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# Energy Security in Nova Scotia

Larry Hughes
Energy Research Group
Electrical and Computer Engineering
Dalhousie University
Halifax, Nova Scotia, Canada
larry.hughes@dal.ca

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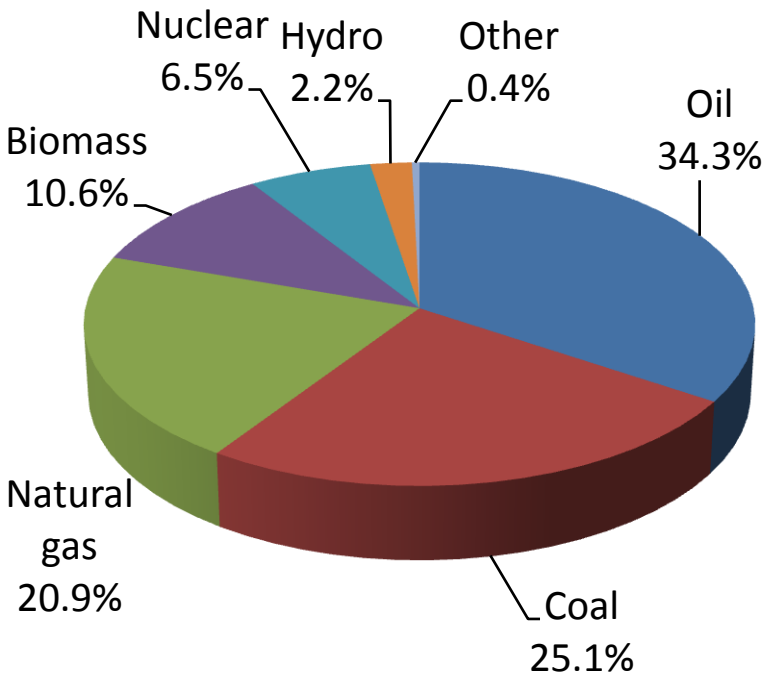
Larry Hughes, PhD
Energy Research Group
Department of Electrical and Computer Engineering
Dalhousie University
http://lh.ece.dal.ca/enen

# What if…

Your home is heated with fuel oil. In late December, supply shortages occur because of refinery failures in the United States. Despite pleas to increase production, OPEC is unwilling to do so. Nova Scotia's premier gives additional tax rebates, but these are unable to offset the rising cost of fuel oil and do not increase supply.

How will you heat your home?

