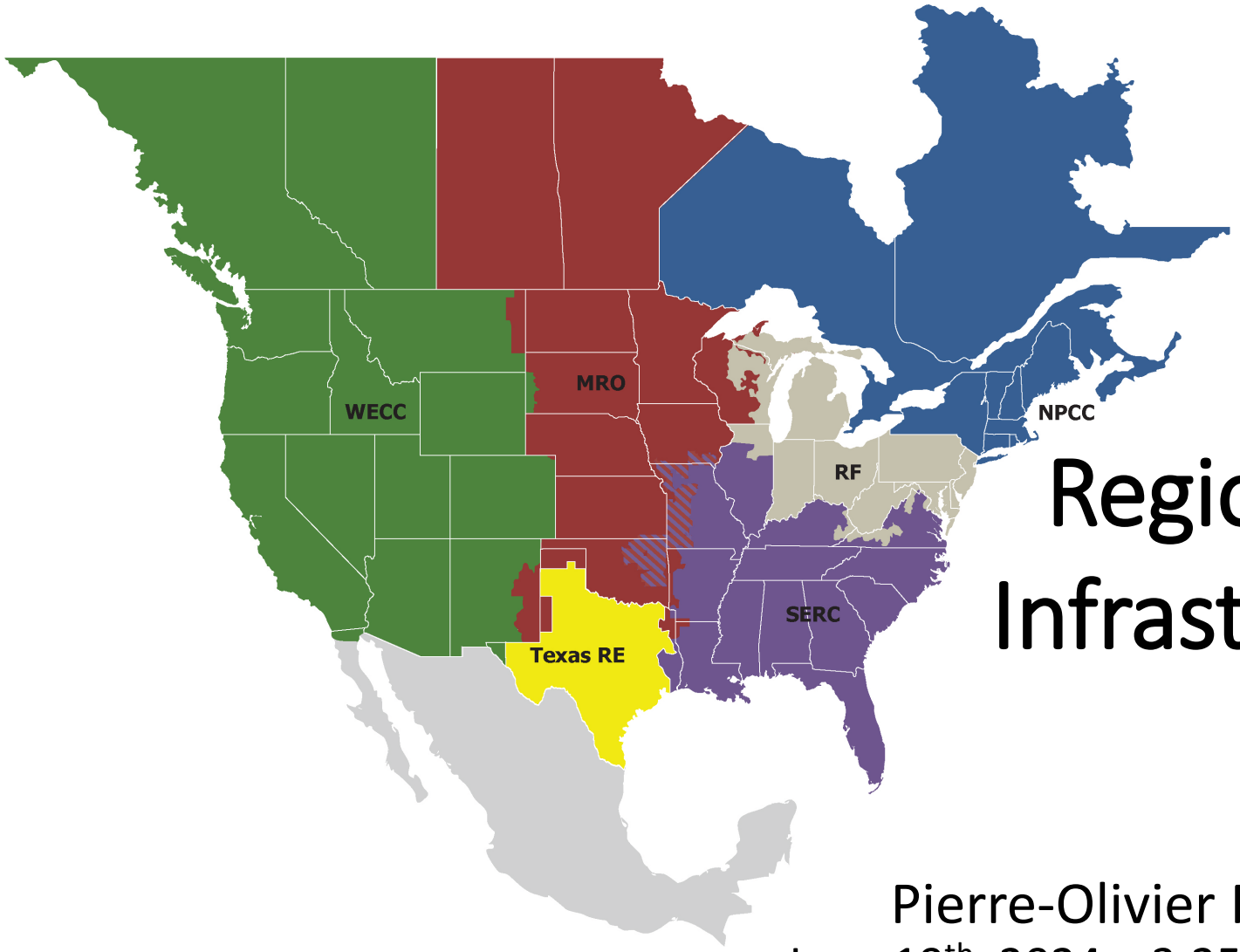


Chair in Energy Sector Management

HEC MONTRÉAL

Regional Collaboration and Infrastructure Optimization in Energy Modelling

Pierre-Olivier Pineau

June 19th, 2024 – 3:25 - 5:00pm AT

Session 4: Collaborating in Action: Bridging Energy Modelling with Policy Agility

