

CANADA'S NEED FOR AN ELECTROMAGNETIC LEVITATION RAIL INFRASTRUCTURE

Presentation for the 8th Canadian
Pollution Prevention Roundtable,
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PRESENTATION OVERVIEW

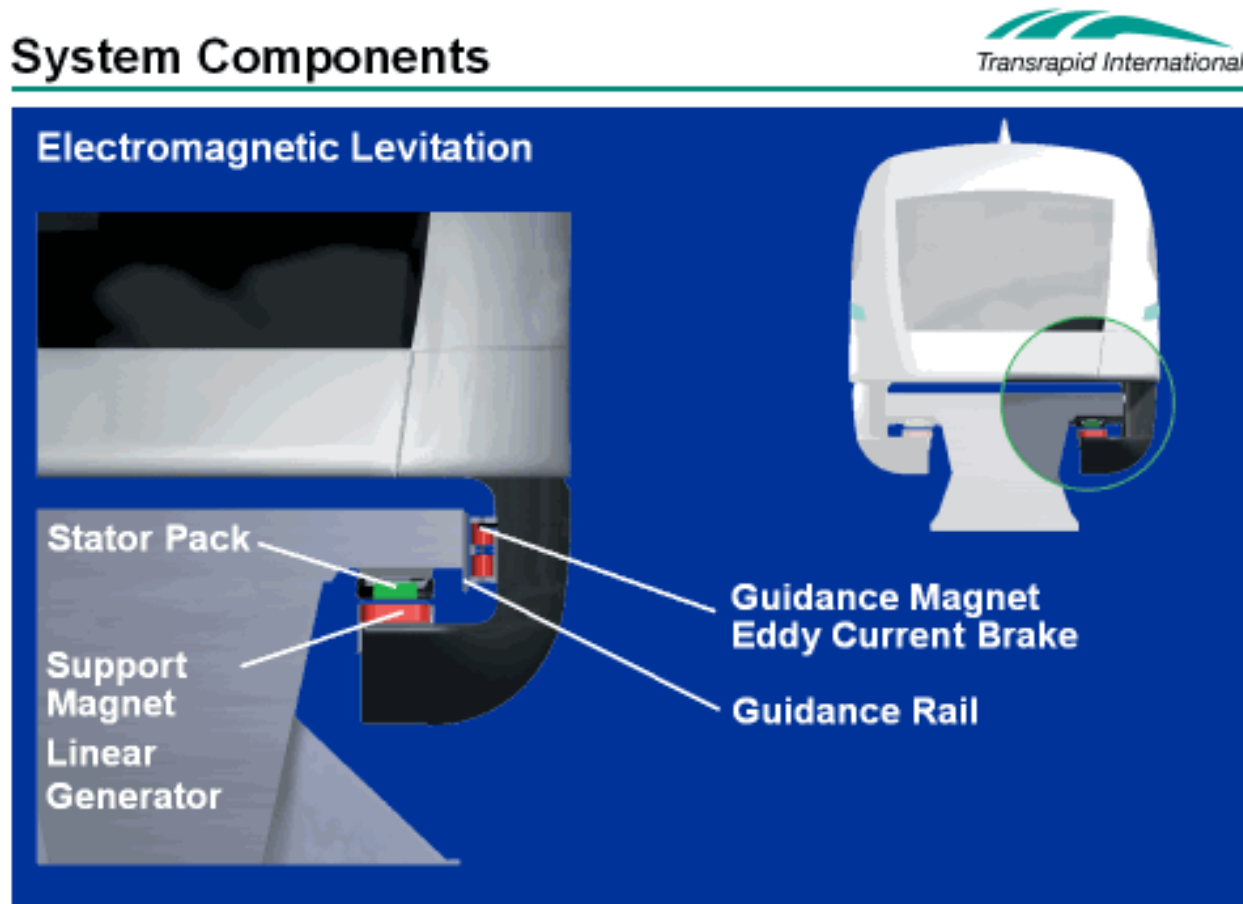
- Introduction to Maglev Technology
- Maglev & Sustainability
 - Land Use Policy
 - Energy Efficiency
 - Pollution
- Social & Economic Incentives for Maglev
- Maglev Case Study
- Conclusion

WHAT IS MAGLEV?