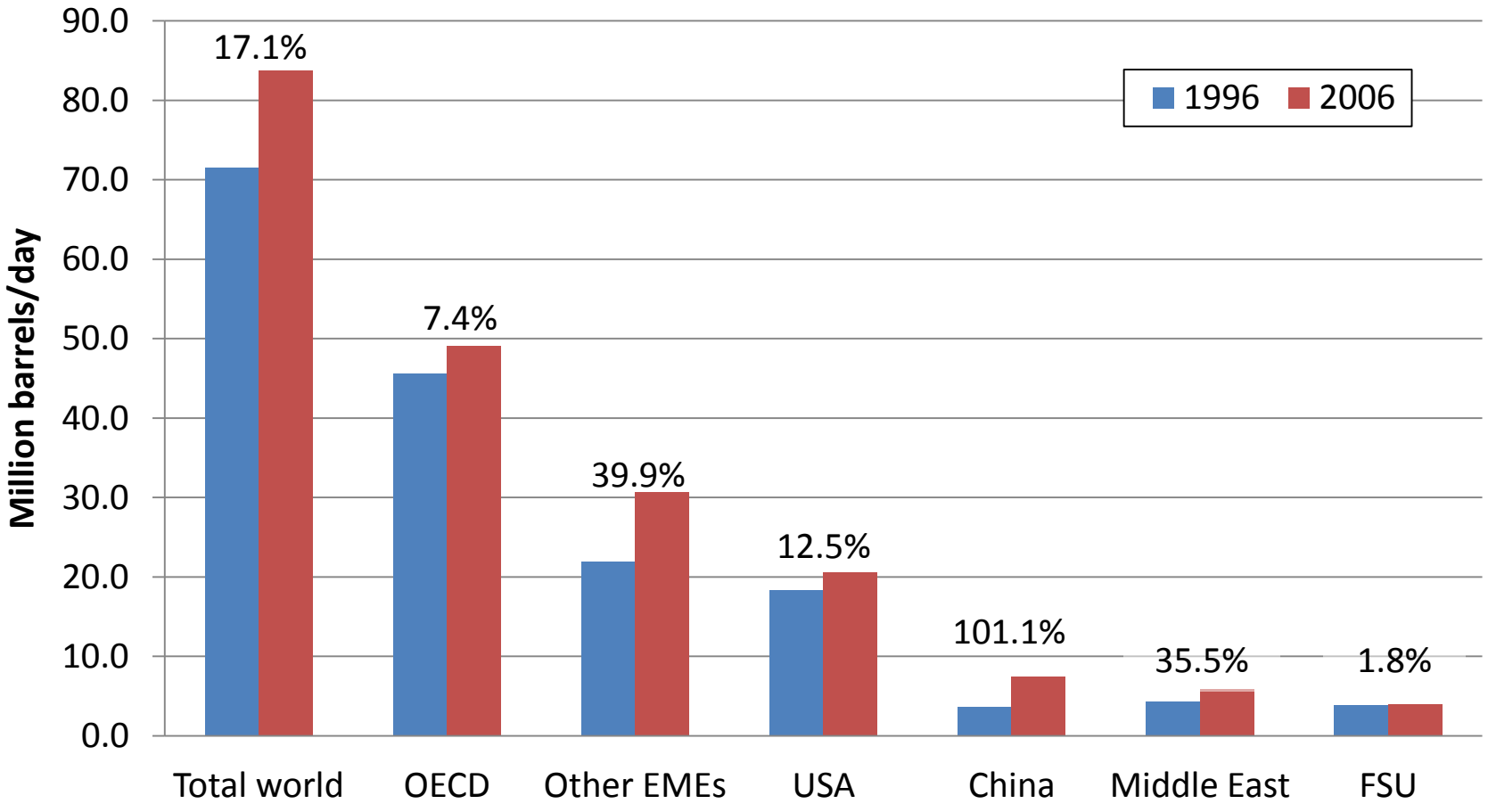
# Oil—the world's lifeblood




- Energy:
  - Over 98% of motorized transportation
  - Space and water heating
  - Lighting and cooking
- Non-energy:
  - Pesticides
  - Plastics
  - Cosmetics
  - Asphalt

*Source: IEA, Key World Energy Statistics, 2006*

# World oil consumption: 1996-2006




*Source: BP Statistical Review of World Energy, 2007*

# Times are changing…

- "Unexpected" issues:
  - Light-sweet vs. heavy-sour crude
  - Exploration and development costs
  - Weakness of US dollar
  - Tensions in Iraq, Iran, Nigeria, Mexico, Venezuela
- Growth in "resource nationalism":
  - Sakhalin and Kovykta: Russia/Gazprom vs. Shell and BP
  - Oronoco: Venezuela vs. ExxonMobil, Chevron, Conoco-Philips
  - Kashagan (Caspian Sea): Kazakhstan vs. Eni

# Medium term trends

- International Energy Agency (IEA):
  - "Supply crunch" starting in 2009:
    - OECD production begins to tighten and fall
    - OPEC spare capacity shortfall
  - OPEC and Russia expected to pick up the slack
- National Petroleum Council:
  - Risks in oil production growth after 2015
  - Mature field decline
  - Geopolitical and financial constraints
  - Supply growth to occur in Middle East (OPEC)

# Energy security

- What:
  - The availability of a regular (i.e., uninterrupted) supply of energy at an affordable price.
- Why:
  - Economic growth
  - Poverty reduction
  - Political stability
- Requires:
  - Supply
  - Infrastructure

*Sources: IEA, 2001; "Energy Security Issues", World Bank, 2005*

# Energy security: Examples

- UK:
  - North Sea oil and natural gas have peaked
  - Relying on Russia (pipeline) and LNG
- United States:
  - World's largest importer of energy products
  - Uses military force to maintain energy security
- China:
  - World's second largest importer of oil products
  - Trade and takeovers to maintain energy security

