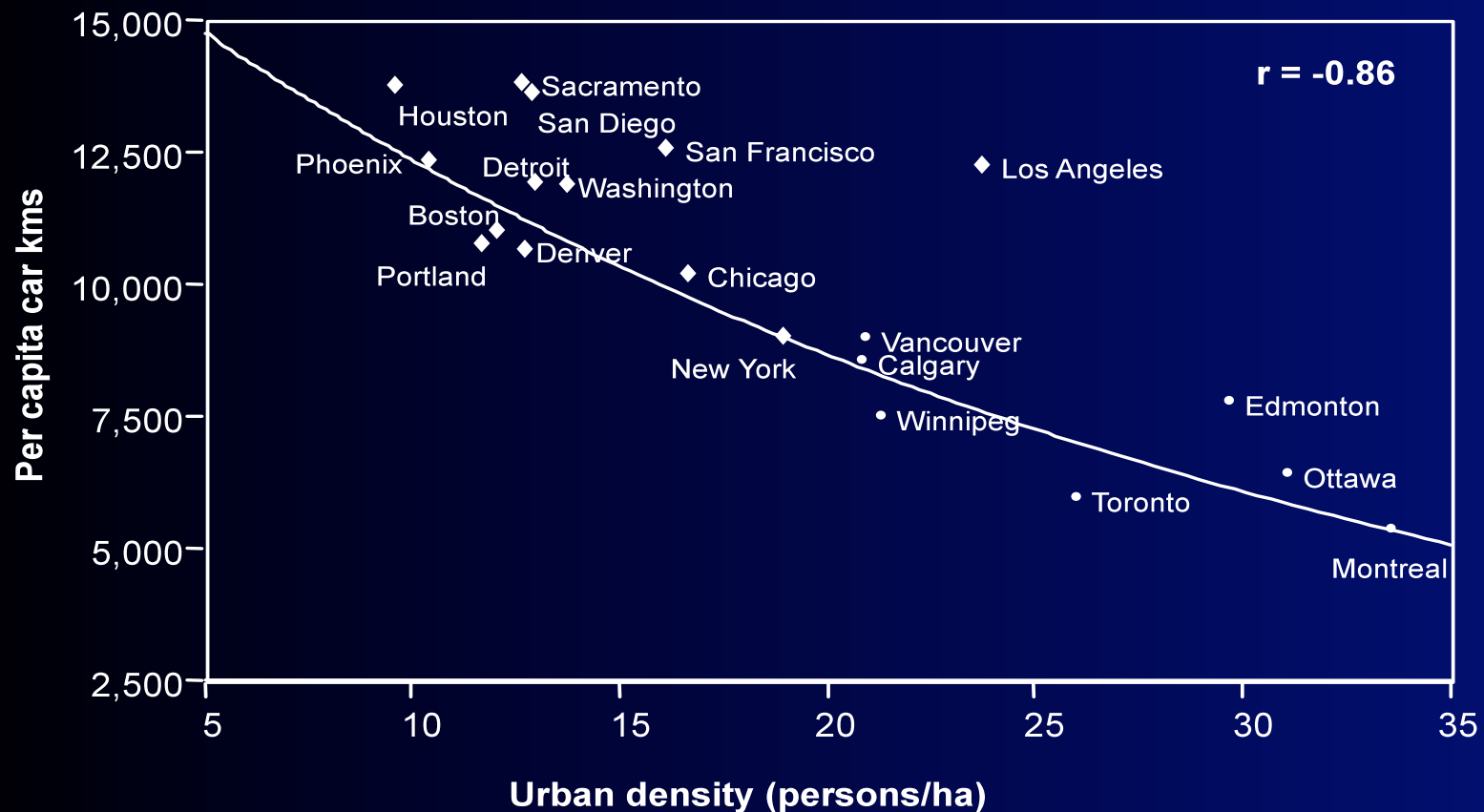


# Development Pattern of Greater Vancouver's Residential Dwellings, 1941-2006



# Density and Car Use

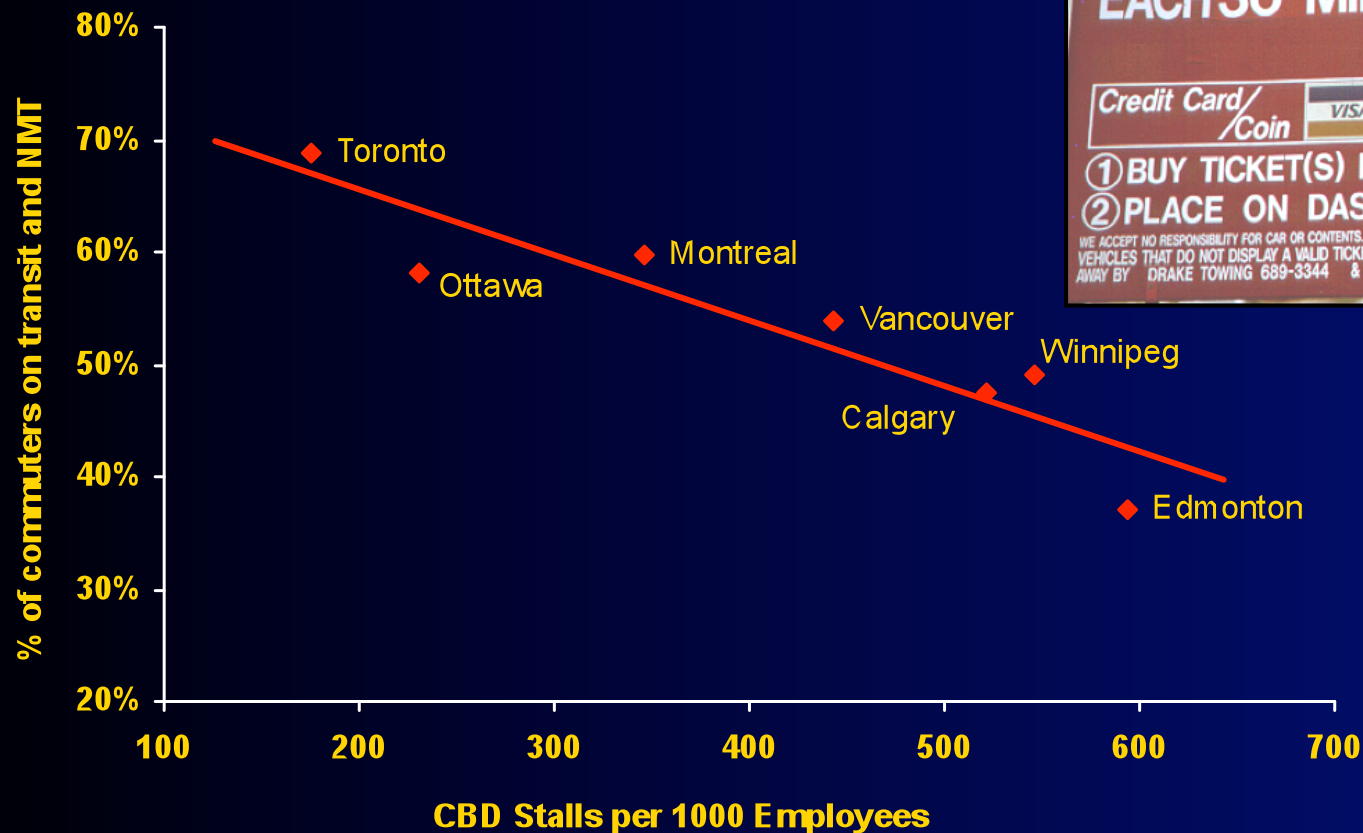
## VKT/capita in Canadian and U.S. cities





# CBD Parking Supply and Mode Split

## Canadian cities



# Impact of Parking Supply on Mode Split

Calgary CBD parking supply & mode choice, 1971-1991