- Levitation due to magnetic field interaction
- Magnetic forces of attraction or repulsion
- Eliminates wheel-on-rail contact

MAGLEV COMMERCIALIZATION

- German Consortium: Siemens/ThyssenKrupp
- Transrapid system installed in Shanghai, China



<http://www.transrapid.de/en/index.html>

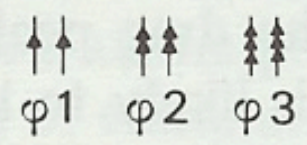
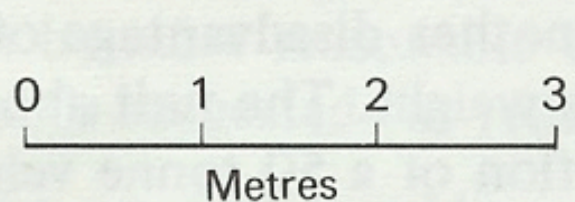
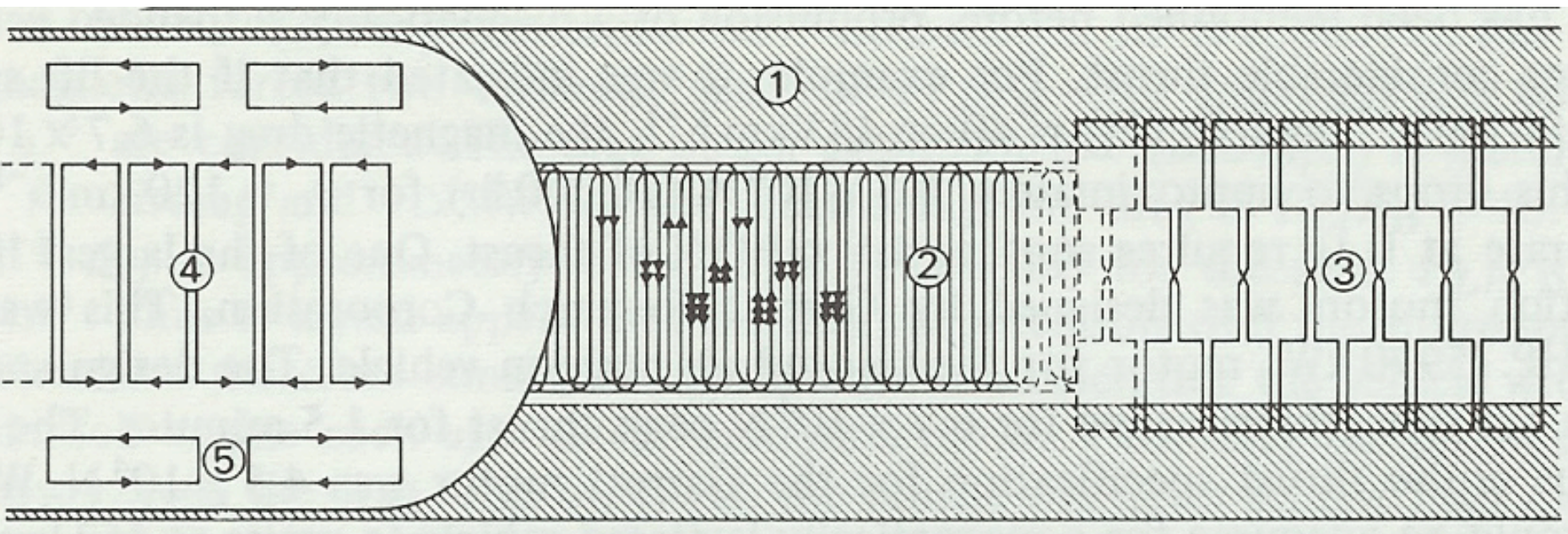
MAGLEV R&D

