

# Interprovincial transmission in Canada

Energy System Integration Group (ESIG)

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# *Outline*

Many studies show the benefits of inter-provincial transmission

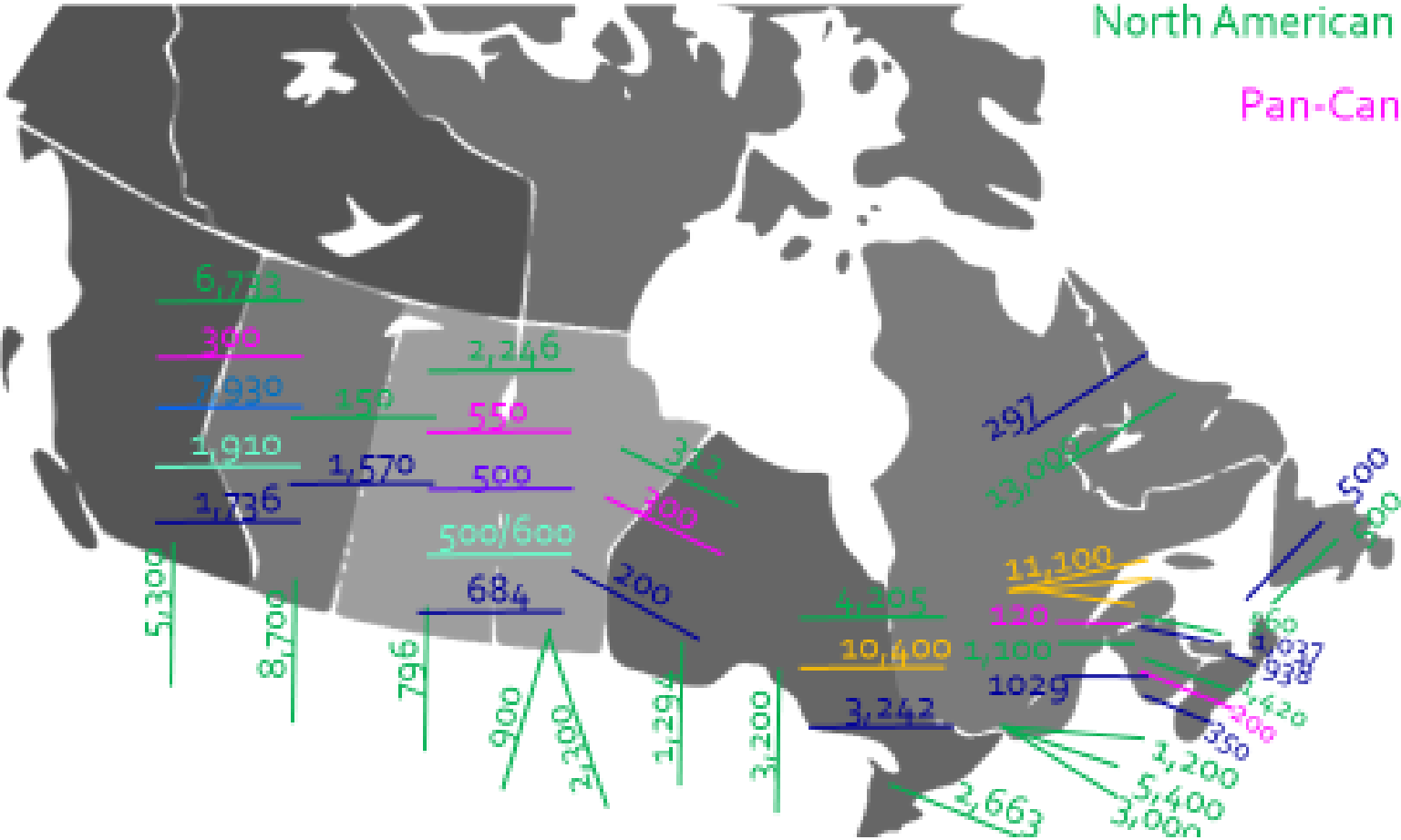
Benefits span several dimensions

And yet, transmission expansion is limited in Canada...  
... why?

International case studies may provide some lessons

Moving forward...

