LESSONS FROM HONG KONG, THE MOST SUSTAINABLE AFFLUENT CITY

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Presentation at a workshop entitled
Energy, the Environment, and Society: Making Choices
sponsored by the Royal Society of Canada
Held at the University of British Columbia
Robson Square Campus, Vancouver
March 14, 2003
Hong Kong

• Extreme, affluent large urban region in Asia-Pacific (‘affluent’ = >US$10,000 GDP/cap. In 1995)

• Special Administrative Region of China since July 1997 (“one country; two systems”)

• One of two affluent large urban regions not in a OECD Member country (other is Singapore)

• ‘Extreme’ mainly because of high settlement density

• Nevertheless, provides several lessons for other urban regions.
Hong Kong’s distinctiveness

Among the world’s affluent cities, Hong Kong has the:

- highest residential and employment densities
- greatest intensity and use of public transport
- second highest rate of taxicab use (after Singapore)
- highest cost of car use (per kilometre)
- most expensive roads
- highest spatial intensity of transport emissions
Hong Kong’s distinctiveness 2

Among the world’s affluent cities, Hong Kong has the:

- lowest length of heavy rail network (per capita)
- lowest length of road (per capita)
- lowest rates of car ownership and use
- second-lowest expenditures on moving people
- lowest transit costs
- lowest rate of energy use for transport of people within the urban region (and likely the lowest rate of overall energy use, even if air travel is included)
Hong Kong’s distinctiveness 3a

“highest public transit use and residential density”

![Graph showing public transit trips per resident vs. residential density for different regions.](https://example.com/graph.png)
Hong Kong’s distinctiveness 3b

“highest public transit use and residential density”

![Graph showing the relationship between public transport's share of all motorized trips and residential density for different regions.]

- **Public transport's share of all motorized trips (%):** The y-axis represents the percentage of all motorized trips that are taken by public transport.
- **Residential density of developed part of urban region (persons/hectare):** The x-axis shows the residential density, ranging from 1 to 1000 persons/hectare.

Legend:
- **Blue diamond:** Affluent Asian
- **Red square:** Canadian
- **Orange triangle:** U.S.
- **Black x:** Australian
- **Green circle:** Western European

**Regions:**
- **HONG KONG**
- **TOKYO**
- **BARCELONA**
Hong Kong’s distinctiveness 4

“lowest car ownership”

- Residential density of developed part of urban region (persons/ha)
- Passenger cars per 1000 residents

Atlas: ATLANTA, CALGARY, SINGAPORE, HONG KONG

Categories: Affluent Asian, Canadian, U.S., Australian, Western European
Hong Kong’s distinctiveness 5

“second-lowest proportion of GDP spent on moving people”

Canadian urban regions:
1. Calgary
2. Ottawa
3. Toronto
4. Vancouver
5. Montreal
Hong Kong’s distinctiveness 6

“lowest transit costs”

Canadian urban regions:
1. Calgary 4. Vancouver
2. Toronto 5. Montreal
3. Ottawa

Cost of transit use (US$/pkm)
Hong Kong’s distinctiveness

“lowest per-capita energy use for transport of people”
Hong Kong's distinctiveness

“likely the lowest overall energy use per capita”

Annual end-use consumption in gigajoules/capita
Hong Kong’s distinctiveness

“highest spatial intensity of emissions from transport”
UPPER DECK SEATING 樓上座位 69
LOWER DECK SEATING 樓下座位 40
STANDING 樓下企位 34

PLEASE TENDER EXACT FARE

請備輔幣
其實有很多東西未完成
Comparing Hong Kong, the GTA, and the GVRD

Data for 1995

<table>
<thead>
<tr>
<th></th>
<th>Hong Kong</th>
<th>GTA</th>
<th>GVRD</th>
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<tbody>
<tr>
<td><strong>Population</strong></td>
<td>6.31</td>
<td>4.63</td>
<td>1.90</td>
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<tr>
<td><strong>GDP/person</strong></td>
<td>22,968</td>
<td>19,456</td>
<td>25,793</td>
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<td><strong>Area</strong></td>
<td>1,096</td>
<td>7,075</td>
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<td><strong>Developed area</strong></td>
<td>18</td>
<td>25</td>
<td>31</td>
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<tr>
<td><strong>Density</strong></td>
<td>320</td>
<td>26</td>
<td>22</td>
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<tr>
<td><strong>Car ownership</strong></td>
<td>47</td>
<td>464</td>
<td>530</td>
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<tr>
<td><strong>Total trips</strong></td>
<td>2.81</td>
<td>1.97</td>
<td>3.14</td>
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<td><strong>Motorized trips</strong></td>
<td>1.85</td>
<td>1.73</td>
<td>2.65</td>
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<tr>
<td><strong>Car/motorcycle trips</strong></td>
<td>8</td>
<td>86</td>
<td>79</td>
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<tr>
<td><strong>Annual cost of transport</strong></td>
<td>964</td>
<td>2,490</td>
<td>2,618</td>
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<td><strong>Energy use for transport</strong></td>
<td>6.5</td>
<td>35.7</td>
<td>31.8</td>
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</tbody>
</table>