- Yamanashi Test Centre {Japan}
- 550km/hr top speed



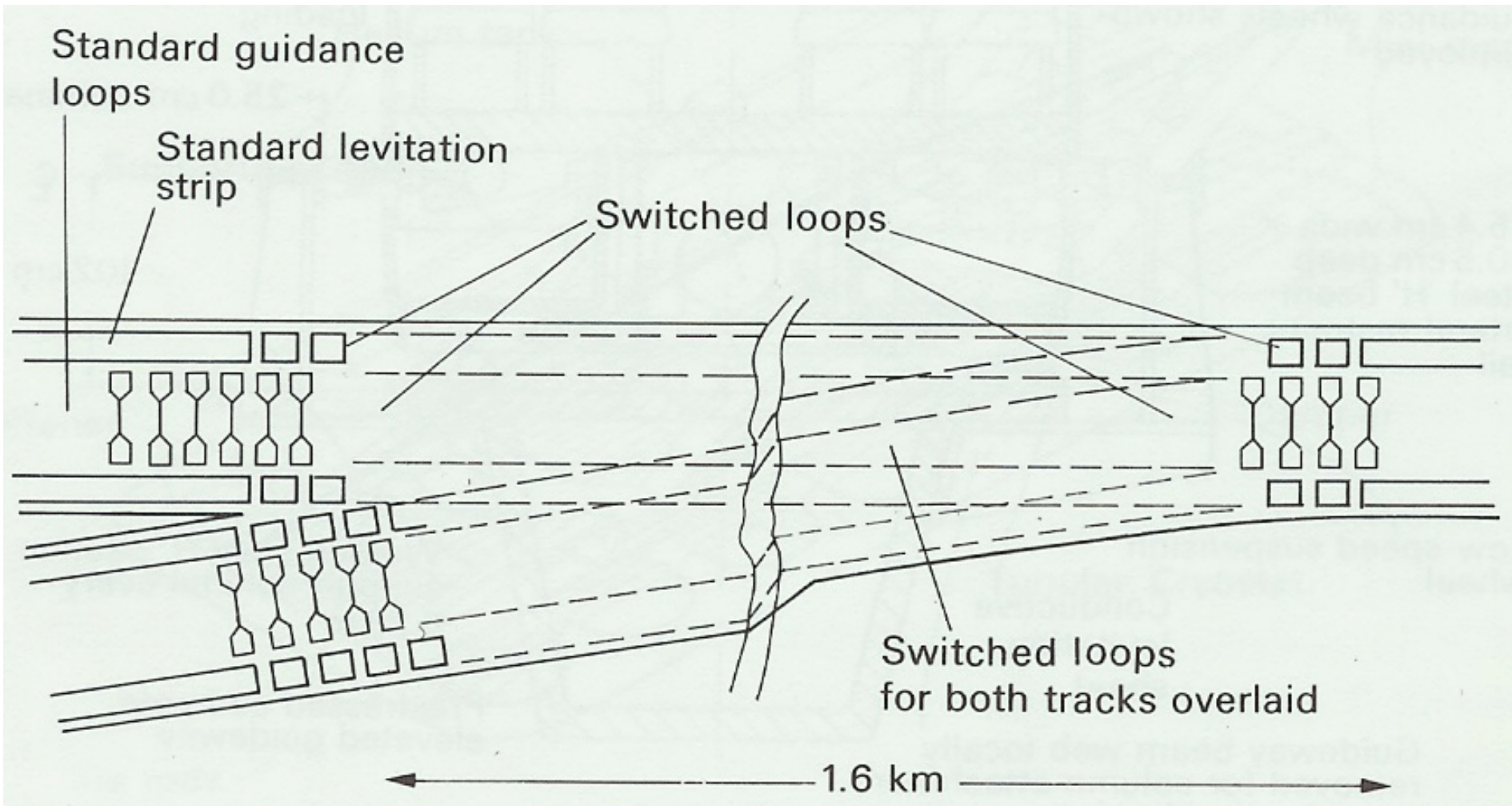
<http://www.rtri.or.jp/rd/maglev>

CANADIAN MAGLEV



- 1 Aluminium levitation strip
- 2 Linear synchronous motor windings
- 3 Null-flux guidance loops
- 4 Superconducting propulsion magnets
- 5 Superconducting levitation magnets