Atlantic Canadian Conference on Energy System Modelling

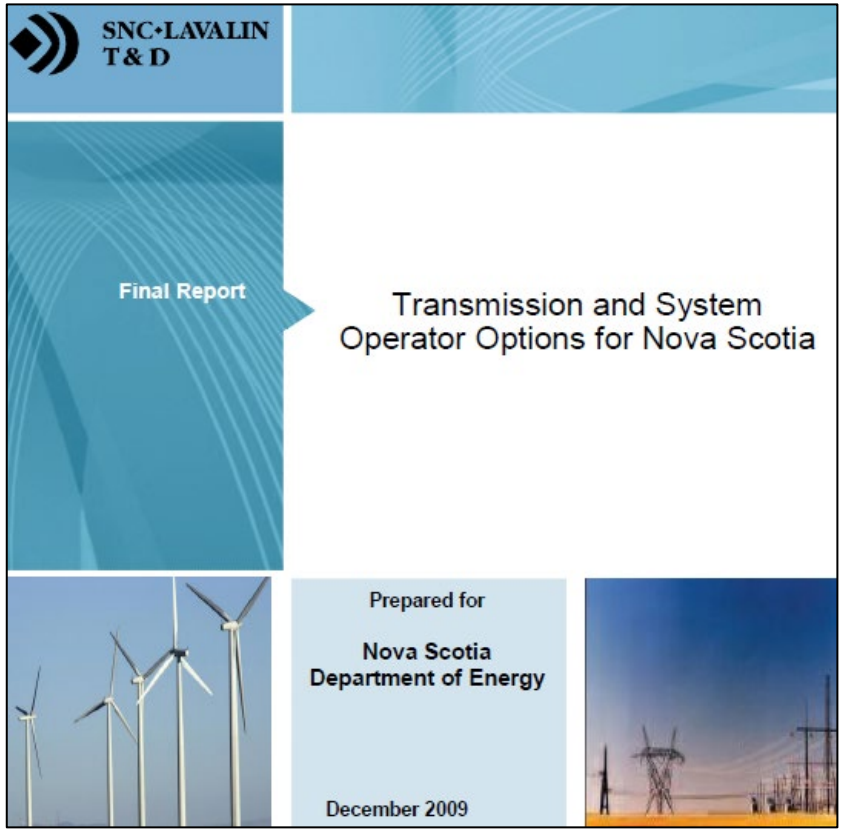
Energy Modelling Hub and Net Zero Atlantic

Delta Hotel Beausejour, Moncton, New Brunswick.

Outine

1. Short review of the long history of electricity modelling in Atlantic Canada
2. An illustration of the benefit of regional collaboration
3. Understanding inertia in regional collaboration
4. Linking modelling to policy

An early study (2009)



*"It is recommended that a **Maritime Regional Transmission Planning function** be implemented to study and plan transmission system requirements on a regional basis for attaining mutual benefits over the long term."*

Atlantic Energy Gateway (2012)

Atlantic Energy Gateway Transmission Modeling Study Report

A Study of Transmission Upgrade Options
For
Atlantic Canadian Utilities

March 30, 2012

NAVIGANT

Regional Clean and Renewable Energy Market Opportunities

Study Findings

Prepared for:

Atlantic Energy Gateway

Atlantic Canada Opportunities Agency | Agence de promotion économique du Canada atlantique

Canada

Atlantic Energy Gateway

Resource Development Modelling Study

A Study of Potential Savings for the Combined Resource Planning of Atlantic Canadian Utilities

March 2012

ABB Ventyx *Strategist*® model

Atlantic Energy Gateway (AEG) Balancing Study Report

A Study of Potential Savings in the Case of a Common Unit Commitment and Dispatch Function for Atlantic Canada