- Population: millions
- GDP/person: US$
- Area: square kilometres
- Developed area: % of total area
- Density: persons/hectare developed area
- Car ownership: cars/1000 persons
- Total trips: daily trips/person
- Motorized trips: daily trips/person
- Car/motorcycle trips: % of all motorized trips
- Annual cost of transport: US$ per person
- Energy use for transport: gigajoules per person/year
Moving freight

It’s hard to be precise about freight movement because:

- Data on freight movement are poor
- There are many unknowns about trade with the Mainland
- Plans for rail freight for the next decade or so are much less clear than plans for passenger rail
- There has been less experience with trolley lorries than with trolley buses
- Independently mobile vehicles could be needed for the last sections of many deliveries and pick-ups, and it’s not clear how they would be coordinated with tethered freight vehicles

Freight movement by tethered vehicles could rise from its present <3% (by rail) perhaps to about 80% (by rail and trolley lorry).
Central issue in sustainability: oil (and NG)
Proposal for moving people sustainably

<table>
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<th>2002</th>
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<th>2032</th>
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<tr>
<td></td>
<td>Trips (millions)</td>
<td>Per cent of total</td>
<td>Trips (millions)</td>
<td>Per cent of total</td>
</tr>
<tr>
<td>Motorised trips by:</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Personal vehicles</td>
<td>1.1</td>
<td>8%</td>
<td>1.0</td>
<td>4%</td>
</tr>
<tr>
<td>Taxis</td>
<td>1.3</td>
<td>10%</td>
<td>1.0</td>
<td>4%</td>
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<tr>
<td>Buses</td>
<td>6.5</td>
<td>47%</td>
<td>7.4</td>
<td>32%</td>
</tr>
<tr>
<td>Rail</td>
<td>4.7</td>
<td>35%</td>
<td>14.1</td>
<td>60%</td>
</tr>
<tr>
<td>Total motorised trips</td>
<td>13.6</td>
<td>100%</td>
<td>23.5</td>
<td>100%</td>
</tr>
<tr>
<td>Population (millions)</td>
<td>7.0</td>
<td></td>
<td>10.0</td>
<td></td>
</tr>
<tr>
<td>Trips/person</td>
<td>1.95</td>
<td></td>
<td>2.35</td>
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</table>
Why electric vehicles?

- Because for transport to be sustainable it will have to use renewable energy, i.e., energy from wind, sun, tide, etc.

- In any case, worldwide production of oil and natural gas is likely to start declining before 2032, with resulting major increases in prices.

- The best way to distribute renewable energy may be through the electric power grid. Distribution of hydrogen, a frequently discussed alternative, seems less feasible.

- Moreover, electric vehicles meet Hong Kong’s need for quiet, pollution-free transport in populated areas.
Why *tethered* electric vehicles?

- Because tethered systems require **much lower overall energy input** than fuel-cell systems or battery systems.

- Because, in any case, **fuel-cell systems may not be sufficiently reliable and affordable** by 2032.

- Because **battery power is inherently short-lived**; batteries could never be suitable as the main power source for large vehicles.
Offshore wind is the most promising but not the only renewable energy source

- It’s the only source that’s near price-competitive.

- Hong Kong waters are a suitable place for a massive wind farm that could meet just about all the SAR’s energy needs. (China Power says 750 GW of wind power is feasible from the whole continental shelf.)

- Other renewable energy should be explored too.
Lessons from Hong Kong for Canadian urban regions

- Transport in Canada’s urban regions is dramatically farther away from sustainability than transport in Hong Kong, and yet there is more concern about sustainability there. Being more sustainable may help acceptance of the need for sustainability.

- True sustainable transport requires sustainable energy. A region’s land use and transport plans should be set within the framework of its energy plan.

- Very high densities make low automobile use and profitable transit possible in Hong Kong. Perhaps nothing is more important for sustainability than achieving higher densities.

- The downside of high density can be high local concentrations of pollutants. Transport with zero emissions at source is essential for high density development.
Lessons from Hong Kong for Canadian urban regions 2

- Very high levels of use of public transport can be sustained with a bus-based system, but resulting pollution levels can be unacceptable. It’s better to have diesel buses than nothing, but the long-term plan should be for electric vehicles.

- The efficiency and convenience of Hong Kong’s astonishing Octopus Card help sustain regard for public transport. But the real value is to public transport operators, who know what is happening and in the train stations with powerful precision.

- The individual excellence of the individual public transport operators in Hong Kong has a down side: poor cooperation. Society needs to strike a difficult balance in this respect.

- Freight transport is Hong Kong’s Achilles heel. This is true almost everywhere, but more so for Hong Kong and the solutions will be of special significance.
The downside: space per person

The numbers by the bars show average annual costs of office space in U.S. dollars per square metre.
But, Hong Kong rates well in many objective social indicators, for example:

- Hong Kong has the second-highest life expectancy (after Japan)
- Hong Kong has the second-lowest infant mortality and morbidity (just after Sweden)