

Carbon Pricing

Overview of the Brattle Report

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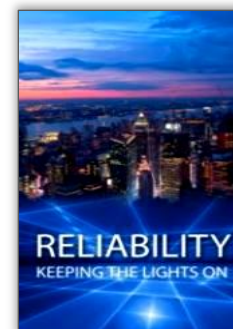
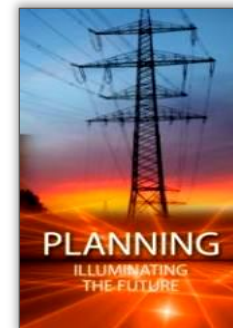
Environmental Advisory Council Meeting

November 3, 2017, Albany Capital Center, Albany, NY



Roles of the NYISO

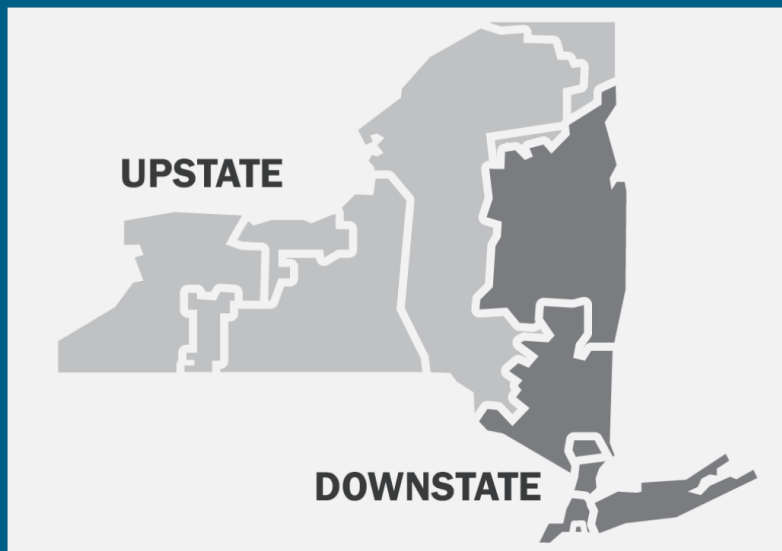
- **Reliable operation of the bulk electricity grid**
 - Managing the flow of power on 11,000 circuit-miles of transmission lines from hundreds of generating units
- **Administration of open and competitive wholesale electricity markets**
 - Bringing together buyers and sellers of energy and related products and services
- **Planning for New York's energy future**
 - Assessing needs over a 10-year horizon and evaluating projects proposed to meet those needs
- **Advancing the technological infrastructure of the electric system**
 - Developing and deploying information technology and tools to make the grid smarter



Agenda

- **Background**
- **NYISO's Efforts on Integrating Public Policy**
- **Brattle Study Purpose and Context**
 - What is carbon pricing?
- **Estimated Impacts of Carbon Pricing**
 - Emissions
 - Economic Efficiency
 - Customer Costs
- **Next Steps**
- **Q&A**

A Tale of Two Grids



“The emerging story of the New York electric system is a tale of two grids — a tale of clean energy abundance and surplus generating capacity upstate and fossil-fuel dependence and high demand downstate.”

Power Trends 2017

New York has Goals, Mandates, and Mechanisms to Substantially Reduce CO₂ Emissions

State Energy Plan

- Reduce economy-wide greenhouse gas emissions 40% by 2030 and 80% by 2050, relative to 1990 levels
- 50% of electricity from renewables by 2030

Clean Energy Standard

- Renewable Energy Credits (RECs)
- Zero-Emission Credits (ZECs)

Numerous other policies

- Participation in the Regional Greenhouse Gas Initiative (RGGI)
- Reforming the Energy Vision
- Energy efficiency standards
- Governor's proposal to eliminate coal-fired generation by 2020

Integrating Public Policy Project

The Brattle Group Work

Carbon Pricing:

Study whether incorporating a state policy defined cost of carbon in the wholesale market would improve the overall efficiency of the NYISO energy and capacity markets

NYISO Work

Market Impact Assessment of 50% Renewable Generation:

Study the impacts of decarbonization goals on the current NYISO energy and capacity markets from the high penetration of low carbon or carbon-free resources

Market Structure Assessment of 50% Renewable Generation:

Study whether other market products or changes to the existing market structure will be necessary to meet the anticipated reliability needs

Carbon Pricing

Brattle Study Purpose and Content

Study Purpose

NYISO commissioned The Brattle Group to explore whether and how New York State environmental policies could be pursued through the existing wholesale market structure.

- The study's purpose is two-fold:
 - Assess market design options for carbon pricing
 - Estimate how carbon pricing would affect market outcomes
- The Brattle Study can be found on the NYISO's website.

Carbon Pricing Can Harmonize NYISO Markets and State Policies

NYISO administered wholesale markets provide electricity reliably and cost effectively

However, markets are not aligned with state decarbonization goals

Carbon pricing could internalize environmental costs and foster competition to meet energy and environmental goals cost effectively:

- Shift commitment and dispatch within the existing fleet
- Tilt investment in renewable resources toward those that displace the most carbon
- Push any investment in fossil generation toward the lowest-emitting technologies
- Reward storage and demand response that reduce emissions
- Incentivize energy efficiency and conservation
- Spur other innovations

Carbon Pricing

Carbon Pricing is a mechanism where the cost of carbon emissions is included in the wholesale market for the purposes of scheduling resources and setting energy LBMPs

Brattle Evaluated the following carbon charge proposal:

- The PSC could set the carbon price consistent with its stated willingness to pay for carbon abatement.
- NYISO would add a charge to resources' dispatch costs based on their emissions rates.
- Generators would earn their LBMP minus their carbon charge.
- Carbon charges would be returned to customers via LSEs.
- Border charges would be applied to prevent leakage (several workable approaches).

Carbon Pricing

Estimated Impacts

Analysis Overview

How would a carbon charge affect carbon emissions, economic efficiency, and customer costs?

Analytical approach:

- 2025 snapshot
- Compare case with \$40/ton carbon charge to case with CES and RGGI alone
- Spreadsheet model

Two analysis components:

- **Static Analysis:** Capture the direct effect of a carbon charge, assuming no change in operations or investment (affects energy prices, returned carbon charges, REC, ZEC, and TCC prices)
- **Dynamic Analysis:** Capture adjustments to operations and investment in response to the carbon charge

Extensive uncertainty analysis to test alternative assumptions

Environmental and Economic Efficiency Gains

The Brattle Group estimates a carbon charge could plausibly reduce annual CO₂ emissions by 2.6 million tons

These reductions could replace costlier measures to achieve the same CO₂ reductions

For example, these reductions could avoid 6.3 TWh of REC purchases, reducing total annual economic costs by \$120 million

