

Impacts of Carbon Management Policies on Electricity Markets in Canada

CERI Breakfast Overview

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Canadian Energy Research Institute

Overview

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Our mission is to provide relevant, independent, and objective economic research of energy and environmental issues to benefit business, government, academia and the public.

CERI publications include:

- Market specific studies
- Geopolitical analyses
- Commodity reports (crude oil, electricity and natural gas)

In addition, CERI hosts an annual Petrochemicals Conference.

Canadian Energy Research Institute

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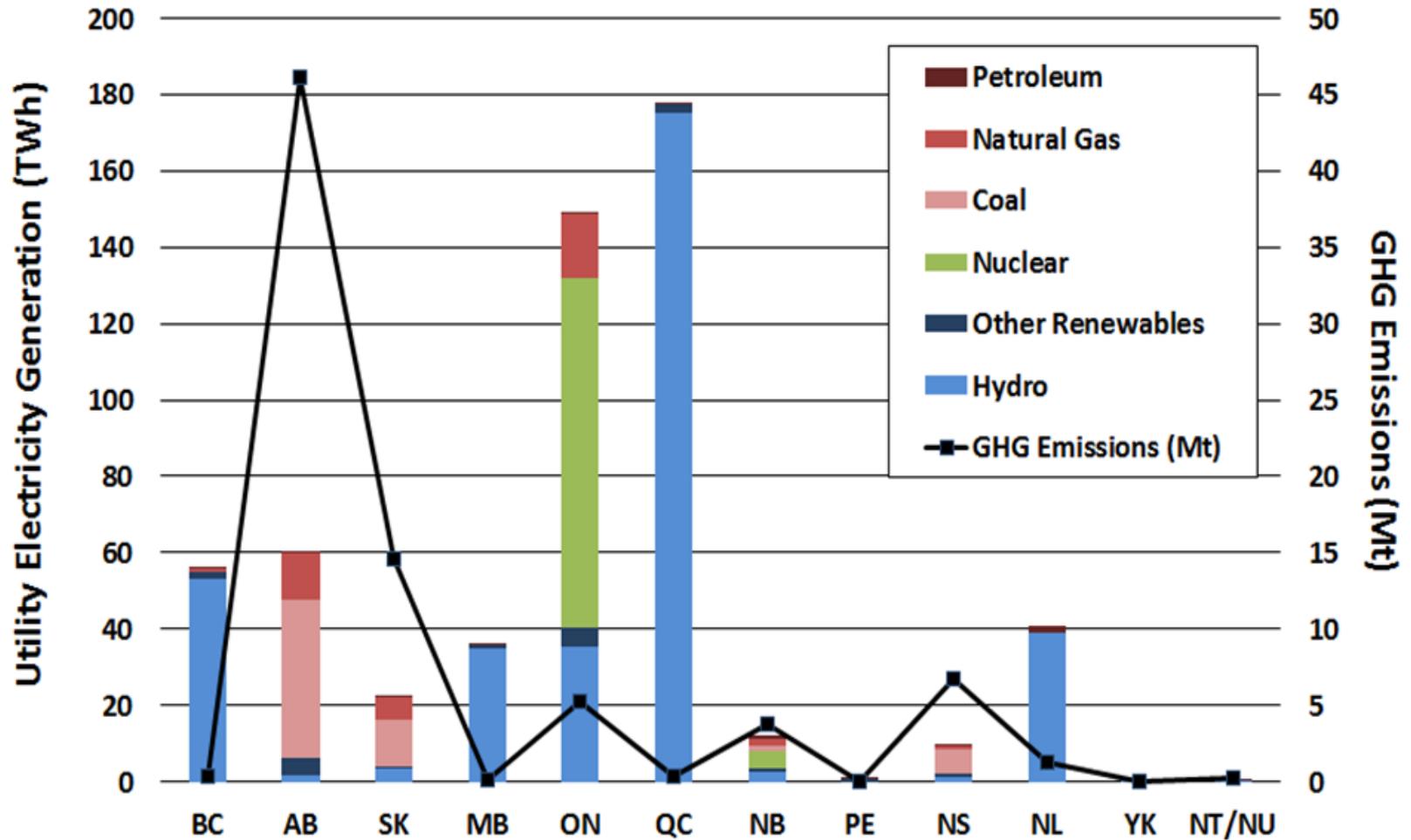
Presentation Outline

- Background
- The Electricity System
- Carbon Management Legislation and Regulatory Frameworks
- Impacts on Price and Operations
- Conclusion

Background

- Canadian electricity supply is being seen as a key element in various policies to reduce carbon emissions in the country.
- Electricity supply and demand varies by province. Each has unique characteristic of resource availability and demand requirements.
- Under normal growth forecasts we see modest growth in electricity demand (1% to 2% annually). Under scenarios which encourage electrification this growth rate could be much higher.
- The marginal cost of new supply is decreasing and lower than current average costs in most jurisdictions. Some of the cheapest options are low or zero emitting.
- Canada already has a low emissions electricity system where approximately 84% of generation comes from zero emissions options.

