

Potential New Carbon Pricing in the NYISO Market

Analysis Group's Final Report

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Agenda for today's update for stakeholders

- **Changing context for and scope of work the Analysis Group study**
- **Overview of the final report**
- **Next steps**

The changing scope of work for this report

Recap

- **NYISO engaged Analysis Group to examine potential economic impacts of the proposed carbon-pricing mechanism for NY's wholesale power markets.**
- **Original intention was to build off of the Brattle/IPPTF modeling results (from December 2018) and expand analyses to capture other economic considerations.**
- **We met with Market Issues Working Group on March 28th, April 23rd, and June 24th, 2019.**
- **Subsequent Analysis Group review of data, issues, feedback.**
- **Rounds of modifications to Analysis Group's original scope of work:**
 - first, after discussions with stakeholders,
 - second, after deep dive into the Brattle/IPPTF modeling runs, and
 - third, after enactment of New York's Climate Leadership and Community Protection Act.

The impacts of those process and scope changes ...

- **In response, we have altered the premise of the analysis:**
 - from *whether* New York would pursue aggressive goals for reducing carbon emissions and do so through administrative and other mechanisms, to
 - *how* New York will best accomplish its goals and meet the Act's mandates for reducing GHG emissions in the power sector and in the economy at large.
- **This pivot has fundamentally changed the nature of this study.**
- **It now examines:**
 - how NYISO's proposed carbon-pricing mechanism can help the State meet its new statutory requirements for decarbonizing the electric system through efficient market design and at the lowest cost, and
 - how New York's wholesale competitive electric markets can help the state achieve its climate goals more broadly, efficiently, and effectively.

Outline of the Analysis Group report

Three documents:

Summary for Policy Makers

Full Report (including Summary)

Technical Appendix

Summary for Policy Makers

I. Introduction

- A. Background
 - 1. New York State leadership in clean energy
 - 2. Federal interest in New York's clean power policies
 - 3. NYISO efforts to explore a carbon price in the wholesale market
- B. The NYISO carbon pricing proposal
- C. Studies of the impacts of the NYISO carbon pricing proposal
 - 1. Brattle/IPPTF Study (2018)
 - 2. Other studies
- D. Purpose and Scope of this Analysis Group Study

II. The context for NYISO's consideration of incorporating a price on carbon into its wholesale energy market

- A. Introduction
- B. Current conditions in New York's wholesale electric system
- C. New York State's public policy context
- D. FERC regulation of wholesale electricity markets
- E. Economic and public policy literature on carbon pricing

III. Implications of a NYISO carbon pricing mechanism for assisting New York in accomplishing its CLCPA goals

- A. Introduction
- B. New York's upcoming clean energy challenge: The numbers
- C. New York's clean energy challenge: Framing the issue of the costs
- D. A carbon price: Its value as an arrow in New York's policy quiver

IV. Impacts related to the risk that FERC will impose broader mitigation of policy-driven resources in NYISO markets

- A. Introduction
- B. Potential impacts of hypothetical FERC mitigation of NYISO markets

V. Impacts on potential repowering of generating units (and/or repurposing of sites)

VI. Impacts on public health from air emission reductions

VII. Impacts on use of fossil fuels in New York State

VIII. Impacts on consumers' electricity costs and social welfare

- A. Framing the consumer cost and social welfare issue
- B. Brattle/IPPTF and Potomac estimates of consumer costs

IX. Impacts on revenues to New York's public-power entities

X. An NYISO carbon pricing mechanism: Its overall value proposition

XI. Conclusion

Technical Appendix: Methodological Issues, Data, and Assumptions

Key findings and Summary for Policy Makers

1. New York has the strongest set of climate policies in the U.S.

New York's new Climate Leadership and Community Protection Act

In June of 2019, New York State lawmakers passed the CLCPA, setting a requirement for the state to eliminate greenhouse gas (GHG) emissions from all man-made sources in New York by 2050.

The CLCPA embraces Governor Cuomo's vision for a Green New Deal.

Among other things, the Act codifies a mandate for the electric system to rely on renewables for 70 percent of supply by 2030 and on zero-emitting resources for 100 percent of supply by 2040.

2. New York State has long been a policy leader

The CLCPA is the newest chapter of New York's economic, clean-energy and environmental leadership

The Act, which builds on years of the state's leadership on clean energy policy, innovation, and support for competitive electricity markets, squarely positions New York as a leader among nations and American states in addressing the urgent issue of climate change.

New York is already a major international economic force: If New York were a stand-alone country, it would be the world's 11th largest economy.

