CO$_2$e Cap-and-Trade
Interactions with Electricity Markets

PRESENTED TO
Association of Power Producers of Ontario

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November 15, 2016
Overview

As perspective on cap and trade implications in electricity:
- Electricity already 80% decarbonized over the past 10 years
- Will be only 5% of GHG emissions cap (if there is no backsliding as nuclear plants retire/refurbish)

But electricity sector implications are substantial:
- Other sectors may decarbonize via electrification (requiring more clean energy to offset load growth & nukes)
- Direct impact to increase energy prices (only in a portion of hours, but very important for economic efficiency!)
- Implications for new investments in the electricity sector
Learning from Other Markets: What Drives Prices?

European Prices Effectively at Zero Due to Oversupply and Phase 1 End-Price Effects

Recession

RGGI 2009-2011

End of EU phase 1 (no banking).

RGGI 2009-2011

Europe 2012

Sep 15, 2008 - Lehman Brothers files for bankruptcy

Price Effects

Europe 2020

Feb 7, 2013 - RGGI lowers the number of yearly allowances in 2014 and beyond.

Europe: Oversupply of Allowances

California & Québec Consistently at (or Just Above) the Price Floor

New Zealand

Int’l Offsets 2012

New Zealand Allowance Prices Collapsed Along with International Offsets (Recovered after Offsets Dis-Allowed in 2015)

Int’l Offsets 2012

New Zealand

Consistently at (or Just Above) the Price Floor

RGGI Historically at (Now Modestly Above) Price Floor due to Rapid CO₂ Reductions. Driven by Low Cost, Fundamentals, and Complementary Policies

California 2013

California 2014

New Zealand

Allowance Prices Collapsed Along with International Offsets (Recovered after Offsets Dis- Allowed in 2015)
Stabilizing Prices: Quantity Adjustment Mechanisms

- Over-supply of allowances and growing “bank” of unused allowances have kept prices low in many CO₂e markets
  - Prices lower than many measures of societal cost
  - Susceptible to collapse and excess influence of unanticipated details (e.g. end-price effects, international linking)

- RGGI and California designs include some price stabilization mechanisms
  - Cost containment reserves (see right)
  - Price floor or “reservation price”
  - In RGGI, unsold allowances are retired. In California, some allowances can be re-offered if prices clear above the floor

- Last auction: California and Québec only sold 35% of the offered allowances

Sources: CARB, RGGI
ISO-NE: Integrating Markets and Public Policy

- ISO-NE has been decarbonizing quickly (41% reductions in 10 years, compared to 18% US nation-wide)
- Growing recognition that technology-specific contract procurements are becoming less effective:
  - Growing out-of-market contract costs
  - Market can work against policy objectives if CO₂ pricing is insufficient
  - Example: clean energy drives down energy prices, puts existing clean nukes and hydro at risk of retiring (unwinding CO₂ abatement)
- Stakeholders now trying to redesign the market to work for policy objectives, proposals include:
  - Higher administrative CO₂ price (US $30-$60/ton)
  - New integrated capacity and clean energy procurement market
  - Energy/ancillary service market enhancements
Ontario: The Last 20% GHG in Electricity Sector

Ontario Hourly Energy Price

10 Years Ago: Fossil on the Margin 75%+ of All Hours
Most Types of Clean Energy had Similar GHG Abatement Value

Energy Prices Fall with Decarbonization

Now: Gas on the Margin ~20%
Clean Energy Needs to Produce or Shift to These Hours to Decarbonize Further

Clean Energy: No Marginal Value 10%+ of the Time
Takeaways for Ontario

Cap-and-Trade

- Uniform CO$_2$e pricing across the fleet, across sectors, and across time (to the extent feasible) will help prioritize expenditures with the greatest potential to avoid emissions.
- Quantity adjustment mechanisms can help stabilize incentives (experience from other markets suggests that more can be done at modest cost).

Electricity Sector

- Non-emitting electricity sector may enable other sectors to decarbonize.
- With decarbonization, the energy portion of the bill is going down, capital portion (i.e. Global Adjustment or capacity payments) must go up. Reflective of a fleet with low variable and high capital costs.
- Growing importance of recognizing that all clean energy is not equal; value of energy shifting and profiling can be rewarded via CO$_2$e pricing.
- Market-based mechanisms for both variable and capital portion of system costs will help mitigate the costs of decarbonizing. Cap-and-trade or CO$_2$e pricing is first and foremost, but many other elements to be harmonized in the electricity markets.
Dr. Kathleen Spees is a Principal at The Brattle Group with expertise in designing and analyzing wholesale electric markets and carbon policies. Dr. Spees has worked with RTOs including PJM, ISO-NE, ERCOT, MISO, AESO, IESO, NYISO and others in the U.S. and internationally to improve their market designs for capacity investments, scarcity and surplus event pricing, ancillary services, wind integration, and market seams. She has worked with U.S. and international regulators to design and evaluate policy alternatives for achieving resource adequacy, storage integration, carbon reduction, and other policy goals.

For private clients, Dr. Spees provides strategic guidance, expert testimony, and analytical support in the context of regulatory proceedings, business decisions, investment due diligence, and litigation. Her work spans matters of carbon policy, environmental regulations, demand response, virtual trading, FTRs, ancillary services, coal retirements, merchant transmission, renewables integration, hedging, and storage.

Kathleen earned a B.S. in Mechanical Engineering and Physics from Iowa State University. She earned an M.S. in Electrical and Computer Engineering and a Ph.D. in Engineering and Public Policy from Carnegie Mellon University.

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