



National Energy
Board

Office national
de l'énergie

ELECTRIFICATION AND CANADA'S ENERGY FUTURE

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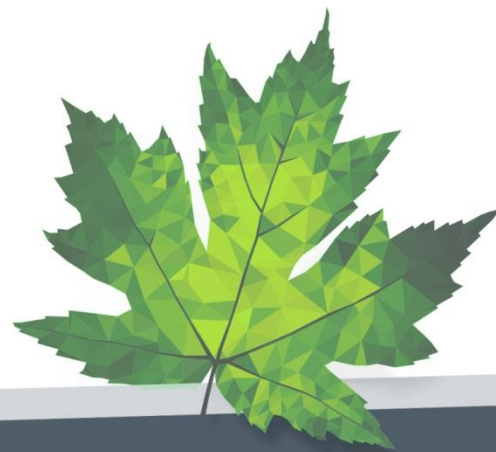
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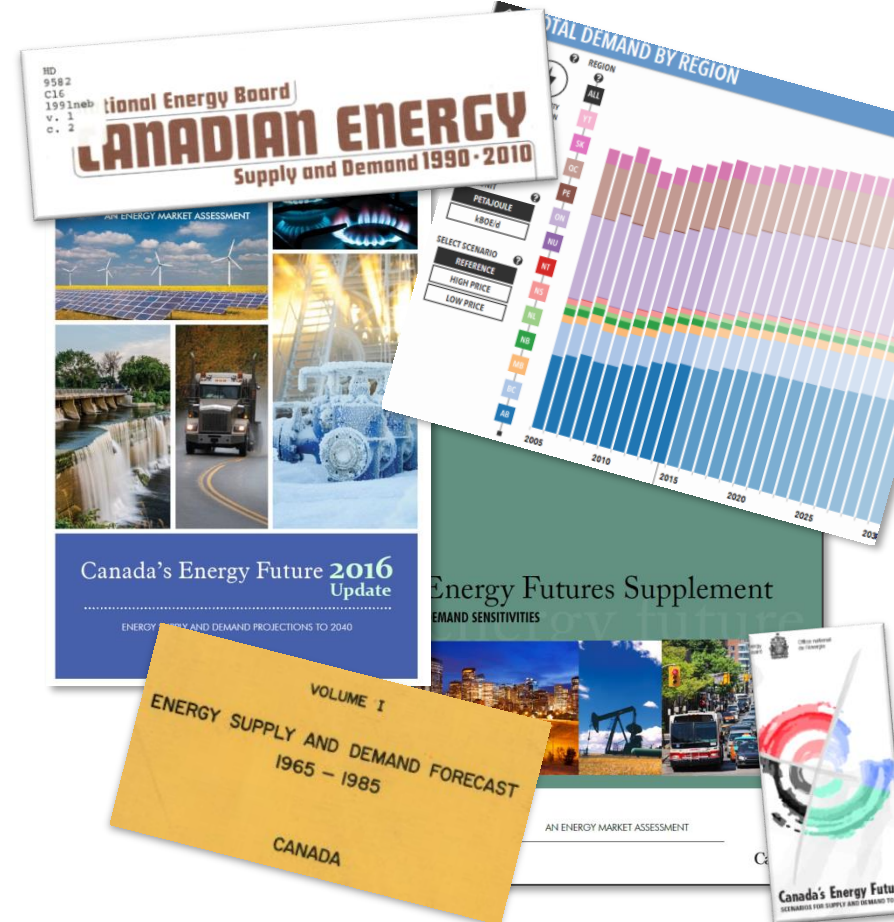
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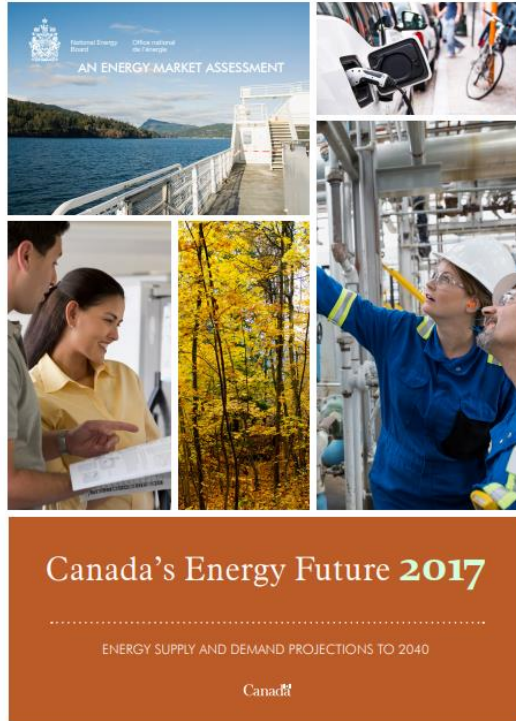