CANADIAN MAGLEV



Source: Eastham, A.R. (ed.). Canadian Institute for Guided Ground Transport Report 77-13 (1977)

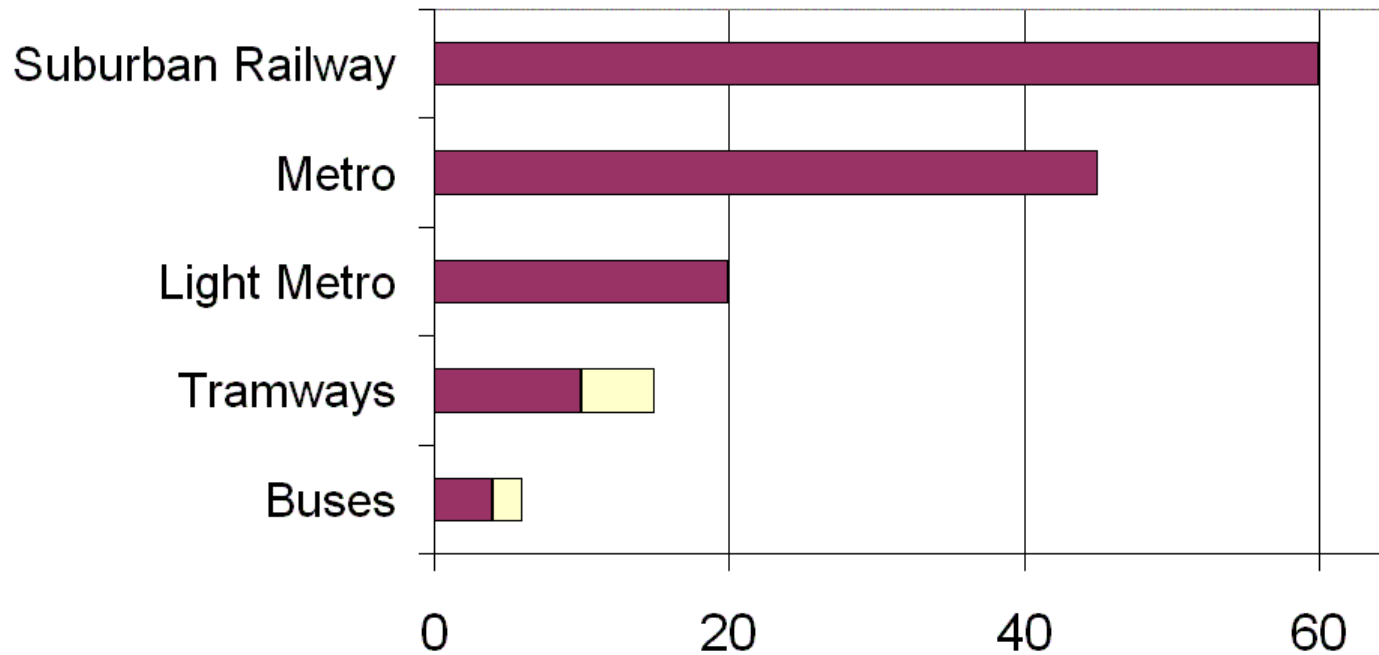
MAGLEV HIGHLIGHTS

- Low friction since wheel-on-rail contact eliminated
- Relatively minimal track maintenance
- Lower risk of derailment
- Higher cruising speeds and track switch speeds
- Intelligent control systems may optimize traffic flow
- Potential for high carrying capacity infrastructure

LAND USE POLICY

- Maglev makes more efficient use of land
- High possible carrying capacity
 - 500000 passengers/hr → 75-lane highway