FINAL REPORT
June 15, 2012

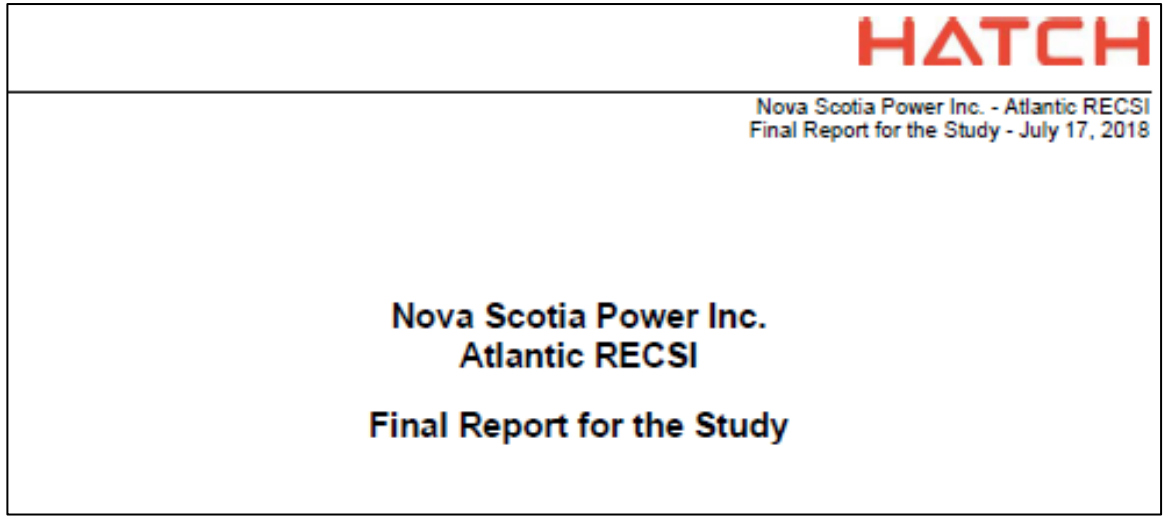
Plexos

Atlantic Energy Gateway Report on Regional Electricity System Operations

MARTILLAC LIMITED and THOMPSON & ASSOCIATES

"Nord Pool contributes to a more integrated and efficient energy market that offers its customers the highest standards and provides cost synergies. It is a model for a more connected and efficient European energy market whose vision is to stretch from Portugal to Finland."

Regional Electricity Cooperation and Strategic Infrastructure (2018)


HATCH

Nova Scotia Power Inc. - Atlantic RECSI
Final Report for the Study - July 17, 2018