National Energy Board and Energy Futures

- The NEB's Energy Futures (EF) is a series of reports that provide long-term energy supply and demand projections for Canada
- Similar to the EIA's Annual Energy Outlook
- 2017 marked 50 years of NEB supply and demand outlooks



Energy Futures 2017



This presentation will focus on electricity results for 2 EF2017 scenarios:

Reference Case

- Currently announced policies
- Consensus view prices, economic growth
- Carbon price flat (nominal) post 2022

Technology Case

- Greater adoption of select technologies (EVs, solar and wind power, heat pumps)
- Rising carbon price
- Lower crude oil price

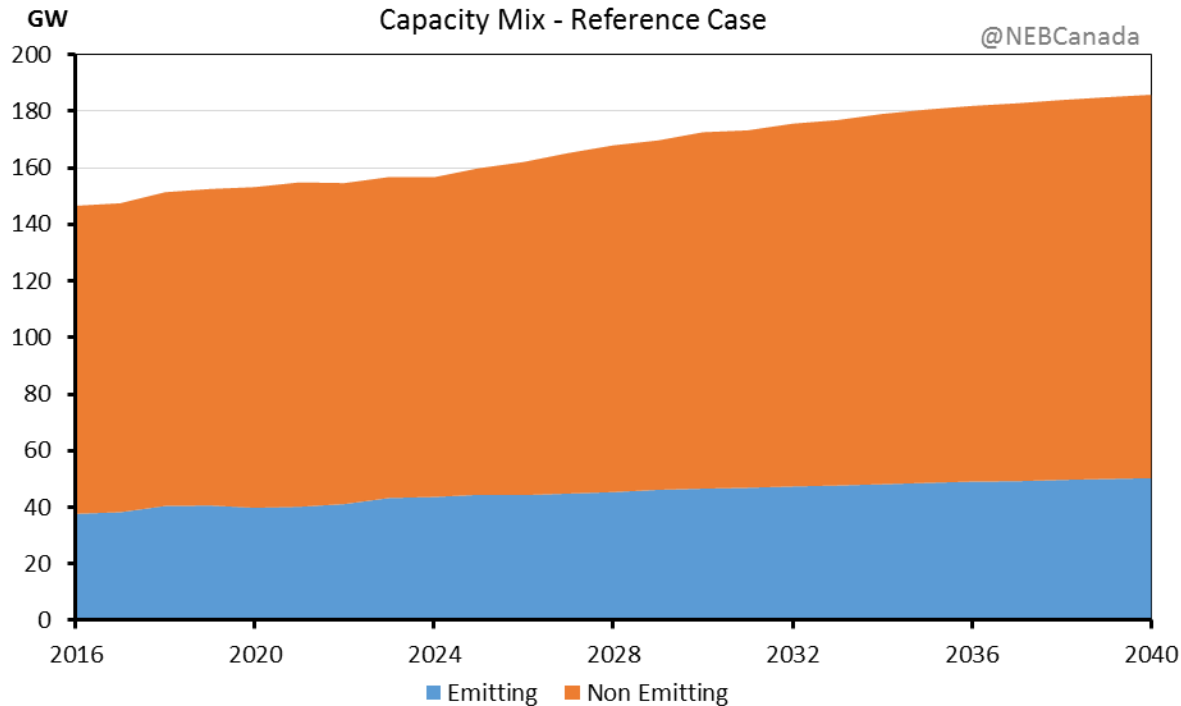
NEB Modeling System

- Main Model: ENERGY 2020, an integrated energy model creates the demand and electricity projections
- Detail for all 13 provinces and territories
