



Canadian
Electricity
Association

Association
canadienne
de l'électricité

North American Electricity Futures

Patrick Brown

Director, U.S. Affairs, Canadian Electricity Association

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Agenda

1. Canada-U.S. electricity relationship

- Background
- Benefits

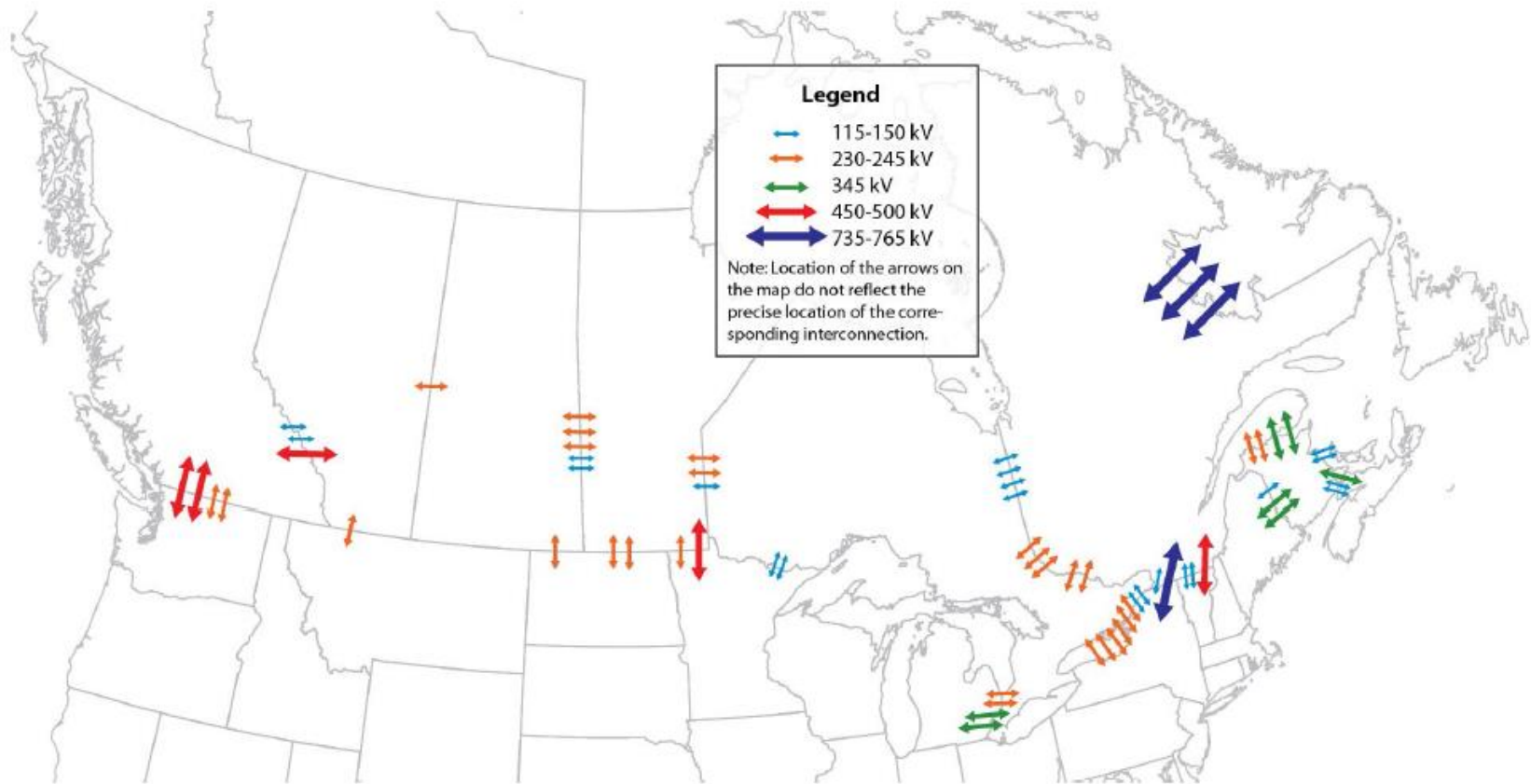
2. Shared challenges & opportunities in North American context