Nova Scotia Power Inc.
Atlantic RECSI

Final Report for the Study

Plexos

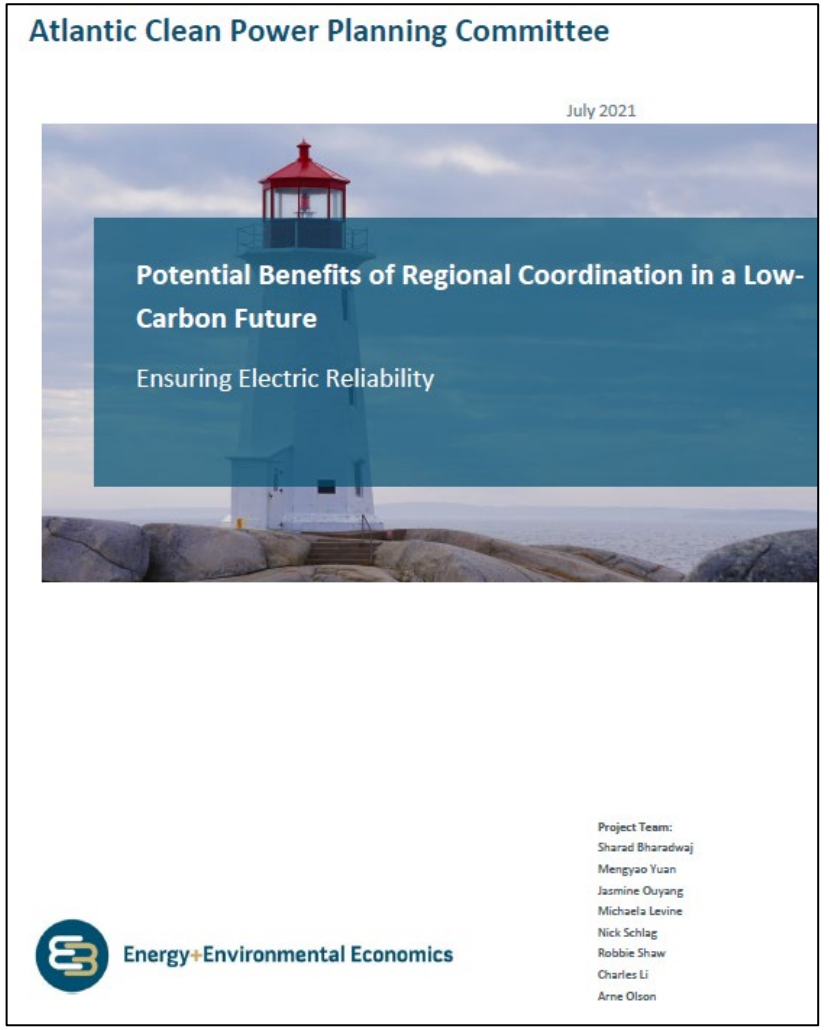
"there are efficiencies to be gained through cooperation and integrated operations…. energy trading arrangements that are very common for electric utilities with contiguous neighbouring utilities around the world"

"To address the concerns of ratepayers and taxpayers, it will be important to engage in ***transparent and inclusive public processes*** *even when the investments are responding to government mandates."*

Atlantic Loop (2019 - …)