- Four primary demand sectors: residential, commercial, industrial, transportation (all with detailed subsectors)
- Electricity production defined for utility and industry across numerous technologies
- The results discussed in this presentation are based on the 2017 Energy Futures Report.

Key Findings

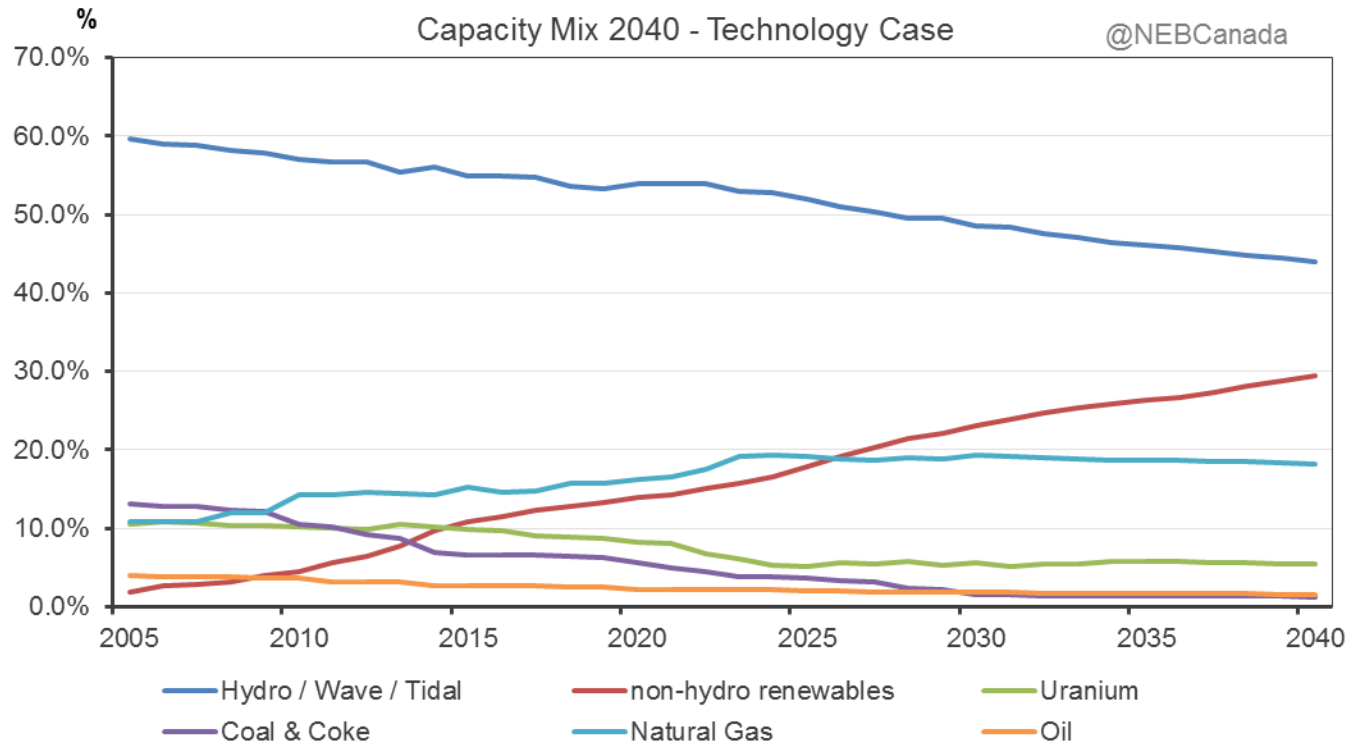
- Electricity will have key role in future energy transition.
- In both demand and supply there are interesting regional differences.
- There is potential for electrification in the residential and commercial sectors although this should be viewed in conjunction with improved efficiency.
- Transportation sector electrification increases the sector's electricity demand but its share remains less than 1% of total end-use demand.
- The findings of this study show end-use electrification and power sector decarbonization contribute to limiting fossil fuel growth.