- Infrastructure
- Emissions reduction
- Reliability & security

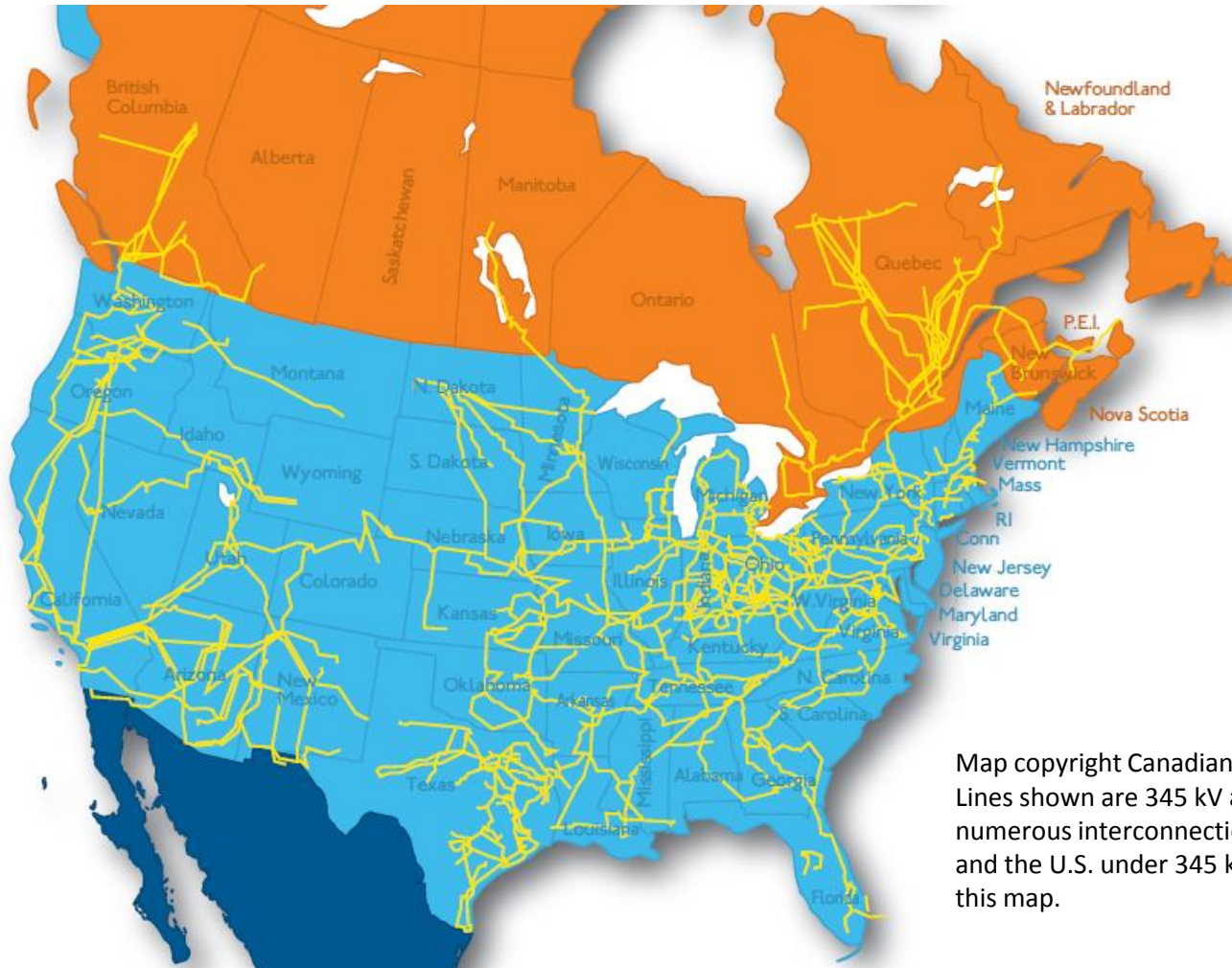


1. Canada-U.S. Electricity Relationship – Background

Transmission Interconnections in Canada

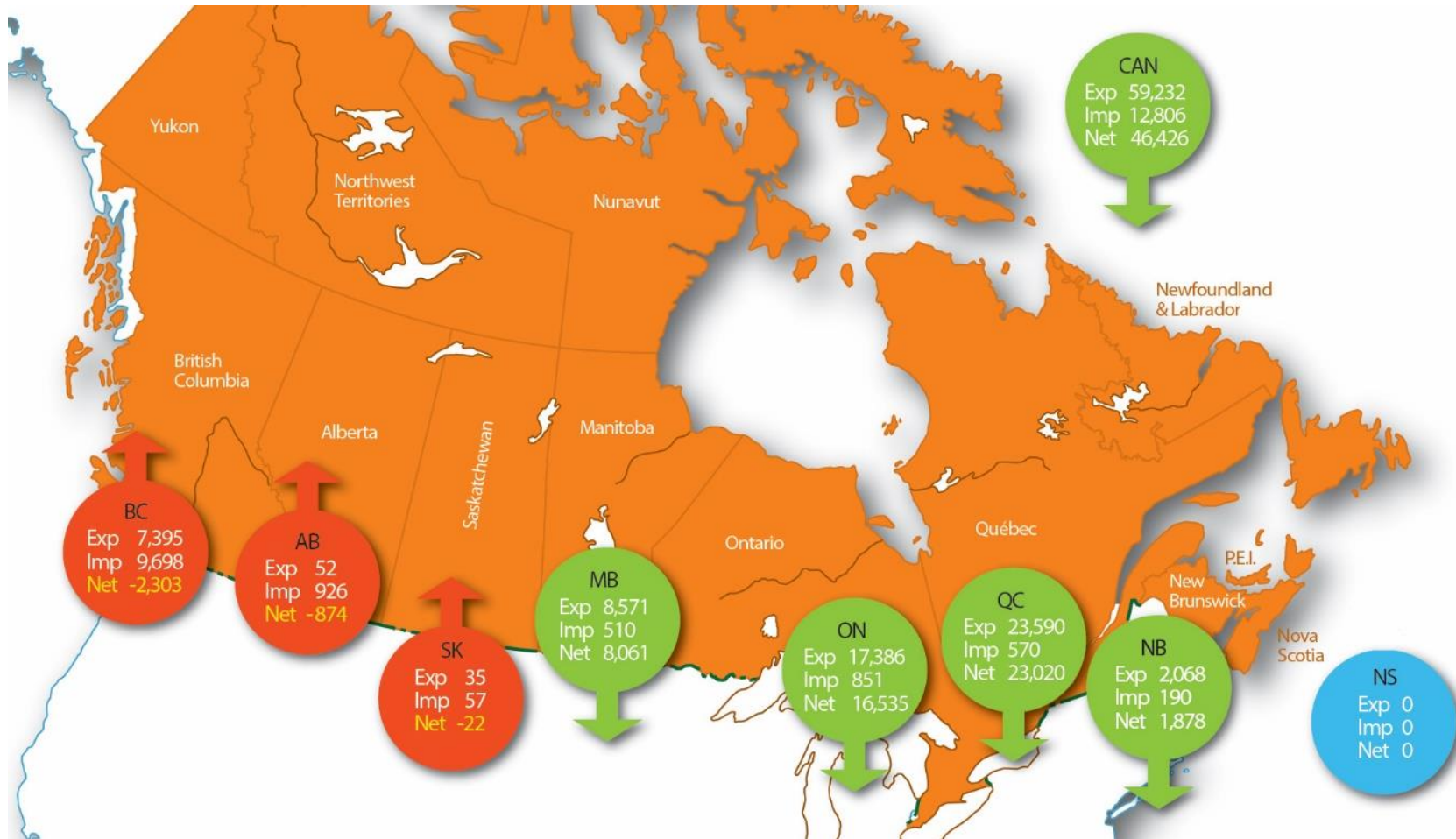


The Integrated North American Transmission Grid



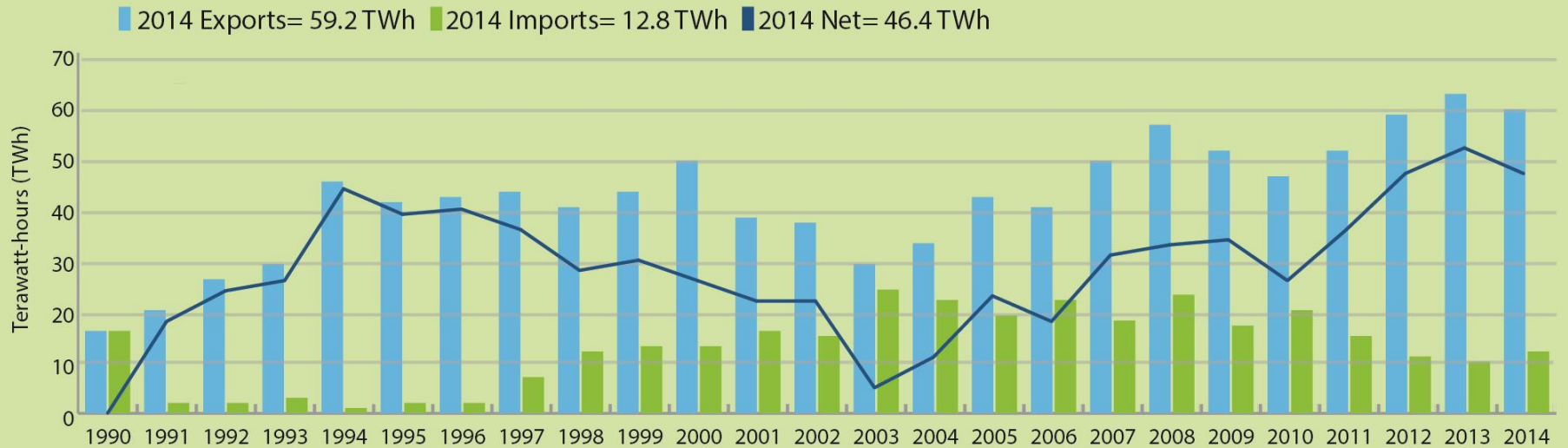