E3's PATHWAYS Model
E3's RESOLVE model

- No endogenous transmission investment
- No hydro storage

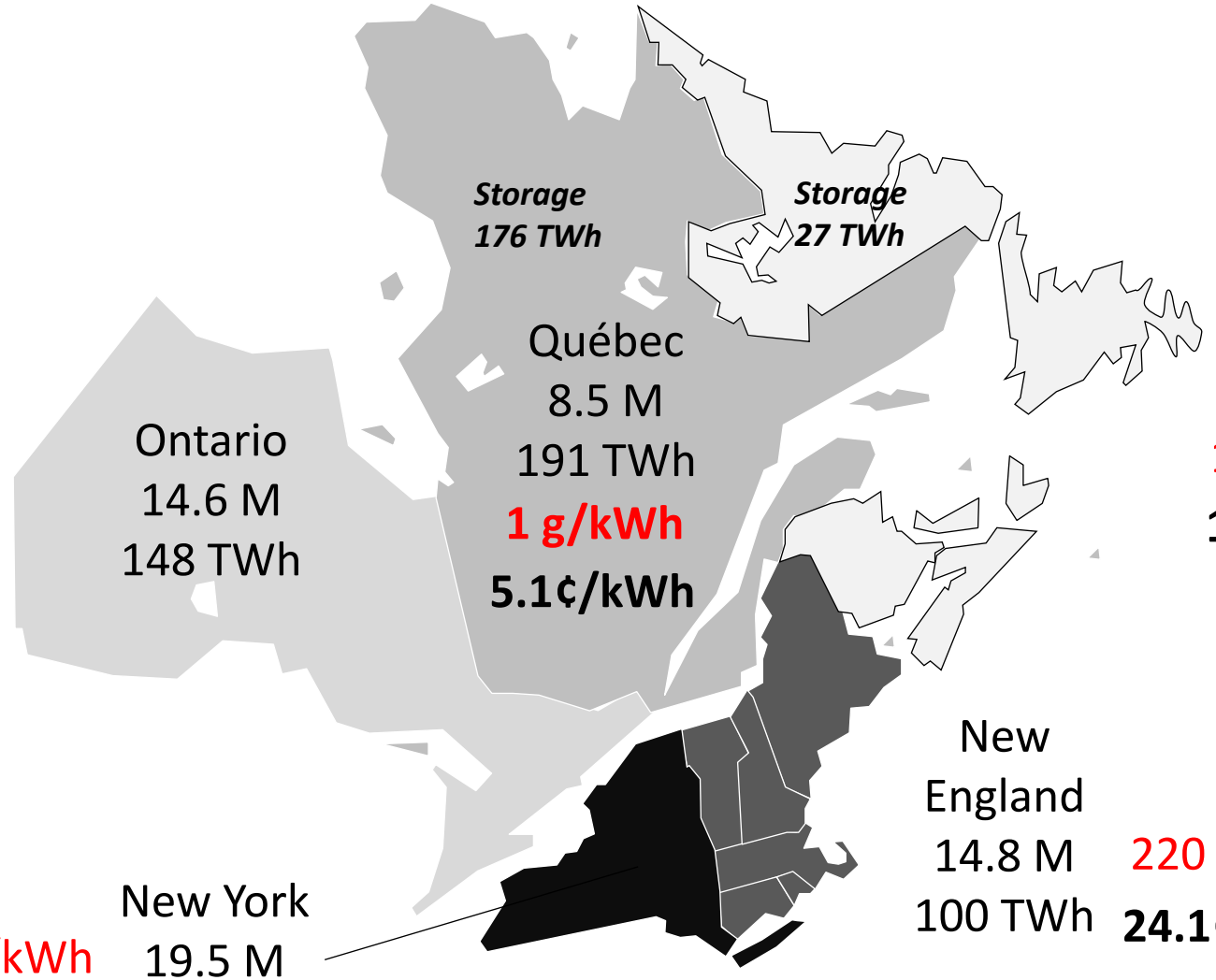


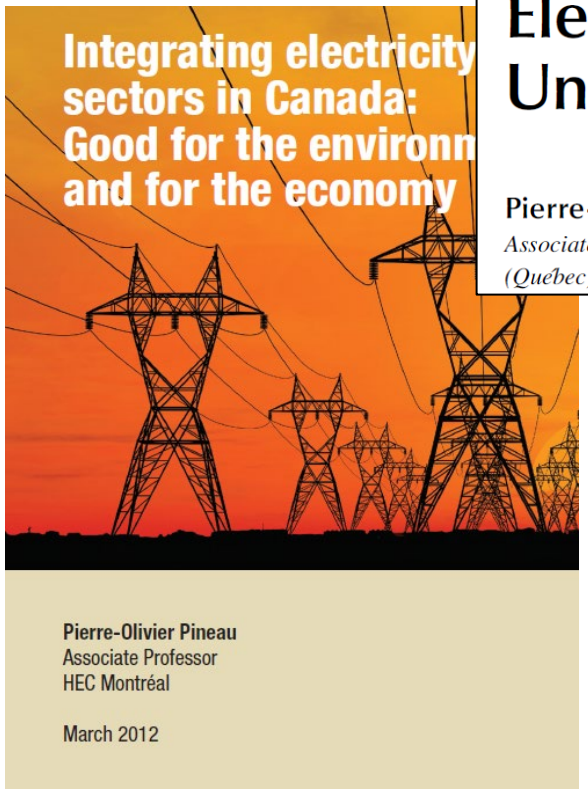
*"Building on a **long history of collaboration**, the Atlantic Provinces and the federal government […] **may collaborate** over the coming decades to build a clean power superhighway across the region"*

"Achieving very deep levels of decarbonization will thus require firm, dispatchable low-carbon energy and capacity to ensure reliability. Without broader regional coordination, this would mean leaning on resources which have not yet proven commercial viability, such as advanced nuclear or carbon capture and sequestration."