Over the past few years favorable policies and declining costs have spurred the deployment of renewables.



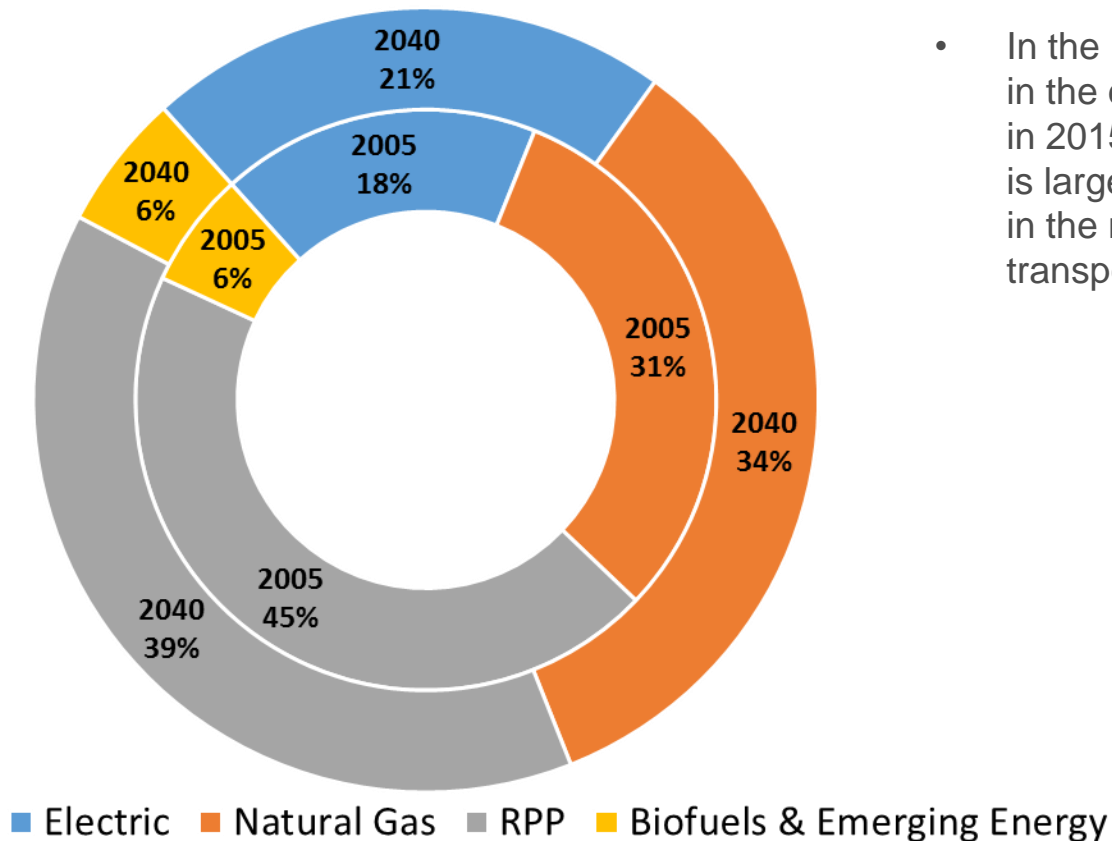
- In 2015 non-hydro renewables accounted for 10% of total installed capacity, this more than doubles by 2040 in the Reference Case.
- In the Technology Case installed capacity for solar and wind reach 25 GW and 31 GW respectively by 2040.

