Trading in Energy Innovation

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Overview

1. Energy Council of Canada
2. Key Canadian Energy Facts
3. Overview of Canadian Electricity Industry (CEA)
4. Electricity Supply and Demand (CEA)
5. Electricity Trade (CEA)
6. Trade Recommendations (CEA)
Who is the Energy Council of Canada?

**Goals / Strategic Plan**

- **Addressing Current Energy Matters Via Multi-Sectoral Dialogue**
- **Informing Energy Policy**
- **Sharing World Energy Council Insights**
- **Creating Value for Our Members**

**Founding Member of the World Energy Council (1923)**
- 97 member countries from across the globe

**Membership - 75 executives from:**
- Government (Federal and 7 Provincial)
- Energy industry
- Professional service companies
- All major energy associations
Canada is one of the World’s Largest Energy Players

- **2nd** largest generator of hydroelectricity (10% of global total)
- **2nd** largest Uranium production and Uranium exports (22% of global total)
- **3rd** largest proven crude oil reserves (173 Billion Barrels)
- **5th** largest natural gas producer in the world
- **5th** in biofuel production
- **7th** in installed wind generating capacity

- **5% of total workforce** (905,000 Direct and indirect jobs)
- **10.8% of Canada’s GDP** (7.7% From oil & gas)
- **$90 Billion in capital expenditures** (down 23% from 2014)
- **$124 Billion in energy trade** ($96B exports, $28B imports, 21% of exports)
Canadian Energy Snapshot

Source: Natural Resources Canada
Global Share of Greenhouse Gas Emissions
Canada is < 2%

- China's share has increased significantly
- US and EU emissions have declined steadily
- Canada's share is 1.6%
  Down a bit recently
Canadian Electricity Association

The Energy Council of Canada
Thanks
The Canadian Electricity Association
For Sharing Slides and Information for this Presentation
Electricity Market Structure in Canada

**Alberta**
- Mandatory Power Pool
- Wholesale & retail open access (2001)
- Fully competitive wholesale market

**BC**
- Wholesale and industrial open access
- Vertically-integrated Crown Corporation serves 94% of customers

**Manitoba**
- Wholesale open access
- Vertically-integrated Crown corporation

**New Brunswick**
- Wholesale open access
- Vertically-integrated Crown corporation

**Newfoundland**
- Vertically-integrated Crown Corporation and investor-owned distribution utility.

**Nova Scotia**
- Wholesale open access
- Investor-owned utility regulated on cost-of-service

**Nunavut**
- Vertically-integrated Crown Corporation.

**NWT**
- Vertically-integrated Crown Corporation.
- Investor-owned distribution utility provides service in several communities.

**Ontario**
- Industry unbundling (1998)
- Wholesale & retail open access (2002)
- Hybrid regulation and competition model

**Québec**
- Wholesale open access
- Vertically-integrated Crown corporation
- Expanding IPP development

**Saskatchewan**
- Wholesale open access
- Vertically-integrated Crown corporation

**Yukon**
- Vertically-integrated Crown Corporation.
- Investor-owned distribution utility provides service in several communities.

**PEI**
- Procures electricity from New England market and long-term contracts with New Brunswick.
Electricity supports quality of life, economic well-being, and a clean environment.

- **80,730** Employed
- **648 TW.h** Generation
- **62.8 TW.h** Net Exports
- **Over 80%** Non-Emitting
- **$31.2 Billion** GDP
- **99.91%** Customer Reliability
- **2.69 Billion** Trade Revenue
- **39.16%** CO₂ Eq. Reduction Since 2000

Industry Overview
Supply & Demand

A RESUME OF ANALYTICS FROM MAY 2014 TO MAY 2015
Generating Capacity

(US. & Canada, 2017)

Canada

- Conventional Steam Turbine: 14.49%
- Combustion Turbine: 8.66%
- Internal Combustion Turbine: 0.94%
- Nuclear: 9.78%
- Wind: 8.35%
- Solar/Tidal: 1.43%
- Hydro: 56.36%

Generating Capacity
143.44 GW

United States

- Coal: 24.67%
- Natural Gas: 43.54%
- Petroleum: 3.35%
- Nuclear: 8.90%
- Solar: 1.36%
- Wind: 6.97%
- Hydro: 8.58%
- Biomass: 1.36%
- Geothermal: 0.32%
- Other: 0.42%

Generating Capacity
1,177.18 GW

Data Source: U.S. Data from Energy Information Administration, 2016; Canada Data from StatCan, CANSim Table 127-0009
Data Retrieved: May 2018; Visual Created by the Canadian Electricity Association
Electricity Demand

ELECTRICITY DEMAND BY SECTOR IN CANADA (2016)

Total Electricity Demand in Canada for 2016 = 501.90 TWh

- Industrial: 41%
- Residential: 33%
- Commercial and Institutional: 20%
- Agriculture: 2%
- Public Administration: 3%
- Transportation: 1%