2. Illustration of the benefit of regional collaboration

Northeast: Population, Generation, carbon intensity and residential price (US$)





2013

Chapter 13

Fragmented Markets: Canadian Electricity Sectors' Underperformance

Pierre-Olivier Pineau
Associate Professor, HEC Montréal, 3000, chemin de la Côte-Sainte-Catherine, Montréal (Québec), Canada H3T 2A7

By Pierre-Olivier Pineau,
Chair in Energy Sector Management
HEC Montréal

2021

Contents lists available at ScienceDirect

Energy Policy

journal homepage: http://www.elsevier.com/locate/enpol

Deep decarbonization in Northeastern North America: The value of electricity market integration and hydropower

Jesús A. Rodríguez-Sarasty, Sébastien Debia, Pierre-Olivier Pineau *
Department of Decision Sciences, HEC Montreal, 3000 Chemin de la Côte-Sainte-Catherine, Montréal, QC, H3T 2A7, Canada

2021

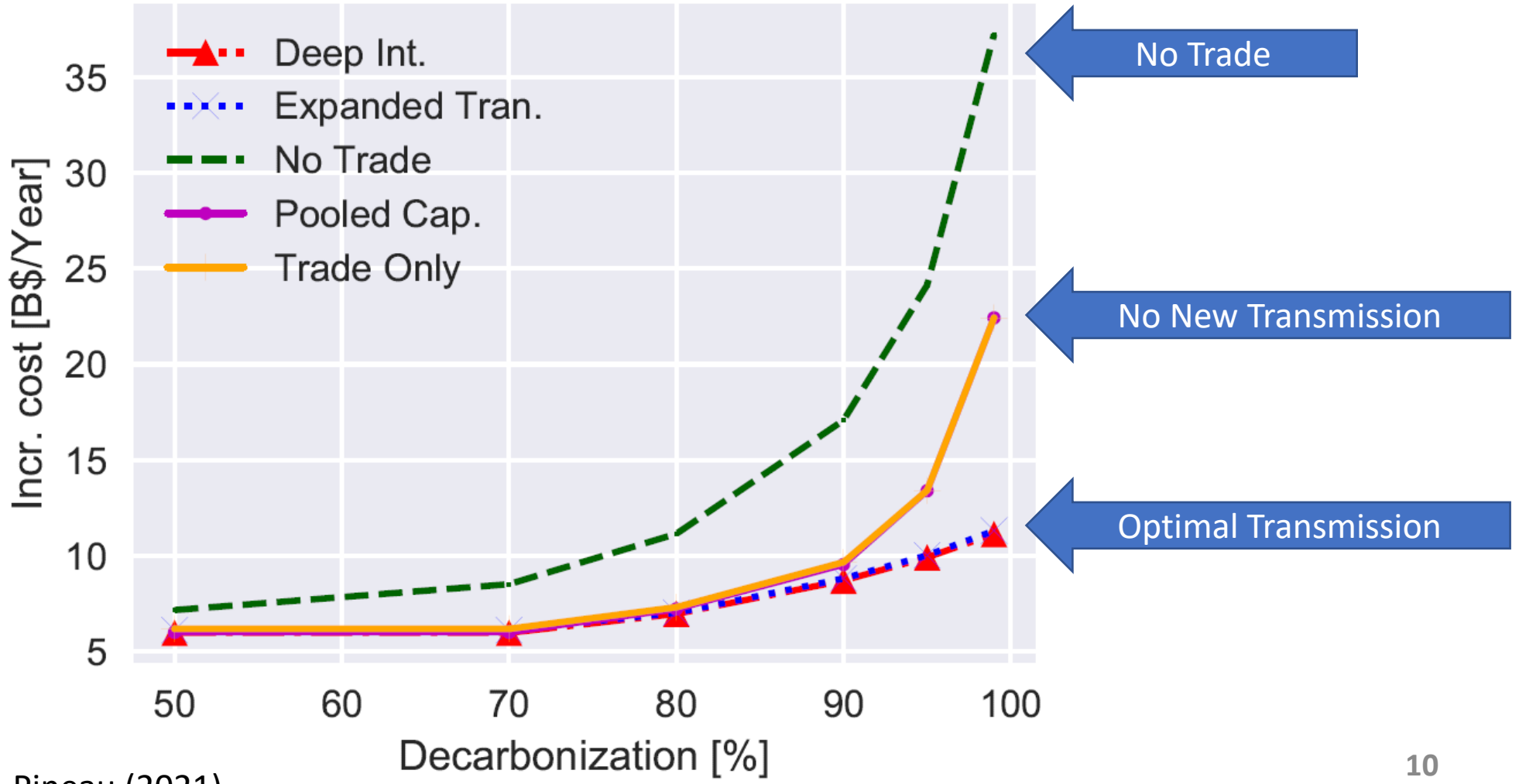
Integrating Thermal and Hydro Electricity Markets: Economic and Environmental Costs of *not* Harmonizing Pricing Rules