Considering that New York's economy accounts for one out of every 200 tons of energy-related carbon dioxide (CO₂) emitted anywhere in the world, the Act's new commitments represent a significant action to reduce and mitigate the costly impacts of global climate change.

3. This work will not be easy

The State must use every effective tool available to get the job done, in the most efficient, lowest-cost way

Achieving the many requirements of the CLCPA will involve an unprecedented and focused effort by policy makers, market administrators, and private actors.

It will require further innovation in policy, markets, technology, business models, financing, service-delivery mechanisms, workforce training, and many other things.

It will require a clear focus on the incentives expressed through energy markets and on the potential for market mechanisms to help transition the state's economy through the upcoming changes at the lowest possible cost.

While these actions and investments will help avoid the damaging impacts of climate change, they also can introduce new costs for energy consumers.

To keep these costs as low as possible, New York will need to draw on the long and successful history of market-based policies and pursue every effective tool at its disposal.

4. The Act envisions using an array of measures

The Act also anticipates putting measures in place as soon as possible

New Yorkers, and the world, will be watching the steps that the state takes.

New York policy makers know this, as shown by the Governor's announcement of the nation's largest contracts for offshore wind at the same time he signed the CLCPA in July 2019.

Many more actions will be needed and implemented as quickly as possible.

The Act recognizes that climate change is already imposing real burdens on New York's economy and on the people who live in the state, and encourages early action and steps to avoid "leakage" of emissions into other regions beyond New York, so as to help protect the competitiveness of New York's economy.

5. The Act envisions a big role for the electric grid

New York's low-carbon economy will continue to depend upon a vibrant and reliable electric system

Although buildings and the transportation sector are responsible for more than 80 percent of New York's energy-related CO₂ emissions, the Act assigns to the state's electric system an outsized role in helping to lower GHG emissions in the state's economy.

This may in part reflect the fact that, over the past two decades, competitive electric markets—in combination with policy—have helped achieve near-continuous reductions in emissions of all air pollutants, while spurring innovation and investment in advanced energy technologies.

The Act calls for the state's new Climate Action Council to include measures promoting “beneficial electrification” as part of the scoping plan that will make recommendations for attaining statewide GHG-emission limits.

The provisions to expand the role of electricity into transportation and buildings will go hand in hand with the Act's requirements that the state's electric system eventually eliminate its carbon emissions by 2040.

But it will also dramatically change the demands on electric generating resources and transmission/distribution infrastructure used to reliably meet power demand.

6. New York has a home-grown policy proposal: a carbon-pricing mechanism

Once embedded in well-functioning electric markets, it can help NY meet its climate goals at lowest cost

NYISO can unleash the power and creativity of market forces through adoption of a carbon price in the state's wholesale electricity market.

In fact, if NYISO were a state agency (which it is not), it would be obligated under Sections 7 and 8 of the Act to contribute to achieving the statewide GHG emissions limits, and adoption of a carbon price would be a natural response to such a mandate.

7. A NYISO carbon price can help deliver NY's clean-energy transition...

...in faster, cheaper, more reliable, more efficient, and more creative ways (1)

This is the core part of the value proposition of a NYISO carbon-pricing mechanism.

NYISO and key stakeholders have already developed a carbon-pricing proposal that—once in place—can send positive signals to encourage early action, consistent with the Act's intent.

A carbon price will send price signals to investors, entrepreneurs and project developers to:

- create innovative solutions and projects;
- locate renewable projects closer to New York's population centers;
- offer inventive and attractive services to help consumers reduce their demand and switch their vehicles and heating systems to electricity;
- provide price signals to spur the development and expansion of electric-vehicle charging infrastructure across the state;
- reduce emissions from fossil-fuel power plants that affect vulnerable communities; and
- invest in additional transmission capacity to open up downstate New Yorkers' access to plentiful and relatively cheap zero-carbon/renewable resources in upstate New York.

7. A NYISO carbon price can help deliver NY's clean-energy transition...

...in faster, cheaper, more reliable, more efficient, and more creative ways (2)

A carbon price will help retain existing generating units with zero or low carbon emissions in operation as long as safely possible.

It will provide owners of many such plants—including units that will come to the end of their contracts for Renewable Energy Credits (RECs) or Zero-Emissions Credits (ZEC) over the next decade—with visibility into future wholesale-market revenues at levels that (for some generating resources) will support the ongoing investments needed to maintain those units in operation.

This has material financial value to consumers, as New York transitions its electric system: For every 1,000 MW of nuclear capacity retained in any year, for example, New Yorkers will avoid the cost of replacing that zero-carbon energy with significantly larger and more costly amounts of capacity and investment in new zero-carbon-emitting power-supply projects.