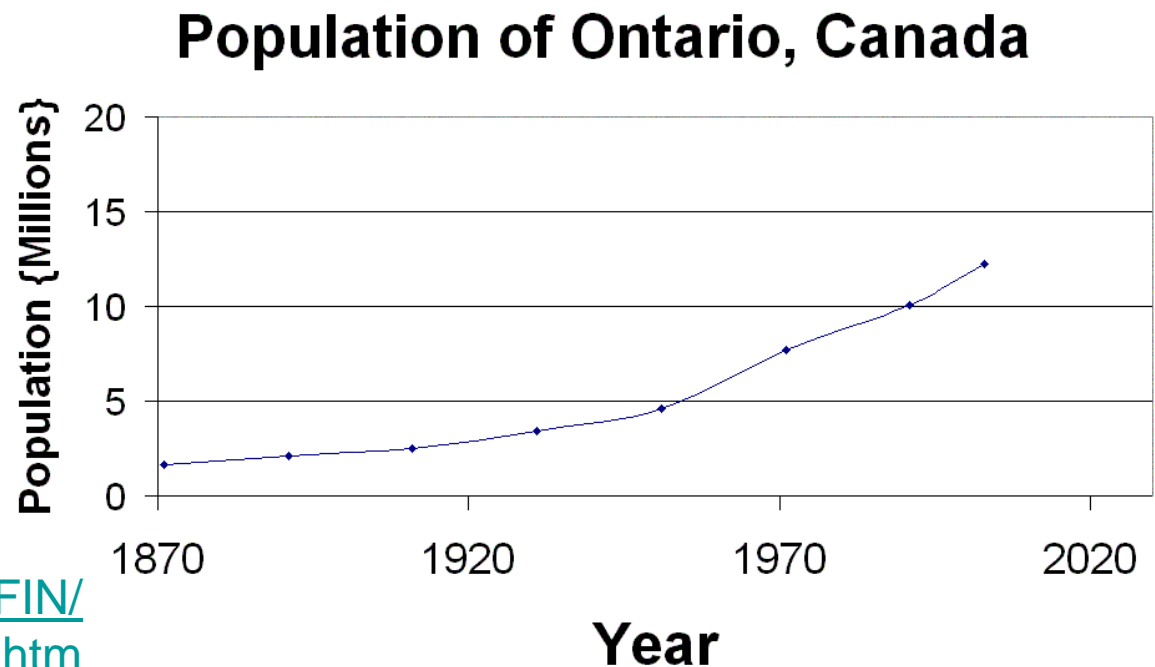
Carrying Capacity of Various Transit Systems