# Mr. Harper and his energy superpower

- "…an ocean of oil soaked sand lies underneath the muskeg of northern Alberta…"
- "We believe in the free exchange of energy products based on competitive market principles, not self-serving monopolistic political strategies."
- "…a new energy superpower…"
- "…a green energy superpower…"
- "…a bastion of world energy security…"

*Sources: Globe and Mail, 15 July 2006; Office of the PM, June 2007*

# Energy security: Canada

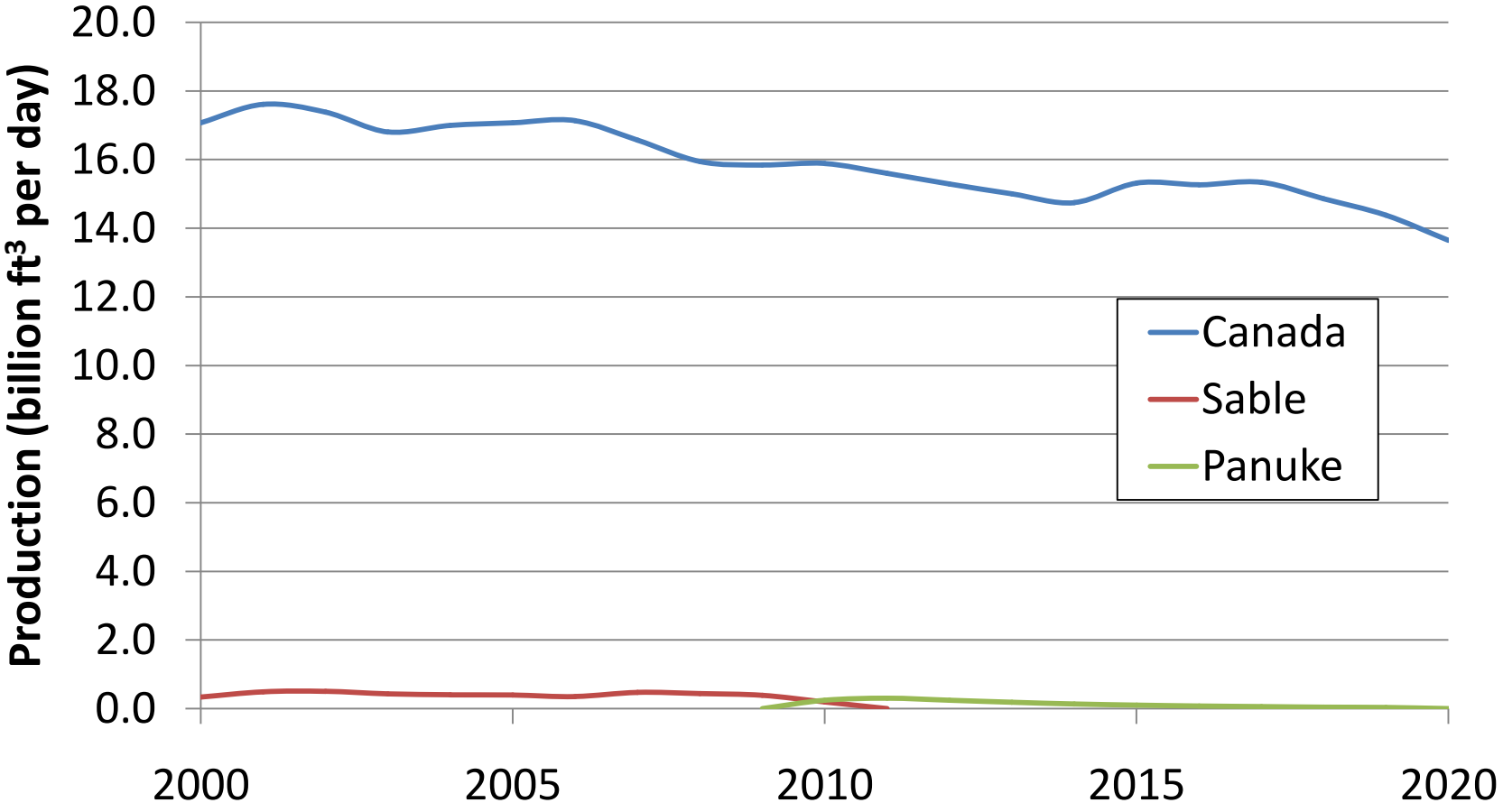
- Oil:
  - Alberta, Saskatchewan, Newfoundland
- Natural gas:
  - B.C., Alberta, Saskatchewan, Frontier
- Coal:
  - B.C., Alberta, Nova Scotia
- Hydroelectricity:
  - B.C., Manitoba, Quebec, Newfoundland
- Uranium:
  - Saskatchewan