Map copyright Canadian Electricity Association. Lines shown are 345 kV and above. There are numerous interconnections between Canada and the U.S. under 345 kV that do not appear on this map.

Canada-U.S. Electricity Exports & Imports (2014)



Data displayed are in gigawatt-hours. Source: National Energy Board, Electricity Exports and Imports, 2014

U.S.-Canada Electricity Trade Volume (1990–2014)



Source: National Energy Board, Electricity Exports and Imports, 2014.
Retrieved March 6, 2015.

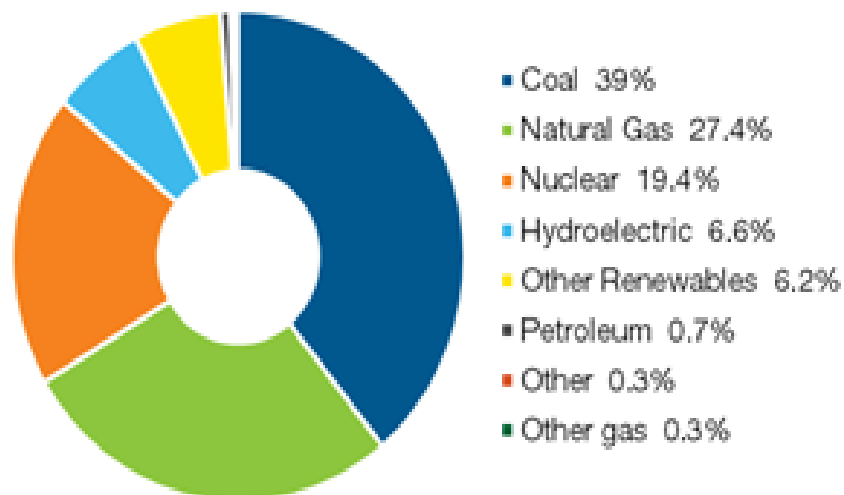
- Integration and trade are enabled by common rules of the road:
 - Open access
 - Reliability standards
 - Market rules



Electricity Generation in the U.S. and Canada by Fuel Type (2013)