*Several studies have demonstrated the benefits of inter-provincial transmission expansion projects ...*



North American Renewable Integration Study (NARIS)

Pan-Canadian Wind Integration Study (PCWIS)

SaskPower/Manitoba Hydro Regional Coordination Study

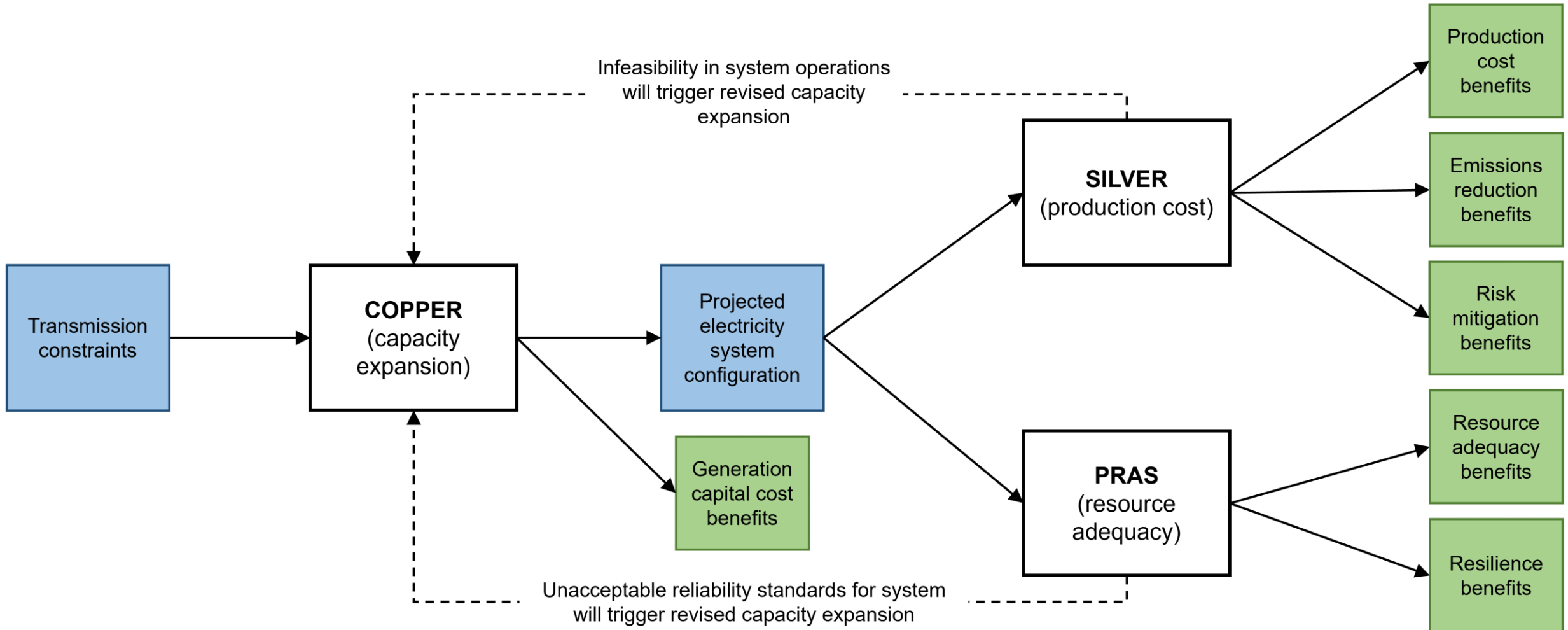
Renewable Electricity Coordination & Strategic Infrastructure (RECSI)