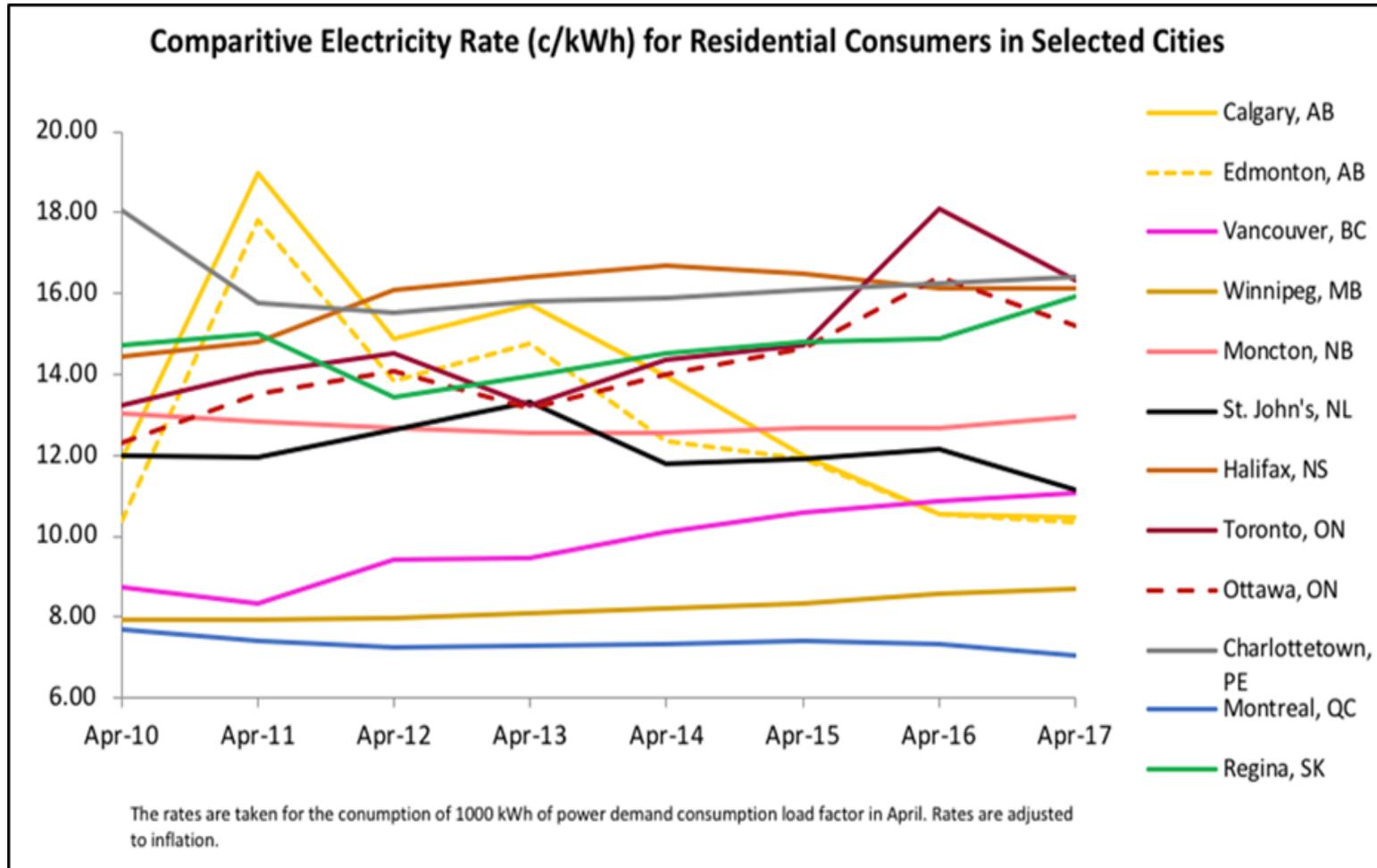
Electricity Sector GHG Emissions



Study Objectives

1. What is the impact of carbon management policies on the retail price for electricity?
2. What are the key policies affecting electricity system GHG emissions?