2016

Etienne Billette de Villemeur and Pierre-Olivier Pineau***

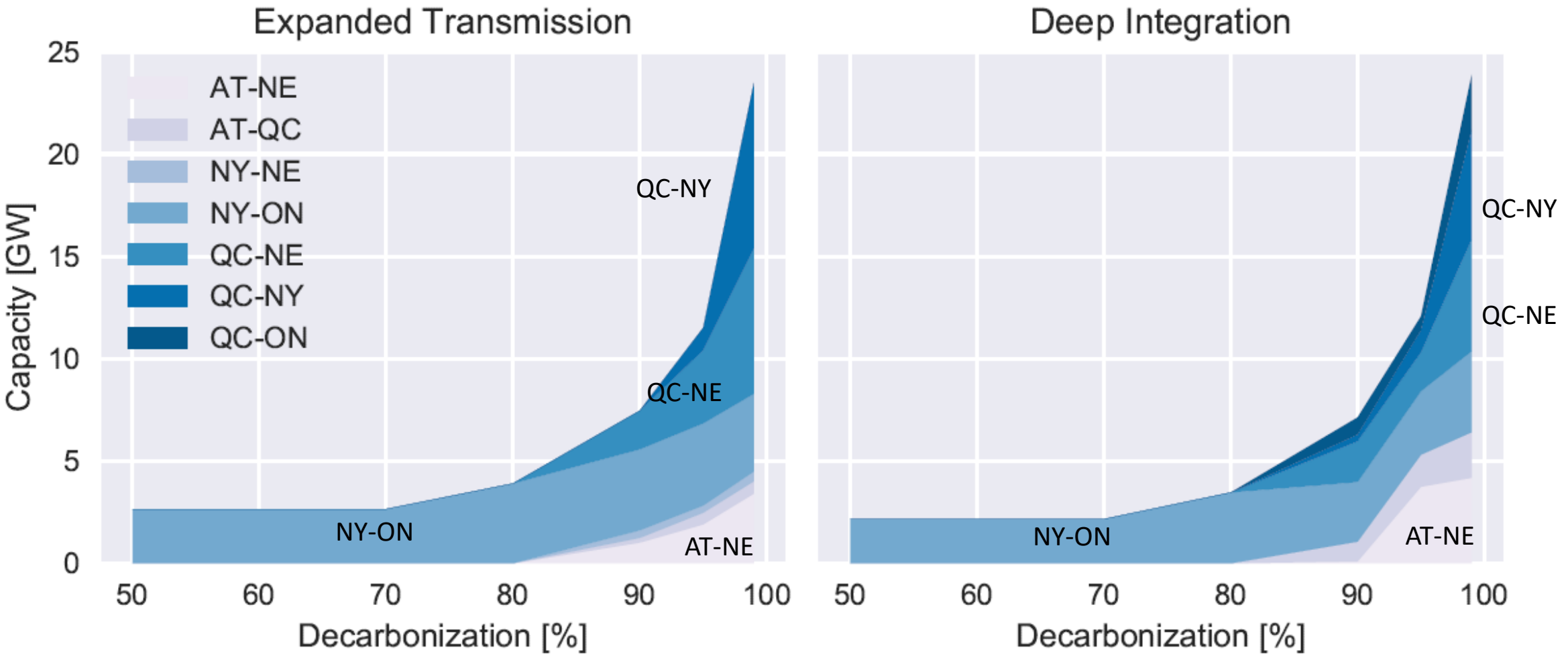
Annual decarbonization cost

No Trade / No New Transmission / Optimal Transmission



Rodríguez-Sarasty, Debia, Pineau (2021)

Interties are critical



Benefits of deeper regional coordination

1. Improving reliability and pooling reserves
2. Reduced investment in generating capacity
3. Improving load factors and increasing demand diversity
4. Economies of scale in new construction
5. Diversity of generation mix and supply security
6. Economic exchange
7. Environmental dispatch and new plant siting
8. Better coordination of maintenance schedules

Commission for Environmental Cooperation of North America (2002) *Environmental Challenges and Opportunities in the Evolving North American Electricity Market*
UN (2006) *Multi-Dimensional Issues in International Electric Power Grid Interconnections*
Energy Sector Management Assistance Program (2010) *Regional Power Sector Integration*, World Bank

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cae-acg.ca / Energy Pathways Project

Power Grid Task Force Report – "Electricity: Interconnecting Canada – A Strategic Advantage"

April 19, 2010

The North American Grid

Powering Cooperation on Clean Energy & the Environment

Canadian Electricity Association

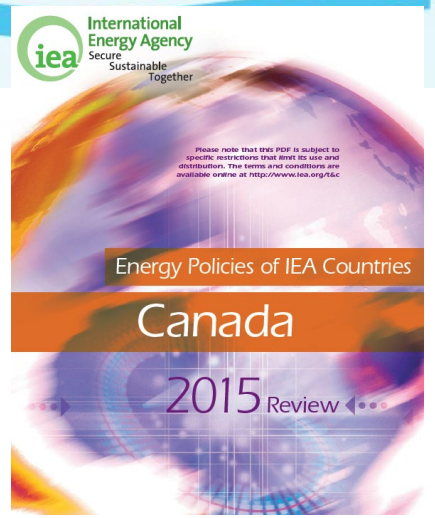
2016

Chapter VI

ENHANCING ELECTRICITY INTEGRATION IN NORTH AMERICA

ENERGY.GOV

2017



3. Understanding inertia in regional collaboration

1. Loss of local power
2. Sense of belonging to the provincial system
3. Protectionism / vested interests
4. Keeping prices low / high
5. Separation of powers (constitution)
6. Québec
7. Fear of the neighbor
8. Lack of skills / competence / workforce
9. Other…

4. Linking modelling to policy

Modelling can enable

- Leadership, credibility, trust
- Education of decision makers and all stakeholders
- Commitment to long term economic prosperity & sustainability

… in a context often characterized by…

- Short-term horizon
- Diffuse benefits, concentrated costs
- Lack of Federal leadership and provincial resistance/ignorance

Models can support cost allocation

- All should gain from integration:
  - low cost regions through higher profits
  - high cost regions through lower prices
- Interties: by demonstrating their value
- Compare decarbonization costs:
  - with regional collaboration
  - without regional collaboration

Possible Next Steps

- **Canadian Free Trade Agreement** (formerly the Agreement on Internal Trade): open market and harmonize
- **Health care strategy**: common criteria on portability, accessibility, universality, comprehensiveness, and public administration
- **North American Electricity Reliability Corporation** (NERC): require/support regional reliability planning in a decarbonization/electrification context
- **Nordic approach**: Facilitate provincial discussions, bottom-up collaborations

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