English et al. (2020) – Flexibility requirements

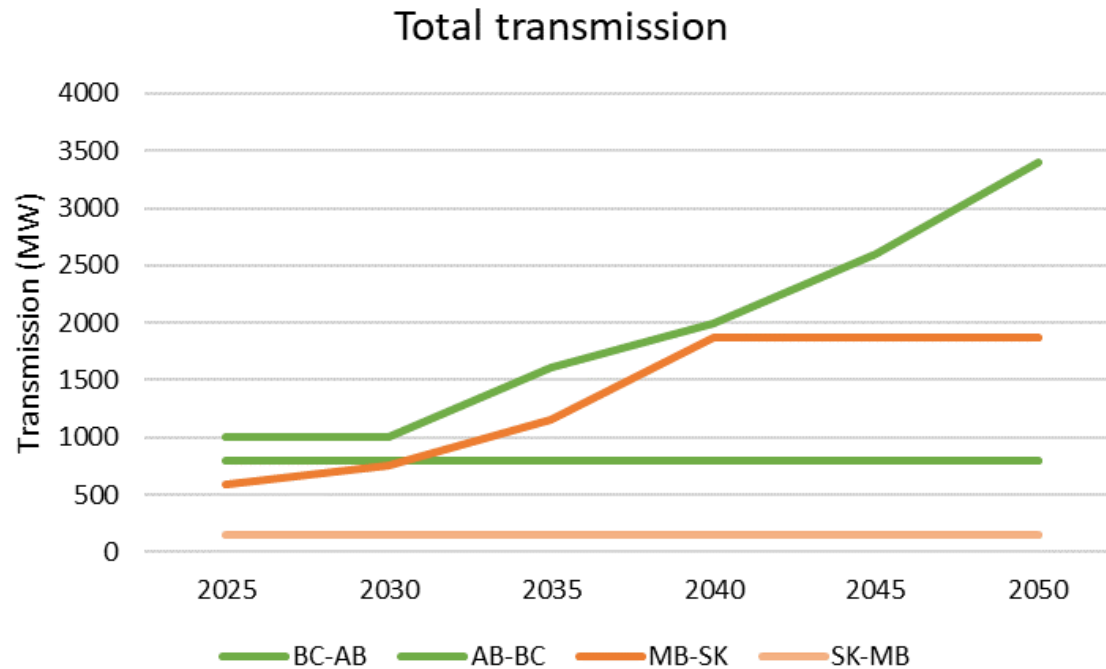
East Grid – Canada Grid

Sustainable Energy Systems Integration & Transmission (SESIT)

# Case study – multi-benefit analysis of transmission expansion



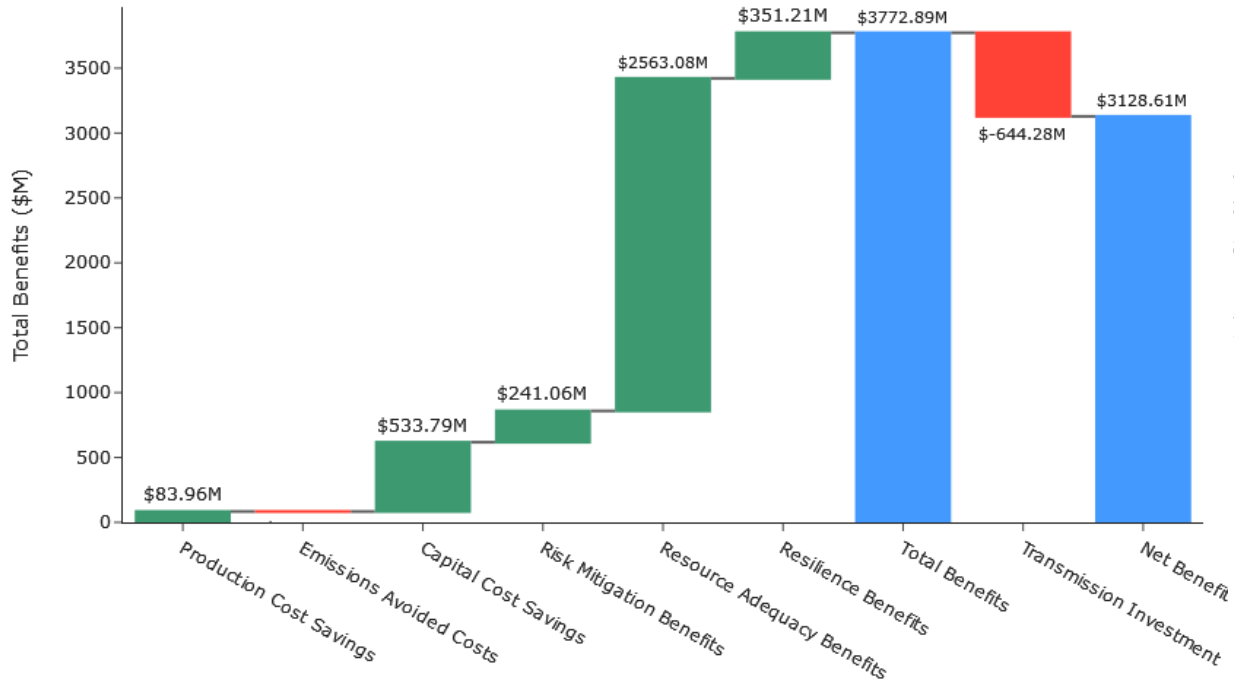
# *Case study – BC-AB & SK-MB transmission expansion*