The shift towards wind, and solar causes Canada's already low-emitting electricity sector to become even greener. By 2040, non-hydro renewables make up 30% of the supply mix.



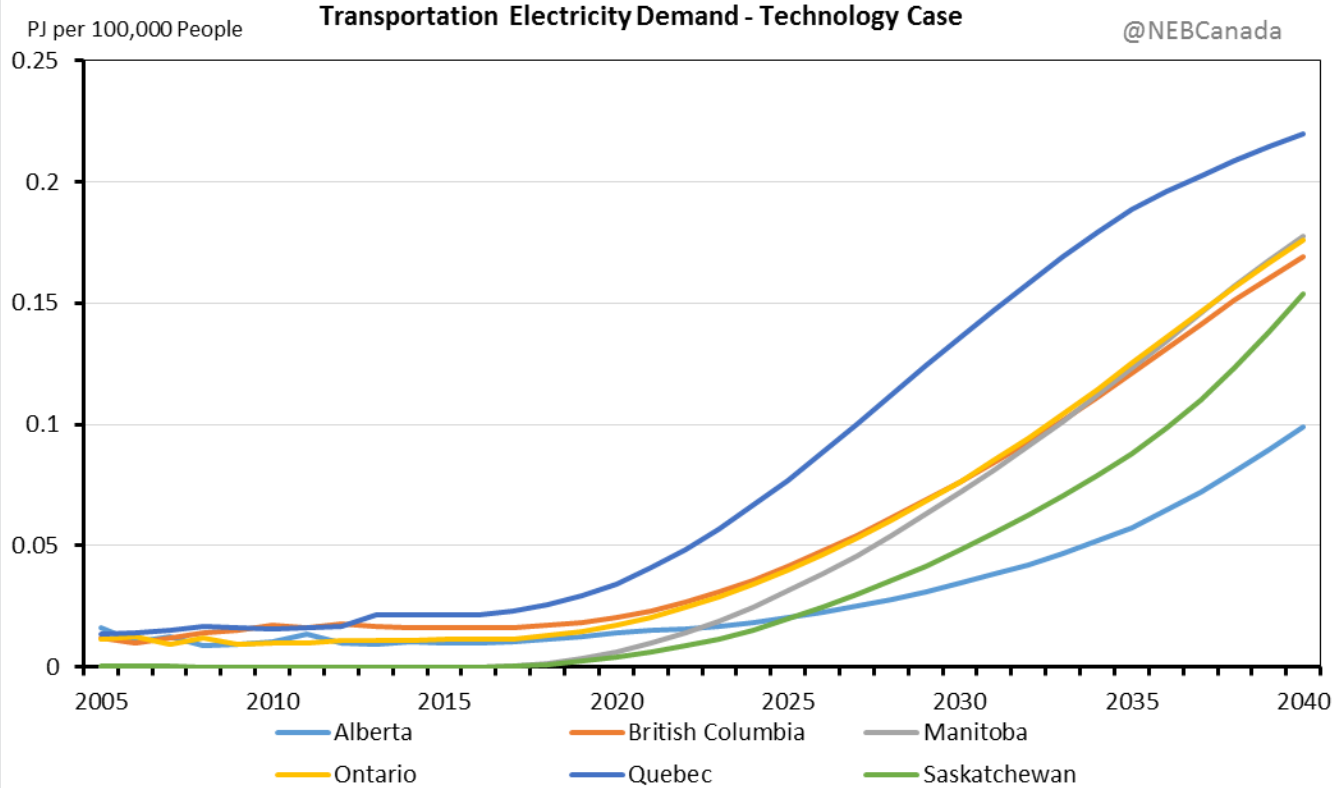
Electricity Demand 2005 vs 2040

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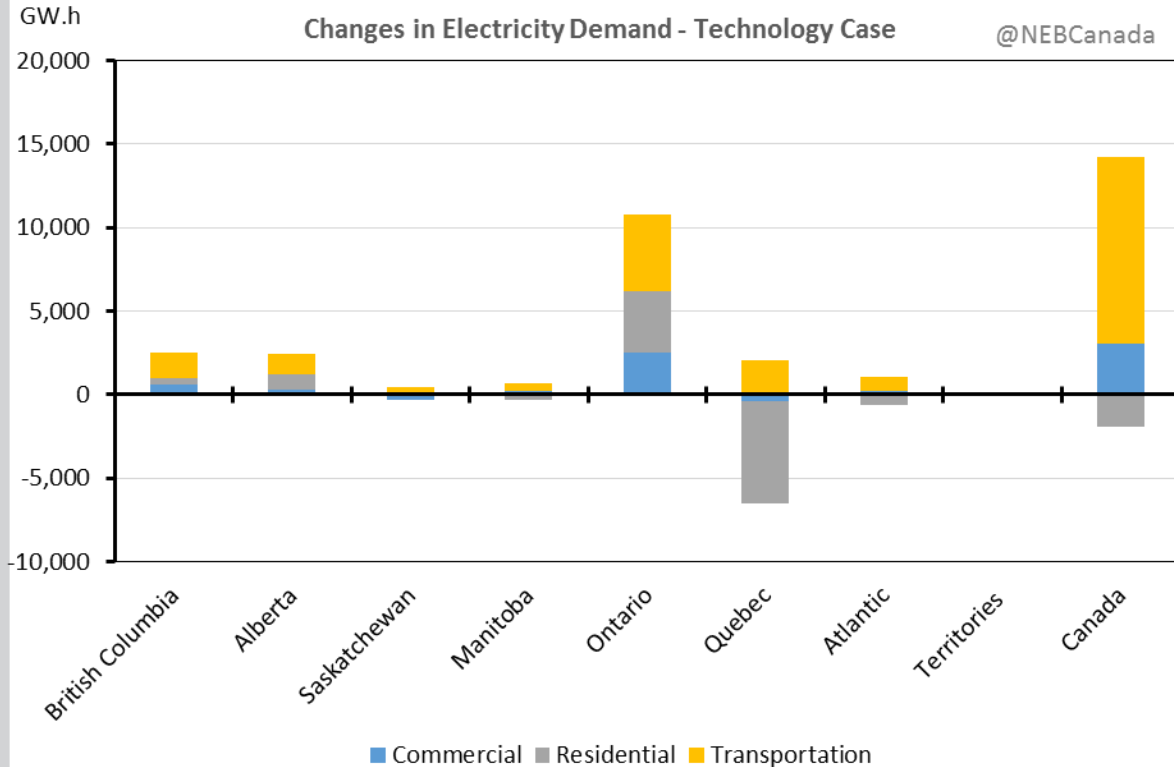
- In the Reference Case, electricity demand in the end-use sectors rise from 1 800 PJ in 2015 to 2 300 PJ in 2040. This growth is largely driven by end-use electrification in the residential, commercial and transportation sectors.

EV Adoption by Region



- Sales grow quickest in Quebec because of the province's EV mandate.
- By 2040, EVs account for 34% of all passenger vehicles; total transportation energy demand in the Technology Case is 5% lower than the Reference Case.

Increased EV adoption boosts electricity demand, while impact of adding heat pumps for space and water heating varies by province.



- Different technologies are used to heat homes and business.
- In regions like Quebec, with a high share of baseboard heating systems, high penetration of heat pumps decreases electricity demand.
- In contrast, the switch increases electricity demand in other provinces, such as Ontario, Alberta and British Columbia.

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