# Nova Scotia's energy suppliers

| Fuel source | Supply | | Suppliers |
|---|---|---|---|
| Refined petroleum products | 178.3 PJ | 63.1% | North Sea, Venezuela, Middle East, NFLD, U.S. |
| Coal (imported) | 69.1 PJ | 24.5% | Colombia, Venezuela, U.S. |
| Renewables (non-utility applications) | 16.6 PJ | 5.9% | Nova Scotia |
| Coal (local) | 10.3 PJ | 3.7% | Nova Scotia |
| Natural gas liquids | 3.1 PJ | 1.1% | Imported, Nova Scotia |
| Primary electricity | 2.7 PJ | 1.0% | Nova Scotia |
| Natural gas | 2.3 PJ | 0.8% | Nova Scotia |
| Total | 282.4 PJ | 100.0% | |

*Sources: Statistics Canada, NRCan*

# Nova Scotia's offshore




*Source: Canada's Energy Future: Scenarios to 2030, NEB, 2007*

# Can Nova Scotia rely on Canada?

- No significant energy corridors:
  - 300 $MW_{el}$ connection to New Brunswick
  - Natural gas pipeline to New England
- NAFTA proportionality clause on energy exports

# Nova Scotia's approach

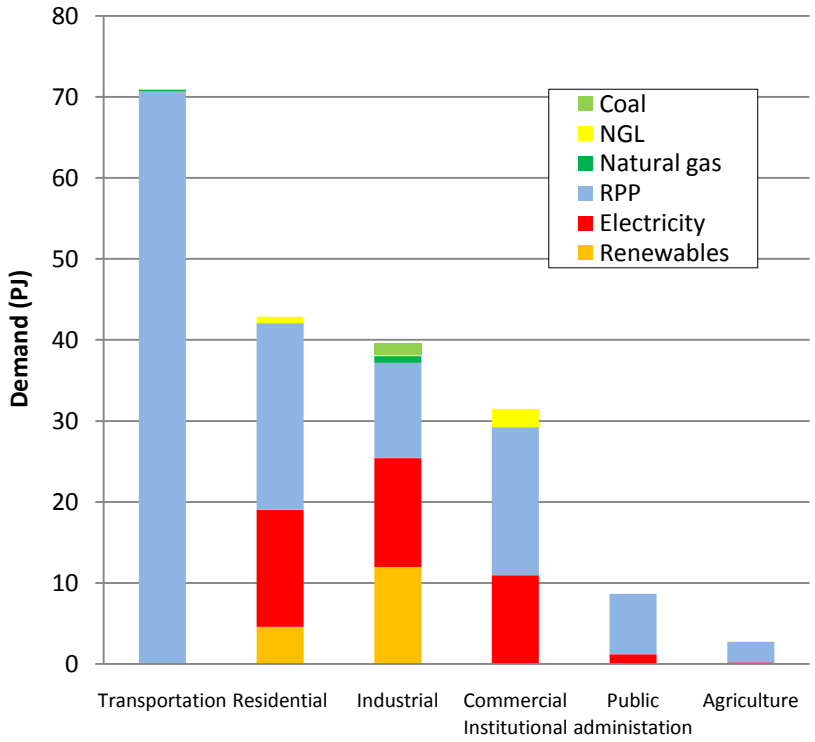
- 2001 strategy: Energy security for the US
- 2007 Energy Strategy "renewal":
  - Climate change
  - Electricity
  - Natural gas
- Energy security in 2007:
  - Focus on electricity
  - "Energy security through diversity"