Impact on Customer Costs

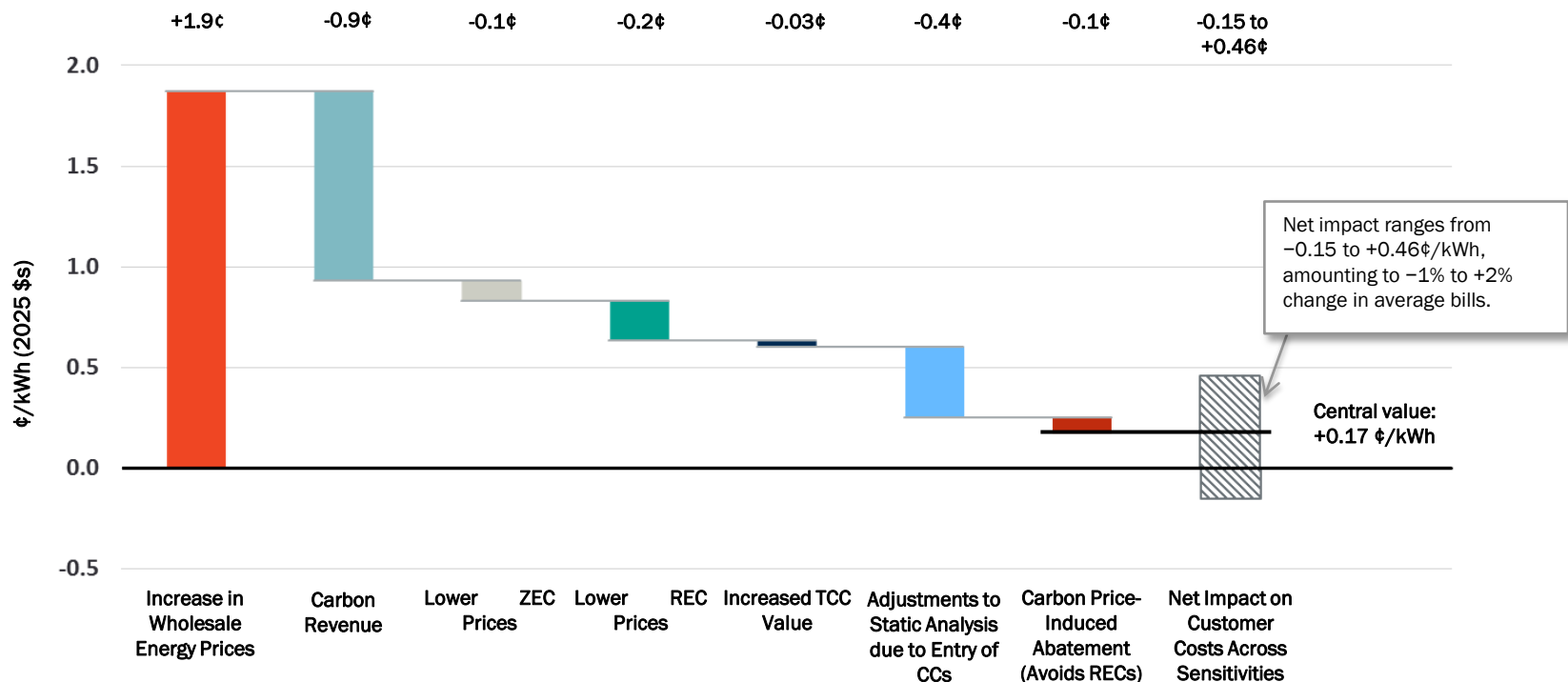
How much of the economic gains are enjoyed by consumers vs. clean energy producers?

Do higher energy prices cause a wealth transfer from consumers to producers?