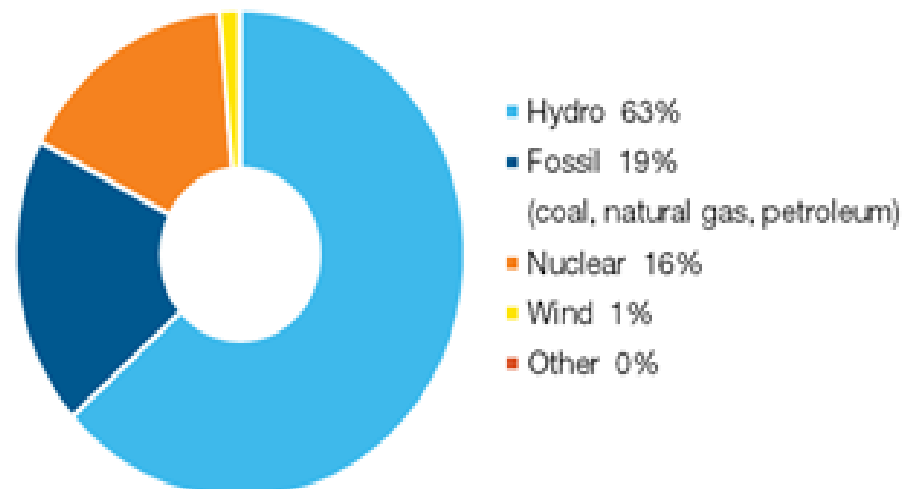
UNITED STATES

Total Electricity Generation in 2013 = 4058 TWh



CANADA

Total Electricity Generation in 2013 = 611 TWh



Numbers may not sum to 100 percent due to rounding.

Source: US Energy Information Administration, Electric Power Monthly, 2012; Statistics Canada, Survey 2151, 2012.

Retrieved September 16, 2014.



Canada-U.S. Electricity Relationship – Benefits

- **Reliability**

- Operational efficiencies; supply diversity; ability to manage oversupply, loss of supply and extreme contingencies.

- **Affordability**

- Consistent observation from U.S. market monitors – importing electricity from Canada reduces wholesale power costs for U.S. consumers.

- **Emissions reduction**

- Electricity imports from Canada help displace U.S. GHG emissions.

- **Support for development & optimization of renewables**

- Cross-border marriage of wind and water (e.g. Manitoba exports are critical to wind growth and integration in U.S. Midwest).



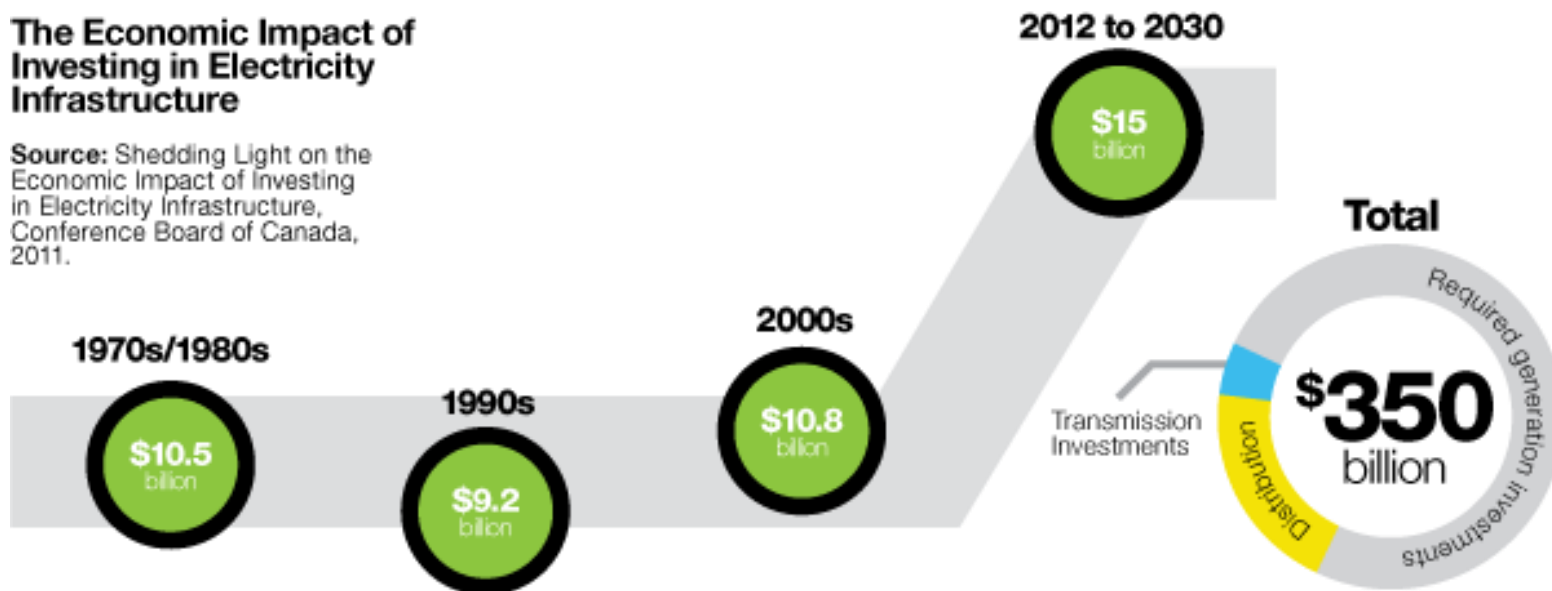
2. Shared Challenges, Opportunities in N. American Context