# The three ‘R’s of energy security: Review, reduce, and replace

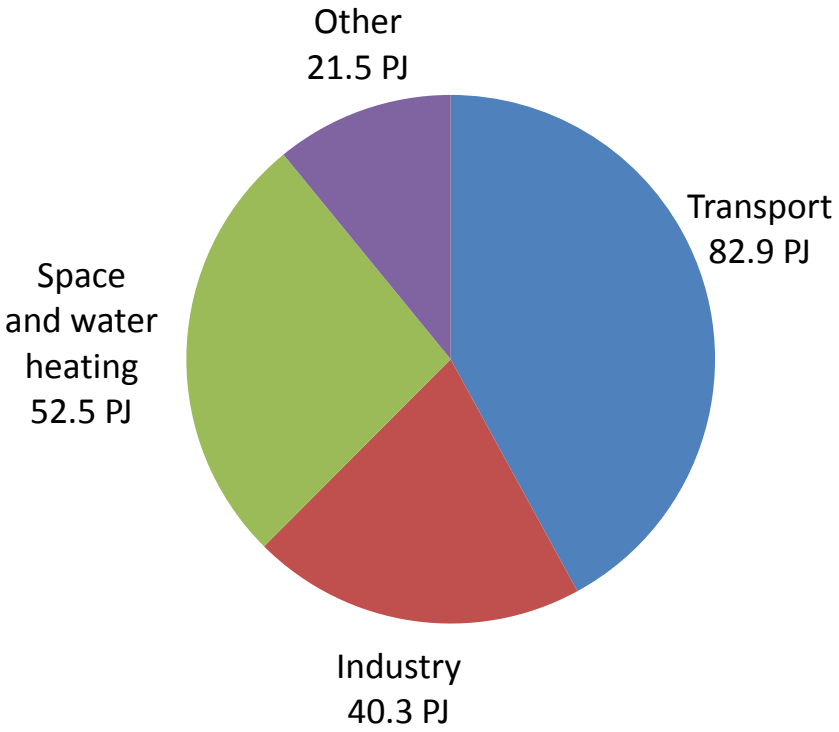
- Review:
  - Domestic energy supplies and infrastructure
  - End-use
- Reduce:
  - Reduce demand
  - Conservation and efficiency measures
- Replace:
  - Replace imported energy with secure sources, preferably clean and domestic