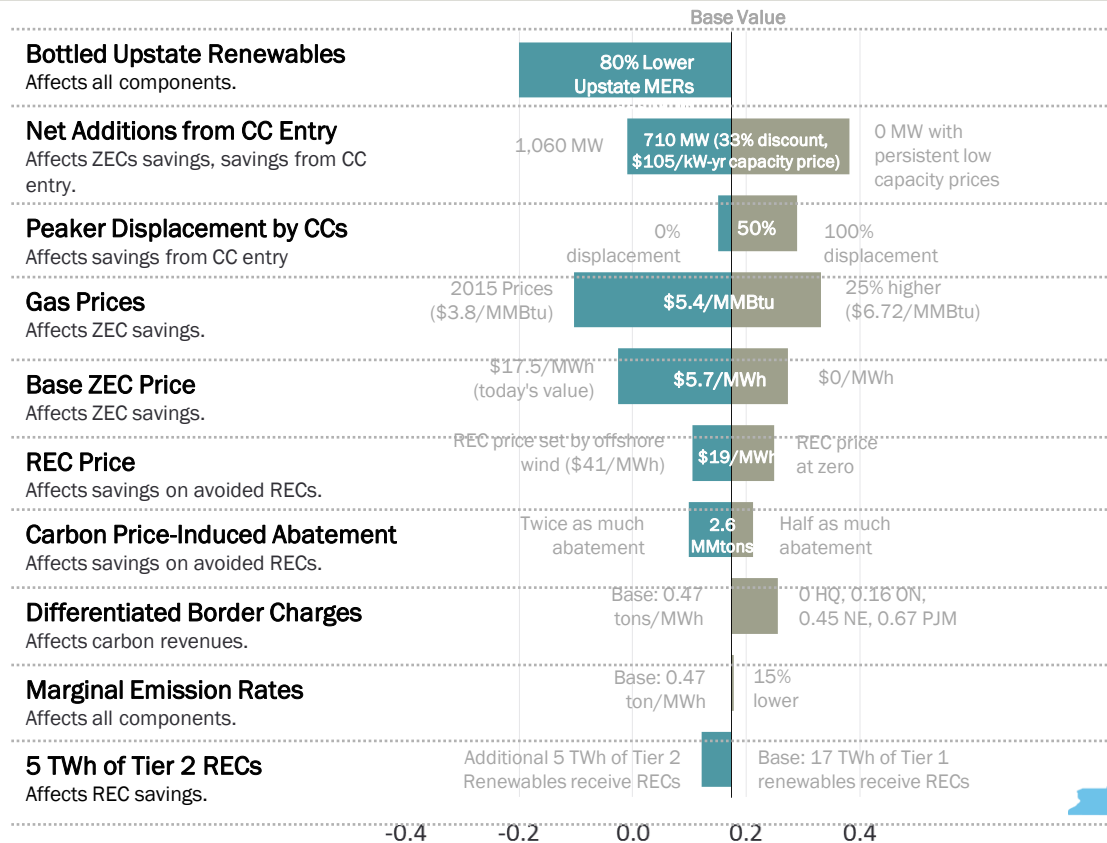
The Brattle Group estimates customer costs would not rise materially

- On net, average customer costs change between $-\$1.5/\text{MWh}$ to $+\$4.6/\text{MWh}$ around a central value of $+\$1.7/\text{MWh}$
- This amounts to a -1% to $+2\%$ change in total customer electric bills
- Impacts could vary by zone, but the differences can largely be mitigated by targeted allocation of carbon revenues

Effects of Uncertainty



Effect of Major Sources of Uncertainty



Conclusions

Straightforward and economically efficient way to harmonize state goals and markets

Would improve the economic efficiency of meeting the state's energy and environmental goals

Customer costs would not rise materially, although more economic gains would flow to producers than consumers

Several market design areas for further discussion

Next Steps

Process Going Forward

Going Forward

NY DPS Notice on Process, Soliciting Proposals and Comments, And Announcing Technical Conference (Issued October 19, 2017) (Matter 17-01821)

Integrating Public Policy Task Force (IPPTF)

- First meeting held October 27. Next meetings November 20 and December 19. January dates TBA.
- Deliverable: enable the joint NYISO/NY State team to develop a plan, by the end of January 2018, to produce a proposal that would harmonize NYS policy on carbon dioxide emissions in NY wholesale energy, capacity and ancillary series markets.

Joint DPS & NYISO Technical Conference – December 11 2017

- Topics: Border adjustment mechanisms to prevent leakage & the criteria and first principles that should be applied in developing and evaluating any plan for carbon revenue allocation

Questions?

We are here to help. Let us know if we can add anything.

The Mission of the New York Independent System Operator, in collaboration with its stakeholders, is to serve the public interest and provide benefits to consumers by:

- Maintaining and enhancing regional reliability
- Operating open, fair and competitive wholesale electricity markets
- Planning the power system for the future
- Providing factual information to policy makers, stakeholders and investors in the power system



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