Carrying Capacity {Thousands of passengers per direction and hour}

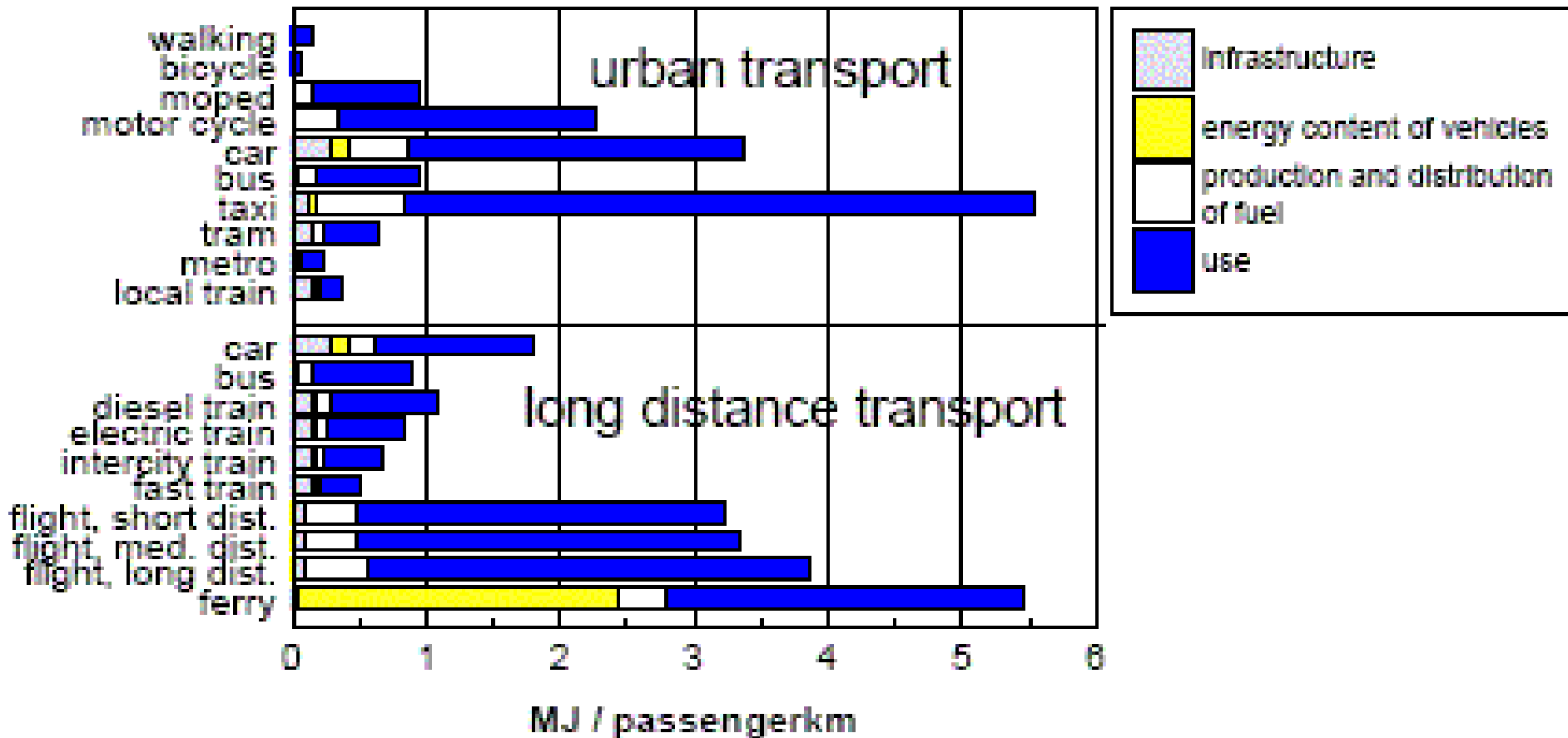
URBAN SPRAWL IN ONTARIO

- 74.6% of Ontarians live in metropolitan areas
- Ontario grew by 6.1% from 1996-2001
- High GTA growth rate, 1996-2001:
 - Vaughan (37%)
 - Richmond Hill (30%)
 - Brampton (21%)
 - Markham (20%)
 - Overall (9.8%)