(i) Infrastructure investment

- Conference Board of Canada – C\$350 billion required by 2030.
 - Average annual investment = C\$15 billion (highest in history).
- Similar figures in U.S. EEI estimates US\$90 billion annually.

The Economic Impact of Investing in Electricity Infrastructure

Source: Shedding Light on the Economic Impact of Investing in Electricity Infrastructure, Conference Board of Canada, 2011.



Drivers

- Reinforcing, modernizing aging system
- Meeting current and future demand growth
- Integrating new sources of non-emitting and variable generation

Challenges

- Regulatory
- Public acceptance and evolving relationship with customer
- Stakeholder consultation
- Who pays?



Solutions & opportunities

- Modernized and efficient regulatory review.
- Policy and regulatory environment that looks to the long-term.
- Strengthened, diversified regional connections and markets:
 - New U.S.-Canada interconnections (multiple projects in the queue).
 - New interprovincial connections in Canada (Newfoundland-Nova Scotia; Québec-Ontario; Manitoba-Saskatchewan). Recognized in recent Canadian Energy Strategy.
- New partnership models (e.g. equity projects with First Nations).
- Maintaining openness to cross-border investment (e.g. Berkshire Hathaway acquisition of AltaLink; proposed Emera purchase of TECO Energy).



(ii) Emissions reduction

- Electricity emissions in Canada trending nowhere but downwards:
 - More hydro, renewables coming online.
 - Most stringent GHG rules for coal (926 lbs/MWh); CCS deployment.
- More integration will maximize N. America's clean energy potential.
- Each pending and proposed Canada-U.S. transmission project would unlock new supplies of non-emitting energy.
- Clean Power Plan recognizes emissions benefits of Cdn imports.
 - Expansion and/or creation of regional carbon markets under CPP may present opportunities for additional linkages with Canadian markets.
- Positive developments in state policy:
 - Revised California RPS allows for out-of-state generation, including Canada.
 - New England increasingly interested in importing more Canadian hydropower.
- Transportation electrification also ripe for N. American cooperation.



(iii) Reliability & Security

- Risks, threats to the grid are increasingly complex & sophisticated. Bilateral cooperation therefore becoming even greater imperative.
- North American Electric Reliability Corporation (NERC) is unique success story. NERC standards set forth common, mandatory requirements for grid planning and operations (including cyber).
 - There is interest at NERC forums in prospects of including Mexico.
- NERC regime and standards are well-suited to addressing many reliability and security challenges – but not all.
- Electric utility sector welcomes legislation to facilitate greater government-industry sharing of threat information.
- Enhanced gov't-industry partnerships (e.g. Electricity Subsector Coordinating Council) are showing effectiveness, nimbleness in improving sector's security posture. Will be critical moving ahead.





QUESTIONS?

Patrick Brown

Director, U.S. Affairs

Canadian Electricity Association

(613) 627-4124

brown@electricity.ca