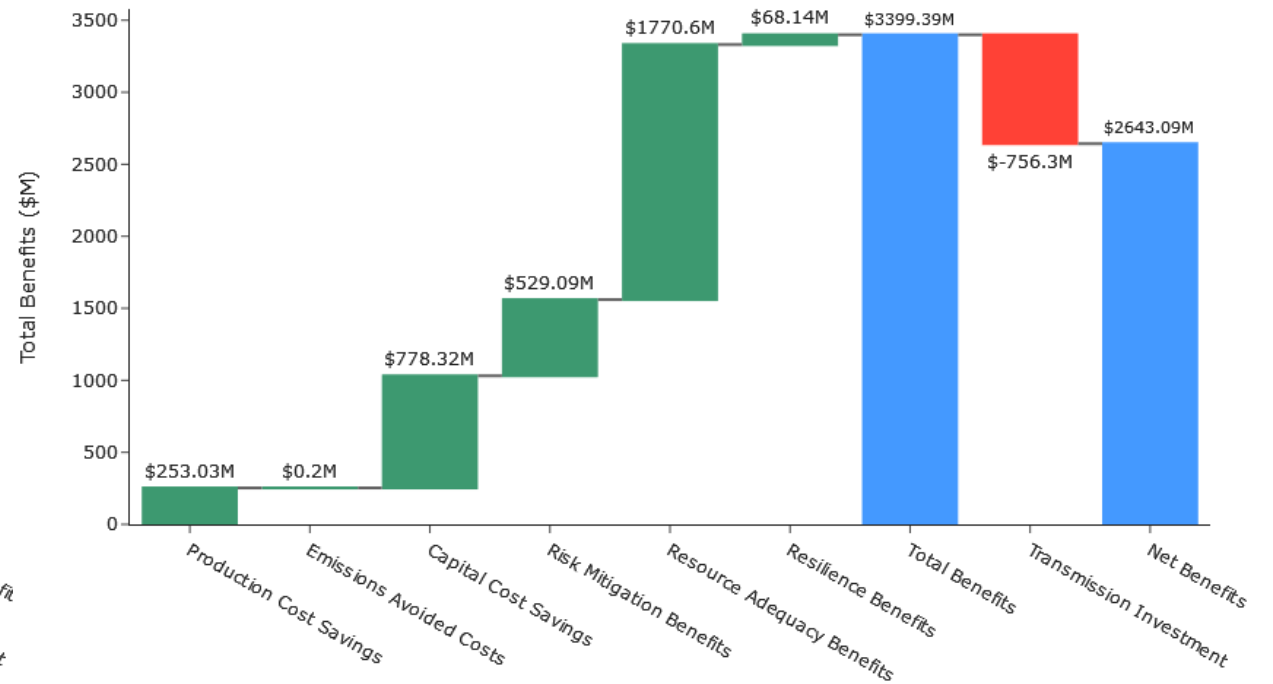
Transmission corridor	Expanded transmission capacity (MW)	Transmission investment (M\$)
BC-AB	2,395	\$644
MB-SK	1,472	\$756

# Case study – multi-benefit stacking

## BC – AB Transmission Expansion



## MB – SK Transmission Expansion



*... any yet procurement is limited for a variety of reasons*

### Provincial jurisdiction over energy

- > revenues flow to provincial government
- > regulatory and market structure mismatch between provinces
- > economic barriers – can't access new customers in neighboring provinces
- > political barriers – local jobs; provincial rivalries; local accountability; provincial champions
  - federal action is seen as threatening independence and powers

### Lack of leadership on power sector planning, including now decarbonization

- > lack of innovative culture within the regulators across Canada
- > lack of centralized discourse – lack of venue for a cohesive dialogue
  - >>> allow vested interests to dominate the conversation & maintain the status quo

### Local concerns -NIMBY

# *Regulatory mismatch – the context for transmission expansion varies by province*

- Canada doesn't have federal intervention (like FERC or the IRA support)
- Regulation and tariffs across Canada:
  - Transmission is regulated by provincial regulators under a cost-of-service methodology
  - Each regulator sets a rate of return, based on their allowed investments
  - This approach favors additional assets (over which a return is earned) instead of alternative approaches (e.g., DSM) which are less straightforward to remunerate
- Provinces fall into one of three categories
  - Vertically integrated crown corporations with little competition
  - Vertically integrated private companies with little competition
  - Unbundled electricity sector with open wholesale & retail competition