Meeting the Act's requirements over the next few decades will likely require market and policy mechanisms that result in *both* retaining nuclear capacity and adding renewable resources.

7. A NYISO carbon price can help deliver NY's clean-energy transition...

...in faster, cheaper, more reliable, more efficient, and more creative ways (3)

New York's wholesale market has a successful track record in delivering reliable power with billions of dollars in savings to consumers from increased efficiency, lower cost and less financial risk to consumers.

The State can leverage NYISO's markets to help realize the Act's directives to add 6,000 MW of PV solar by 2025 and 3,000 MW of storage capacity by 2030.

Given NYISO's experience over the past two decades, we estimate such market efficiency savings (net present value) on the order of \$280-\$850 million between 2022 and 2040 (2019\$, 3 percent discount rate). This estimate is likely conservative, based on the unrealistically low assumption—given the decarbonization and electrification aspirations under the CLCPA—of a business-as-usual outlook for electricity demand.

The full build-out of a zero-carbon economy over the next two decades will require significant investment in incremental low- and zero-carbon resources to accommodate decarbonization through electrification of buildings' and vehicles' energy use.

Thus, the savings that can flow from an efficient carbon-pricing mechanism in the electric sector will be vital in helping New York manage the costs of the clean-energy transition.

8. A carbon price will position private investment and operations

...to row in the direction of the state's climate goals

New York has an integrated system of power suppliers and transmission facilities, coordinated and operated reliably and economically by the NYISO.

For over two decades, this system has operated based on a competitive market design.

NYISO administers a market that is regulated by the Federal Energy Regulatory Commission (FERC), comprised of a diverse set of over 425 market participants—transmission owners with over 11,000 miles of transmission circuits, companies owning over 700 power plants, privately owned and publicly owned distribution utilities, end-use suppliers, consumer groups, environmental organizations, and others—and reliant on market rules designed to provide reliable and economical power to New Yorkers.

Since 2000, private power companies and public power authorities have added nearly 13,000 MW of new power-production capacity (which now equals more than one-third of the capacity on today's NYISO system).

Most of these more-modern and more-efficient power plants have located in downstate New York where most of the state's power consumption occurs, and where the operation of competitive and efficient markets minimizes production costs and investment risks for the state's consumers of electricity.

9. A carbon price in NYISO markets creates synergy ...

...between the state's wholesale electricity market design and the Act's GHG-reduction targets

Adoption of a carbon price would help to send efficient price signals to market participants about the value of clean energy resources, and would establish an electric system strongly aligned with the goals of the Act.

It is broadly understood that efficient competitive wholesale markets depend on transparent price signals that accurately reflect electric-system conditions, system needs and the impacts of electricity production and consumption.

With the Act, New York's electric system now needs to move quickly towards a lower-carbon footprint.

The NYISO market design, therefore, should have a similar link, one that identifies the higher value New York places on carbon-free and low-carbon resources through transparent wholesale market signals—something that the proposed carbon-pricing mechanism can provide.

Investors and developers depend upon such signals as they consider the types of investments, operational expenditures, and projects they bring to the system, and when and where to locate them.

NY will benefit from aligning the NYISO market design with the State's climate goals, so that renewable energy and storage additions can enter the market at a pace that is much faster than NY has ever seen.

10. A carbon price can work hand in hand with other policies ...

...to amplify innovation in clean-energy products and services, the control of air pollution, investment in advanced energy infrastructure, and improvements in public-health outcomes

It would help to speed up the state's clean-energy transition through early action, as the state's ramps up its programs to meet the Act's targets.

It would complement and accelerate the impact of other state policies (e.g., NYSERDA's competitive solicitations and long-term procurements of RECs and ZECs).

It would create targeted financial incentives for innovative solutions and for clean-energy resources to locate in areas now served by fossil units, and for reducing output and air emissions at fossil-fueled power plants (especially in downstate New York areas affecting environmental-justice locations).

It would help align retail and wholesale prices, send a signal to investors of the value of adding more transmission capacity between upstate and downstate New York.

It would provide an economic basis to avoid FERC action to mitigate New York's market and avoid consumer cost impacts of such mitigation policies.

These many benefits support New York's other goals, some of which are embodied in the Act.

11. There will be out-of-pocket costs to transition NY's energy economy

A price on carbon in the NYISO markets would help lower these costs

Certainly, it will be difficult to achieve the goals of the Act without incurring costs.