Data Source: StatsCan CANSIM Table 128-0016
Data Retrieved: May 2018; Visual Created by the Canadian Electricity Association
Electricity Generation Breakdown

**Generated**

*Utilities Only (2016)*

- **Hydro**: 60.82%
- **Nuclear**: 16.45%
- **Coal and Coke**: 10.55%
- **Natural Gas**: 7.19%
- **Oil and Diesel**: 0.59%
- **Biomass**: 0.38%
- **Solar**: 0.30%
- **Wind**: 5.06%
- **Tidal**: 0.00%
- **Steam from Waste Heat**: 0.02%

*Utilities and Electric Utilities (2016)*

- **Hydro**: 59.55%
- **Coal and Coke**: 9.50%
- **Natural Gas**: 9.88%
- **Oil and Diesel**: 0.62%
- **Biomass**: 1.24%
- **Solar**: 0.31%
- **Wind**: 4.73%
- **Tidal**: 0.00%
- **Steam from Waste Heat**: 0.04%

**Generated**

- **587.91 TWh**

- **648.29 TWh**
Supply Industries and Utilities by Province

2016 Supply (TWh): Industries and Utilities

Data Source: StatsCan  CANSIM Table 127-0001, 128-0014, 127-0007
Data Retrieved: June 2018; Visual Created by the Canadian Electricity Association
Canada’s Renewable and Existing Electricity Market

• 65% of Canada’s electricity comes from renewable sources and 80% from non-GHG emitting sources

• Pursuant to Canada’s federal coal regulations and various provincial plans, coal plants will need to replaced by lower emitting or non emitting combinations of sources of electricity by 2030. This will result in an increase of intermittent renewables, interconnections with provinces that have hydroelectric power, and thermal or nuclear generation. It is also likely that gas-fired generation will be an important supply option.

• Intermittent forms of renewable energy, especially wind and solar, are likely to see significant growth in many jurisdictions as both resources have recently seen dramatic reductions in costs and prices.
CEA’s Recommendations for an Increasingly Electrified Canadian Economy

1. **Promote RD & D projects to support electrification**
   - Federal and provincial governments should continue to support research and development for new electrification and decarbonization technologies

2. **Modernize and streamline policies and regulations to facilitate electrification**
   - Government should conduct thorough reviews of energy policies and regulations to identify overlap and opportunities for improvement

3. **Build on Canada’s hydropower advantage**
   - Allow for more flexible regulations that incentivize further investment in Canada’s untapped hydroelectric potential

4. **Advance electrification agenda in North American context**
   - Capitalize further on more north-south trade and connection opportunities between Canada and the United States to help both countries achieve their emissions targets
Trade

ELECTRICITY TRADING BETWEEN CANADA AND THE USA BEGAN IN 1901.
The Integrated North American Grid

Details: Lines shown are 345kV and above. Transmission Lines under 345KV do not appear on this map.
Major Canada-U.S. Transmission Interconnections

Source: National Energy Board
Data Retrieved: July 2016; Visual Created by the Canadian Electricity Association
Canadian Electricity Imports and Exports by Region (2017)

Data displayed are in gigawatt-hours. Numbers may not sum due to rounding.

Trade Volume

Canada-U.S. Electricity Trade Volume (1990-2017)

Data Source: National Energy Board (NEB) and Statistics Canada, CANSIM Table 176-0064
Data Retrieved: May 2018; Visual Created by the Canadian Electricity Association
Trade Prices

Canada - U.S. Electricity Trade Prices (1997-2017)

Exports (CDN$/MW.h)

Imports (CDN$/MW.h)
Trade Revenue

Canada - U.S. Trade Revenue (1990 - 2017)


Global Financial Crisis (2009)

Data Source: National Energy Board (NEB).
Data Retrieved: July 2017; Visual Created by the Canadian Electricity Association
CEA’s Recommendations for Increased North American Trade

Regarding the North American Free Trade Agreement (NAFTA)

1. Maintain an energy chapter in NAFTA;
2. Protect zero tariffs and duties for energy commodity trade;
3. Have Mexico sign as a full Party to the Energy Chapter;
4. Ensure better regulatory alignment, especially as it pertains to:
   • Permitting cross border energy infrastructure;
   • Improved labour mobility; and
   • Strong investor protections.
5. Prohibit discrimination against foreign energy sources;
6. Bolster the security standards of energy infrastructure
THANK YOU!

Coming up in 2018

- North America Region Energy Forum: *Energy Issues & Opportunities in a Trilateral Context*  
  November 14 | Calgary
- Regional Event: *Indigenous Energy in Canada*  
  November 15 | Calgary
- Canadian Energy Person of the Year (CEPY) Award Gala Honouring Chief Jim Boucher  
  November 15 | Calgary
- Toronto Global Forum Energy Panel Breakfast  
  December 10-12 | Toronto

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