# Review: It's the end-use, stupid!

## By final demand

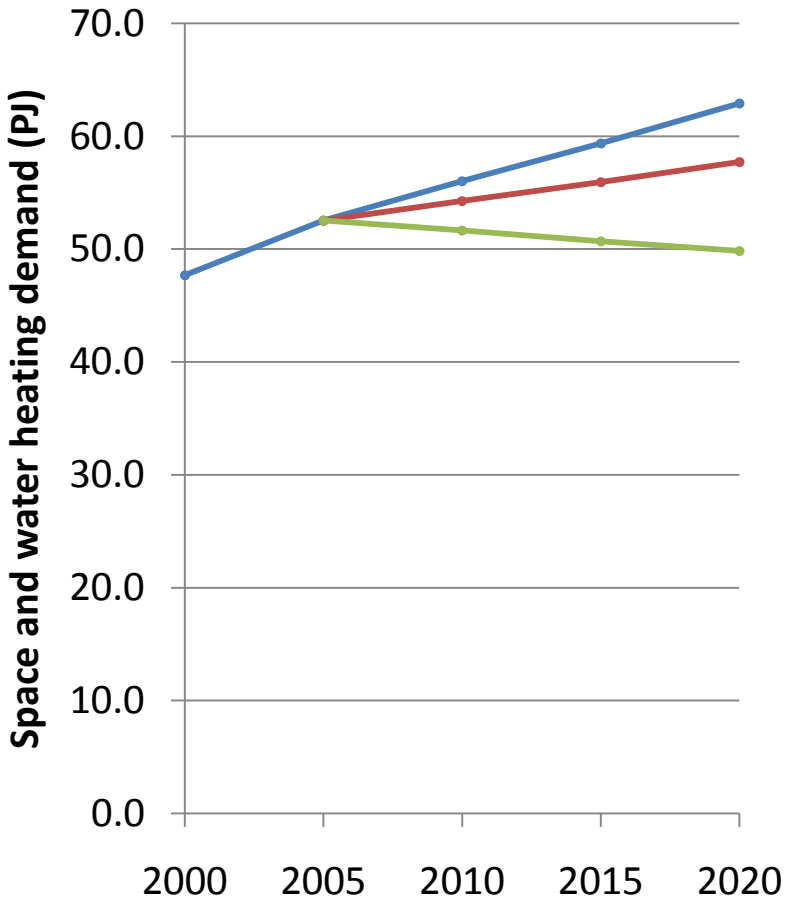



## By energy end-use




*Sources: Statistics Canada; NRCan OEE; CCPA-NS, Hughes*

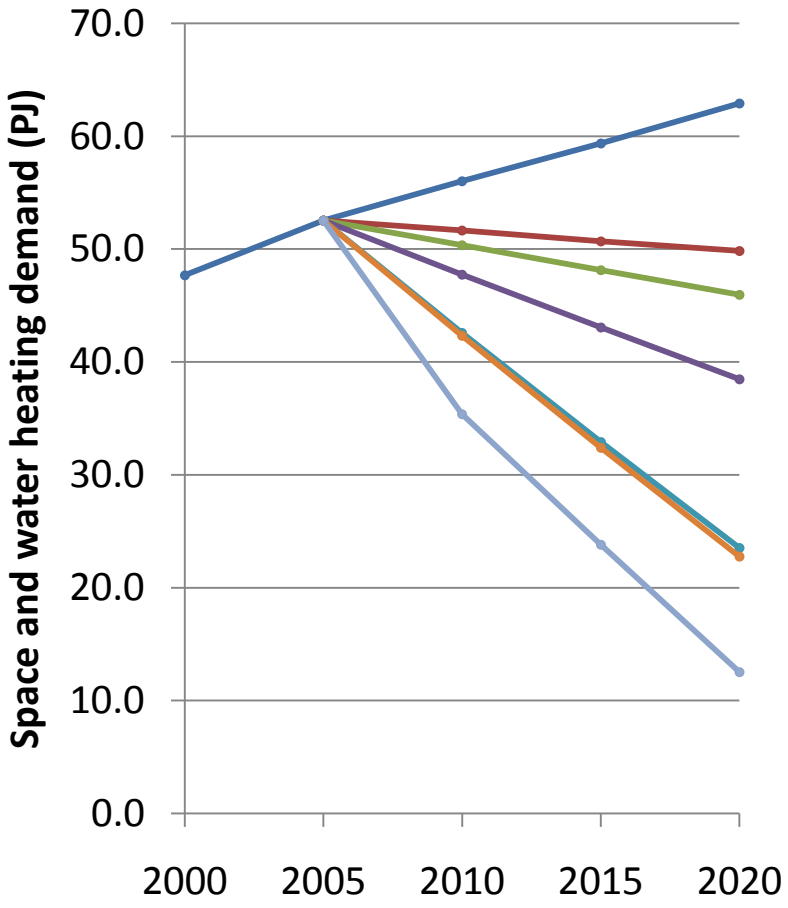
# Reduction: Heating




- New buildings:
  - 50 percent reduction vs. existing buildings
  - Building techniques and materials
  - 5.2 PJ reduction
- Existing buildings:
  - One percent per year reduction
  - Conservation and retrofits
  - 7.9 PJ reduction
- Ideally: 13 PJ reduction