Residential Electricity Prices



GHG Targets

Jurisdiction	GHG emission reduction target by 2030	GHG emission reduction target by 2050
Canada	30% below 2005 levels (approximately 523 Mt of CO ₂ e)	No target for total GHG emissions; 80% below 2005 levels for GHG emissions from federal operations
Newfoundland and Labrador	35-45% below 1990 levels	75-85% below 2001 levels
Prince Edward Island	35-45% below 1990 levels	75-80% below 2001 levels
Nova Scotia	35-45% below 1990 levels	75-80% below 2001 levels (also 80% below 2009 levels)
New Brunswick	35% below 1990 levels (≤10.7 Mt of CO ₂ e)	80% below 2001 levels (≤5.0 Mt of CO ₂ e)
Québec	37.5% below 1990 levels	80-95% below 1990 levels
Ontario	37% below 1990 levels	80% below 1990 levels
Manitoba	Under consultation	Under consultation
Saskatchewan	No target for total GHG emissions; 40% below 2005 from electricity	Unclear
Alberta	No target	No target; Under the 2008 Climate Change Strategy, 14% below 2005
British Columbia	No 2030 target; 2020 target is 33% below 2007 levels	80% below 2007 levels
Nunavut	Not established	Not established
Northwest Territories	1,150 kt CO ₂ e (reduction by 290 kt CO ₂ e from 2015 levels)	Not established
Yukon	No target for total GHG emissions; 20% energy intensity reduction for on-grid diesel by 2020 and carbon neutral.	Not established

The Challenge

1. Lack of information regarding specific impacts of individual policies
2. Our reference point ?
 - Alberta's introduction of a carbon price - 2007
 - Ontario passes Green Energy Act – 2009
 - Quebec implements the WCI – 2011
 - Pan Canadian Framework – 2016
3. Electricity trade

Carbon Management Mechanisms

1. Direct Pricing – wholesale tax, retail tax, market pricing through cap and trade
2. Regulations or Policies – coal retirement, renewable set asides, energy efficiency targets, cap on emissions, technology phase outs (i.e. incandescent lights)
3. Indirect pricing – Government incentives and investments

Legislative Framework

1. Pricing – BC tax, AB & Federal levy with output based allocations, ON & QC cap and trade
2. Regulations or Policies – Monitoring and reporting, coal emissions exemptions, feed-in-tariff
3. Indirect pricing – Canada Infrastructure Bank, Green Funds

Pan Canadian Framework on Clean Growth – elements of all three

Legislative Framework continued

1. Newfoundland and Labrador - no carbon management strategy
2. PEI – no carbon pricing
3. Quebec became the first Canadian province to introduce a carbon tax. Quebec carbon levy system (2007-2015) was superseded by a cap-and-trade system in 2013
4. Manitoba's Climate Change and Green Economy Action Plan (2015) committed to cap-and-trade be linked with Ontario and Québec's. However, MB now implementing a carbon tax
5. A Made-in-Saskatchewan Climate Change Strategy (2017) elected not to choose federal government's framework
6. Alberta's new carbon levy is specifically designed to minimize the impact on trade exposed industries and allows for credits to be earned and sold
7. British Columbia's cap-and-trade system repealed

Pricing and GDP Impacts

Year	Nova Scotia (cents/kWh)	Saskatchewan (cents/kWh)	Alberta (cents/kWh)
2020	0.38	0.36	0.27
2025	0.21	0.52	0.23
2030	0.17	0.28	-0.28

1% increase



NS – 4% Industry
and 2% residential

SK – 6% Industry
and 3% residential

AB – approx. 1%

Province	GDP reduction (Dollars)
Newfoundland and Labrador	334,948
Prince Edward Island	124,800
Nova Scotia	356,371
New Brunswick	852,578
Quebec	10,758,979
Ontario	4,310,342
Manitoba	855,141
Saskatchewan	3,865,715
Alberta	12,581,806
British Columbia	4,884,094

Vulnerable Economic Activities

Trade exposed, energy intensive

- Pulp and paper
- Mining
- Oil and Gas
- Petrochemicals

Observations

- Alberta, Saskatchewan and Nova Scotia will see the largest increase in retail prices going forward (> 1%). Much smaller than those increases seen in Ontario.
- Sufficient low cost technology options with low emissions to allow for competitive bidding for supply and demand projects. Avoided cost of new generation has dropped so the economic justification for energy efficiency programs has decreased.
- Renewable set asides and coal retirement the most impactful instruments.
- Electricity system complexity requires a broad understanding (need to consider carbon pricing, electricity for gasoline substitution, electricity for natural gas substitution, interprovincial trade, distributed generation and demand management).
- Carbon management costs are shared between the rate payer and the tax payer, and so both are manageable and broader than just economic considerations.

Electricity is not the only GHG Challenge in Canada

- Our electricity systems are or soon will be some of the cleanest and lowest emitting in the world. They represent 11% of total Canadian emissions and 0.3%, 4% and 19% respectively for Quebec, Ontario and Alberta.
- The challenge are emissions from all our other activities:
 - Energy production (not including electricity) 26%
 - Transportation 24%
 - Buildings and homes 12%
 - Industry 10%
 - Agriculture 10%
 - Waste and other 7%

Thank You for Your Time

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**Economic and Environmental Impacts of Transitioning
to Renewable Electricity or Cleaner Electricity Grids in
Western Canada**

**An Economic Assessment of the International Marine
Organization Sulphur Regulations on Markets for
Canadian Crude Oil**

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