# *(1) Vertically integrated crown corporations*

## *- little competition*

Provinces include:	British Columbia, Saskatchewan, Manitoba, Quebec, New Brunswick, Newfoundland
Ownership	Provincial government owns the dominate electricity company High degree of vertical integration (ownership is <i>not</i> unbundled)
Operations	Crown corp. oversees generation, transmission, system operation, distribution, retail <i>Not</i> operationally unbundled
Market/ procurement	Wholesale market based on bilateral contracts and regulated retail market IPPs can play a small role through long-term contracts Retail market is not open to competition
Politics	Utilities are not independent; they are influenced by other priorities such as regional development, economic support for industries, etc. Crown corps. earn revenues for the provincial government and are generally popular among citizens

## *(2) Vertically integrated private companies - with little competition*

Provinces include:	Nova Scotia, PEI (to some extent)
Ownership	Single investor-owned company is responsible for the electricity sector NS - High degree of vertical integration PEI - Moderate degree of vertical integration – imports ~75% of power from NB Power
Operations	Nova Scotia Power (NSPI) regulated by Utility & Review Board System operator (NSPSO) operates wholesale market functions as part of NSPI IPPs can sell to NSPI which then distributes to consumers (RE can be sold directly)
Market/ procurement	Wholesale market based on bilateral contracts and regulated retail market There are some supply contracts from IPPs & imports from other provinces
Politics	Clean Energy Solutions Task Force established in 2023 – recommending an independent system operator & standalone energy regulator

## *(3) Unbundled electricity sector - with open wholesale & retail competition*

<b>Provinces include:</b>	<b>Alberta and Ontario</b>
<b>Ownership</b>	Generation by investor- & municipally- owned companies (& Crown corp. in Ontario) Transmission assets are mostly owned by investor-owned companies
<b>Operations</b>	IESO is responsible for planning, conservation, market design* Distribution is under the control of municipal companies (AB and ON)
<b>Market/ procurement</b>	Open, competitive, organized wholesale market providing an hourly price signal Transmission asset owners earn a profit based on a regulated transmission tariff Ontario has a <i>Transmission Rights Market</i> (can import, export, or transport energy) Competitive retail market - competitive retailers in an open retail market
<b>Politics</b>	AB – recently released green paper on transmission (cost allocation, congestion, interties) ON – dual-peaking (due to electrification), capacity shortfall, DR program, nuclear expansion, ultra-low overnight pricing introduced in 2023

# *Projects in Canada*

## New Brunswick/ Nova Scotia Transmission Reliability project

- New 345 kV line; 65 km long; parallel to existing line
- Increase energy operational flexibility & reliability in Nova Scotia
  - to integrate renewables & phase out fossil generation
- Engagement & environmental assessments currently underway; construction in Fall 2024 (?)

## Ontario & Quebec – new electricity trade agreement between provincial governments

- Annual capacity swap of 600 MW trade agreement between IESO & Hydro-Quebec
- Take advantage of complementary seasonal peaks in demand (ON in summer QC in winter)
- 10-year agreement –no payments by either party ('protecting ratepayers in both provinces')

## Birtle Transmission project

- 230 kV line in MB to boarder with SK to transmit power to SK
- began public engagement in 2016; energized in 2021

# Alberta –released green paper on transmission

Addressing seven policy issues:

- Contribution of generation to transmission costs

- Responsibility for line losses

- Non-wires solutions

- Congestion policy

- Cost allocation for transmission

- Cost allocation for ancillary services

- Treatment of interties

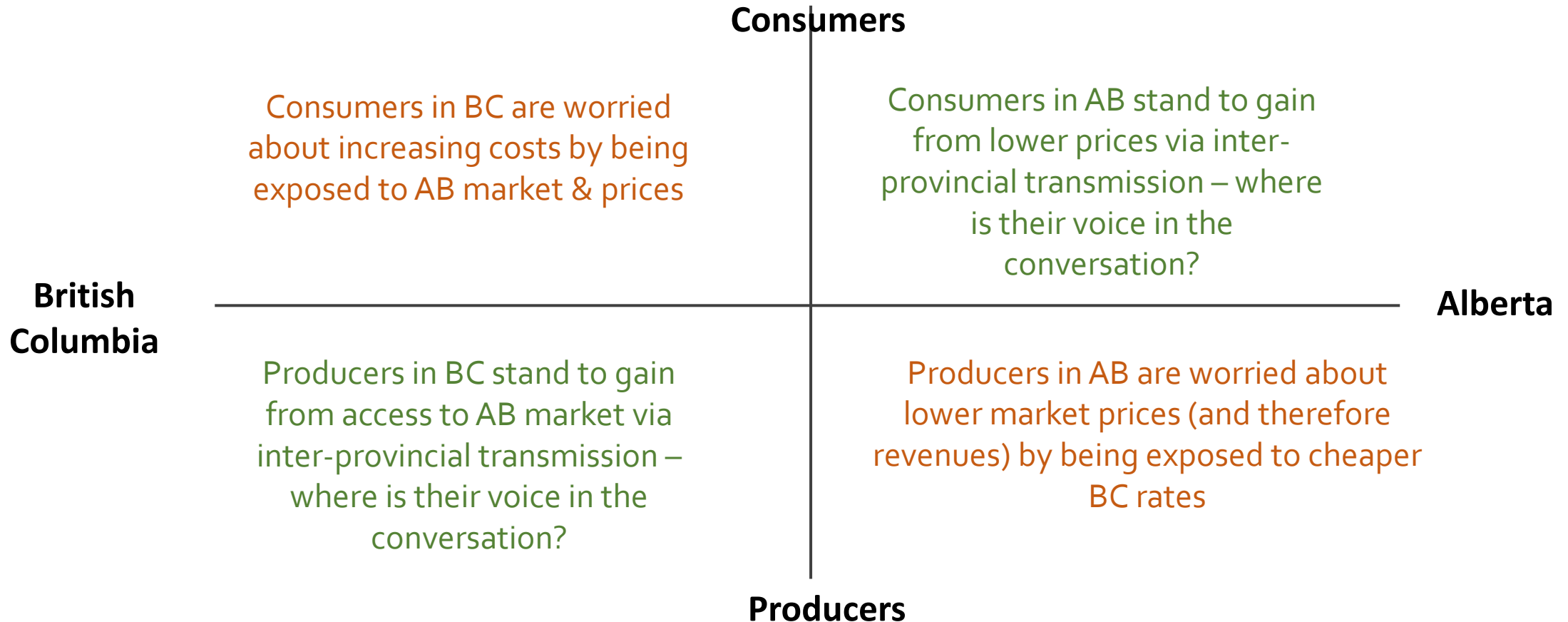
# *The international context*

## *– lessons learned & successful attributes*

	Europe	Nordic	Japan
Commitment from government to <b>break down provincialism</b>	ENTSO-E Represents 39 electricity transmission system operators from 35 countries across Europe	(1) Nord Pool - wholesale market owned by the four countries' TSOs (2) Nordic Council of Ministers TSOs have joint planning sessions (3) Nordic Energy Research group	Organization for Cross-regional Coordination of Transmission Operators (OCCTO) – formulation of a long-term network plan
<b>Sharing of benefits</b>	Pan-European Transmission Network plans and cost-benefit analysis: 10-year network development plan is the basis for the selection of EU projects of common interest	Denmark: worlds largest expansion of wind capacity enabled by backup hydro power from Norway; bigger markets that were more attractive to investors and increased cost efficiency	Need to move power from offshore wind power projects to demand centers; improve resilience
<b>Retain policy autonomy</b>	Each country retains policy autonomy		Regional monopolies

# *Next steps – change the narrative...?*

Bilateral approach that focuses on giving the winners a voice and minimizing the impacts on losers



## *Next steps – bridge the gap between Provincial targets & utility planning*

- In provinces with a crown corporation, there can (and should) be a connection between provincial decarbonization targets & policy and utility infrastructure planning
- In British Columbia, there is a gap between:
  - provincial decarbonization targets published in the CleanBC plan
    - modelling with an energy-economy model (gTech) and
  - power system planning published in the 10-year capital plan
    - BC Hydro infrastructure planning modelled in...?
- In provinces with vertically integrated crown corporations, provincial ownership could help the government execute on transition plans



## *Next steps – federal levers*

- Current process:
  - provinces agree to pay the development cost in its province
  - a long-term contract (signed by the two provinces) support the investment
- Federal government – could support/create incentives
  - Nordic inspiration – combination of Council of Ministers + Research Hub
  - Federal financial support for transmission infrastructure
  - Harmonization of trade across provincial boundaries
- Merchant transmission line
  - Funded by the federal government and/or private investors
  - Contracted by players > generators/TSOs in Alberta, PowerEX, etc.
  - Potentially built on the same right of way inter-provincial pipelines...

## *Future work*

- Embarking on a study - multi-country analysis
  - Planning – degree of centralization
  - Building – process (competitive tendering; do regulations favour incumbents)
  - Operation – access; competitiveness
  - Renumeration – market design; standardized rate of return
- Tease out lessons learned from structures that exist internationally that might be applicable to the Canadian context



Thank you

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