*Source: Canada's Energy Outlook 2006-2020, NRCan*

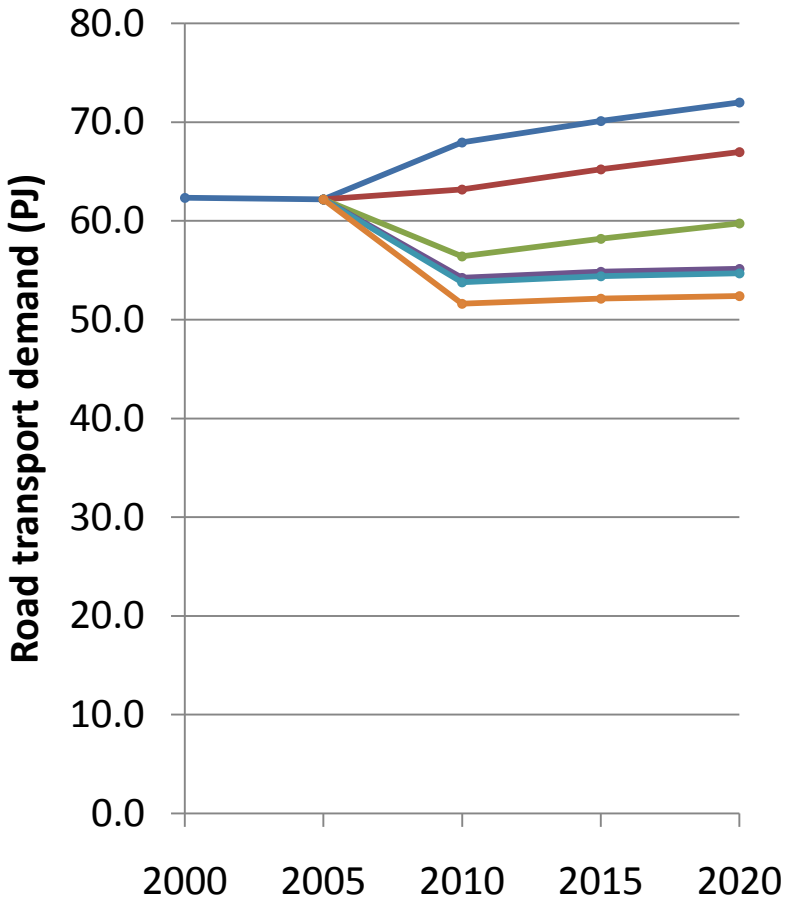
# Replacement: Heating




- Reduction (13 PJ)
- Solar (new buildings):
  - 75% demand from solar
  - 3.9 PJ
- Solar (existing buildings):
  - 15% demand from solar
  - 7.5 PJ
- Wind heating:
  - 30% demand from wind
  - 15 PJ (1,900 turbines)
- District heating:
  - 1.5% demand from district heating
  - 0.7 PJ
- Biomass:
  - 20% from biomass
  - 10.2 PJ (700,000 tonnes)
- 12.5 PJ shortfall

*Source: Canada's Energy Outlook 2006-2020, NRCan*

# Reduction: Transportation




- 90km/h limit:
  - 7% demand reduction
  - 5 PJ
- Tune-up:
  - 10% demand reduction
  - 7.2 PJ
- Fuel economy
  - 0.5% reduction per year
  - 4.6 PJ
- 1% modal shift:
  - 0.5 PJ
- 5% modal shift:
  - 2.3 PJ
- 52 PJ shortfall

*Source: Canada's Energy Outlook 2006-2020, NRCan*

# Replacement: Transportation

- Nova Scotia's road transport demand: 1.228 billion litres of gasoline

| Fuel source | Yield | Requirements | Comments |
|---|---|---|---|
| E5 (5% ethanol) Corn: 400 litres/t | 5t/ha | 42,900 ha | 10.5% Nova Scotia's farmland |
| | 10t/ha | 21,467 ha | 5.3% Nova Scotia's farmland |
| E85 (85% ethanol) | 5t/ha | 729,930 ha | 179% Nova Scotia's farmland |
| | 10t/ha | 365,965 ha | 89% Nova Scotia's farmland |
| Coal-to-liquids (Fischer-Tropsch) | 500 litres/t | 2.5 Mt coal/yr | 5.5 Mt coal/yr (2.5 Mt transport + 3 Mt electricity) or 40 years supply |
| Forest biomass (Fischer-Tropsch) | 210 litres/t | 5.8Mt biomass | 145% of Nova Scotia's forest yield (about 4 Mt/yr) |

*Source: Energy Security and Nova Scotia, CCPA, Hughes*

# Nova Scotia…

- Is part of an “energy superpower”, but it
  - relies on imported energy sources,
  - is not ready for energy price rises,
  - is not ready for energy shortages,
  - has no short term energy security policies,
  - has no long term energy security policies,
  - is not taking advantage of domestic energy sources,
  - is not reducing or replacing energy, and
- is energy *insecure*.

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