CANADA’S NEED FOR AN ELECTROMAGNETIC LEVITATION RAIL INFRASTRUCTURE

Presentation for the 8th Canadian Pollution Prevention Roundtable,
Ottawa, Ontario - April 28 & 29, 2004
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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

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

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
  - 500,000 passengers/hr → 75-lane highway

Carrying Capacity of Various Transit Systems

- Suburban Railway
- Metro
- Light Metro
- Tramways
- Buses

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 Emissions: Canada

Source: http://www.nrcan.gc.ca/es/ceo/update.htm
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

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

I would like to thank Environment Canada and C2P2 for giving me the opportunity to participate in this roundtable.