New York policy makers have decided, at least implicitly in the findings of the Act, that the real costs of climate change are significant enough to warrant urgent, aggressive action to transition the state's economy away from fossil fuels.

The Act is premised on policy makers' recognition that New Yorkers are already experiencing hardships and real economic costs—in the form of air pollution, harm to public health (especially for vulnerable populations), damage to property and critical infrastructure, declines in fish populations, and injury to key industries like “agriculture, commercial shipping, forestry, tourism, and recreational and commercial fishing.”

The Act seeks to reduce and mitigate even worse impacts from a changing climate by requiring the actions the state will undertake to reduce GHG emissions.

12. The Act is still new

None of the prior studies that have modeled consumer cost impacts from a carbon price in NYISO markets reflects the timing and depth of changes that will be needed in NY's electric system under the Act

For this reason, our report de-emphasizes the results of prior studies of consumer cost impacts, and rather focuses on the incremental value of adding a carbon price as one of the engines to drive accelerated changes at lower cost.

Even with this caveat, however, we observe that various studies to date indicate that a carbon price will lead to billions of dollars of positive economic benefits:

- According to a 2019 study from researchers at Resources for the Future, global social welfare benefits fall in the range of \$118-\$755 million (2019\$) per year.
- Using Potomac Economics's results, we estimate that a carbon price would produce net present value (NPV) benefits to New York consumers ranging from \$1.72-\$3.25 billion (2019\$ for the 2022-2036 period), depending upon the scenario modeled and use of the social versus private discount rate.
- Using the Brattle/IPPTF study results, we estimate NPV benefits between \$119-\$605 million (2019\$) for the same period.

13. A carbon price will help move NY's clean-energy economy forward ...

... in ways that are hard to predict

Just as we are unable to quantify the actual costs to consumers of New York's transition to a lower-carbon electricity system and lower-carbon economy, we are unable to quantify the actual costs (or net benefits) of adding a carbon price into NYISO's market.

Yet we strongly expect—based on the efficiencies achieved in electricity pricing since the start of competitive wholesale electricity markets, and on the similarly successful history of SO_x and NO_x emissions pricing in electricity markets—that NY's economy and consumers will benefit from the operation of a carbon price to internalize into market prices the costs of carbon emissions *alongside* the deployment of myriad other public policies aimed at advancing the state's energy transition.

14. Powering more of NY's economy on electricity will help lower the costs ... **... of reducing GHG emissions from buildings and vehicles, compared to other approaches**

This positioning of the electric system to help lower carbon emissions in the economy is consistent with the academic literature which strongly suggests that an electric system comprised of diverse, zero-carbon supplies coupled with an economy that is more reliant on electricity increases the possibility of significantly reducing GHG emissions at lower costs than other approaches.

This increases the relevance and importance of transparent carbon pricing in such electricity market transactions.

Incremental value proposition of a NYISO carbon-pricing mechanism: Summary

Outcome	Impact of a Carbon-Pricing Mechanism in NYISO Markets
State policy leadership	Can be exported to other states and regions, supporting New York's market approach.
Speed of adoption	Can be implemented relatively quickly.
Accelerated entry of renewable projects	Will increase the opportunity for financing of clean energy resources to enter the market in the absence of a long-term REC contract.
Incentives for innovation	Will increase incentives for entrepreneurs and others to develop new supply-side and demand-side technologies, products and services.
Incentives for energy efficiency and other customer-based actions	Has the potential to improve over time price signals to consumers reflecting the full costs of using electricity, and influence consumer access to and use of demand-management technology and practices.
Incentives for efficient transmission investments	Will create strong incentives for cost-effective investment in increased transfer capability between upstate and downstate.
Acceleration of fossil retirements and reduced use of natural gas	Will put financial pressure on existing inefficient fossil units to retire and reduce use of fossil fuels, especially in downstate NY areas. It will also drive increased efficiencies in remaining fossil generation
Compatibility with other policy instruments	Can be a seamless complement to other state policies (e.g., energy efficiency, REC and ZEC contracting), by providing a means to value low-carbon investment and operations in the electric system.
Ability to harmonize policy and markets	Will internalize the cost of GHG emissions into the electric markets, and improve the performance of the wholesale market.
Alignment with wholesale market design	Will support the efficient operations of the NYISO markets.
Consumer cost impacts	Can provide an improved market design, aligned with the state's carbon-reduction goals, to produce savings to consumers.
Public health impacts	Will reduce local air pollution there in downstate New York
Impacts on disadvantaged communities	Will reduce emissions in downstate Environmental Justice areas.
Limitation of leakage of CO ₂ emissions to other regions	Will limit leakage due to the proposal's treatment of emissions related to cross-boundary electricity flows.
Revenue streams to public entities	Will increase revenues to NYPA as a power provider in the NYISO markets.