Source: <http://www.gov.on.ca/FIN/english/demographics/cenhi1e.htm>

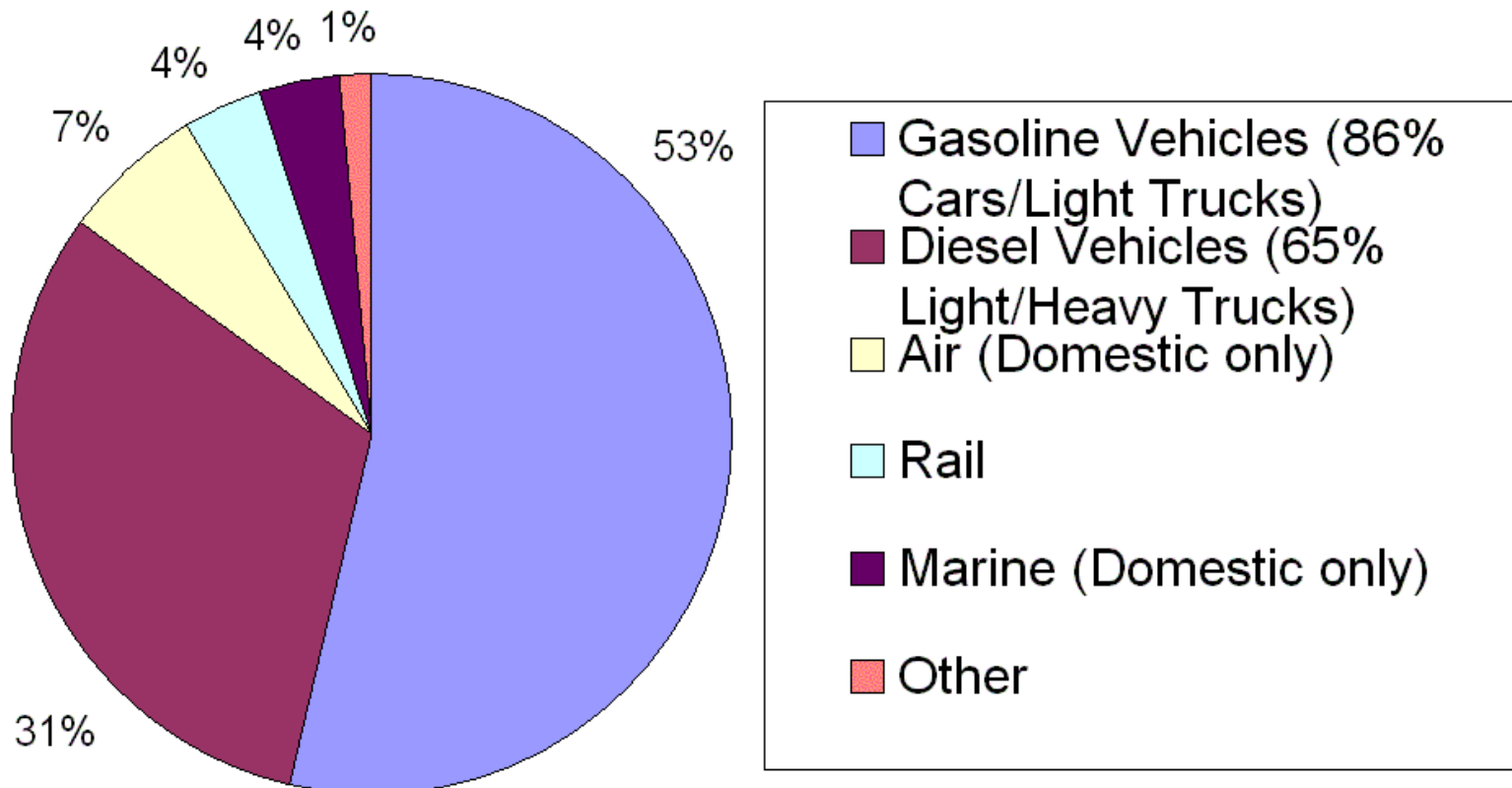
ENERGY EFFICIENCY



POLLUTION

- Transportation: 31% of Canadian CO2 emissions
- Reducing our dependence on fossil fuels and the combustion engine is essential to having cleaner air

Transportation CO2 Emmissions: Canada



AIR POLLUTION

- Kills over 1800 people annually in Ontario alone
- Hamilton has a 10.4% asthma rate



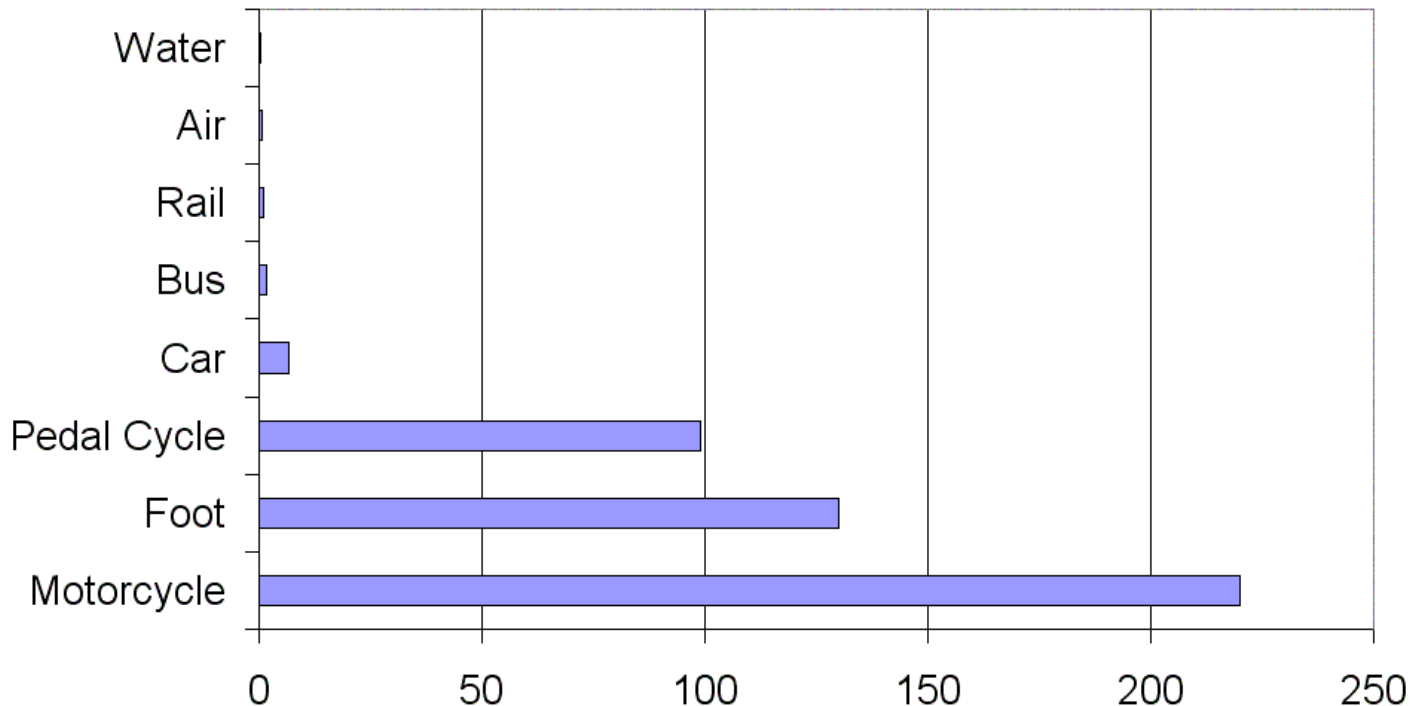
ECONOMIC INCENTIVES

- Ontario Medical Association claims that air pollution costs us \$1-billion annually
- Gridlock in the GTA costs businesses over \$2 billion annually
- Economic growth
- Increased productivity

MAGLEV SOCIETAL INCENTIVES

- Quality of life
 - Cleaner air, healthier cities
 - Faster, safer, less stressful commuting

Risk of Death by Distance Travelled



MAGLEV CASE STUDY

- 300km track in GTA & surrounding area
- >200km/hr design speed
 - Union Station (Downtown Toronto) to Hamilton <30min
- Design capacity: >500000 passengers/hr
 - 75-lane highway equivalency
 - Sufficient infrastructure capacity for future growth
- Pollution prevention of 42Mt carbon at max utilization
 - Equivalent to 71% of Canada's total carbon emissions or 2.3x current transportation emissions

THE MAGLEV ADVANTAGE

- The Answer to Environmental Sustainability
 - Energy Efficiency
 - Pollution
 - Land Use Policy & Urban Sprawl
- Social & Economic Incentives
 - Safety
 - Quality of life
 - Economic growth

CONCLUSION

- Maglev offers numerous advantages over contemporary modes of transportation
- Maglev is a potential solution to sustainability issues affecting Canada and the world
- Keys to Future Success:
 - Cooperation among government, academia and industry
 - Financing
 - R&D of a Marketable Product
 - Right of way for Maglev infrastructure

ACKNOWLEDGEMENTS

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