Next steps

NYISO posts three documents on its website

- Summary for Policy Makers
- Summary + Full Report
- Technical Appendix

Analysis Group posts the same three documents on its website

Analysis Group will return the week of October 21 to answer questions on the report (date TBA)

NYISO proceeds with stakeholder engagement and outreach

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Appendix – Detailed Outline of the Report

Chapter 1 – Introduction

Background and overview

Background

- New York State’s leadership in clean energy
- Federal interest in states’ clean power policies
- NYISO efforts to explore a carbon price in the wholesale market

NYISO’s carbon-pricing proposal – overview

Studies of the impacts of the NYISO carbon-pricing proposal

- Brattle/IPPTF study (2018)
- Potomac Economics study (2019)
- RFF study (2019)

Chapter 2 – Context for NYISO’s consideration of carbon pricing

Factors affecting adoption and implementation of the proposal

Current conditions in New York’s wholesale electric system

- A “Tale of Two Grids”: location of loads relative to renewable resources and zero-carbon resources, prices, constraints on the transmission system

Current public-policy context in New York State

- Many state policies support entry of “preferred” resources: renewable, zero-carbon, and demand-side measures
- Trends: significant entry of new resources, reduced air emissions, flat demand, relatively stable wholesale prices, reliable wholesale supply, relatively low retail bills among states with similar clean-energy profiles

FERC regulation of NYISO’s wholesale electric markets

- FERC’s defense of wholesale electric pricing and organized-RTO capacity markets

Economic and public-policy literature on carbon pricing

- Critical role for the electric sector in achieving cost-effective GHG-emission reductions

Chapter 3 – Implications of the Act vis-à-vis NYISO’s carbon proposal

The role of NYISO’s carbon-pricing proposal in helping to accomplish the CLCPA goals

Introduction

- The State’s policy leadership, with a preference for many tools (including long-term contracts for RECs and ZECs)
- Outcomes: e.g., lower CO₂ emissions, doubling of wind and significant expansion of solar over the past decade (but together non-hydro renewables still only account for 5% of supply in New York’s wholesale market)
- Challenges ahead to meet the CLCPA’s targets and timelines

New York’s upcoming clean-energy challenge: The numbers

- Baseline demand outlook: transformation of the portfolio will be aggressive
- High electrification outlook: transformation will be extremely challenging

New York’s upcoming clean-energy challenge: Framing the issue of cost

NYISO carbon-pricing mechanism: Its potential role as one more arrow in New York State’s policy quiver

Chapter 4 – Impacts related to potential broader FERC mitigation

Risks associated with relying principally on out-of-market actions to transition the electric system

Introduction – FERC mitigation of state-sponsored out-of-market resources in organized capacity markets

- Different approaches in ISO-NE, PJM, NYISO

Potential impacts of hypothetical expansions of FERC mitigation of NYISO markets

- Thought experiment to characterize the risks (and costs) of further mitigation in New York

Chapters 5, 6, 7 and 9 – Other impacts

A carbon-pricing mechanism's contribution to other economic effects

Impacts on potential repowering and/or repurposing of sites with existing fossil generating units in NYC area

- Direct and indirect implications – insights from the Potomac Economics analysis (2019)

Impacts on public health from air emission reductions

- Direct and indirect implications – insights from the Brattle/IPPTF (2018) and Potomac Economics modeling runs, particularly on environmental justice communities
- Net effect of increased electrification on CO₂ emissions – illustrative quantitative example

Impacts on fossil fuels used in New York State

- Direct and indirect implications – insights from the Brattle/IPPTF and Potomac Economics modeling runs

Impacts on revenues to state power entities

- Summary of range of estimates of public value of revenues to NYPA

Chapter 8 – Impacts on consumers’ electricity costs and social welfare

Long-term costs and benefits from introducing a carbon price in NYISO markets

Framing the consumer cost and social welfare issue

Brattle and Potomac analyses of consumer cost impacts

- Implications and caveats for our estimate of NPV savings

RFF estimates of social welfare benefits

- Implications and caveats for our estimate of NPV savings

Chapter 10 – Pulling the impacts together

Focus on the core value proposition of a carbon-pricing mechanism

The incremental value proposition of a carbon-pricing mechanism in the NYISO markets, for:

- Enhancing state policy leadership
- Accelerating the pace of change in the electric portfolio
- Lowering costs to accomplish economy-wide emissions reductions
- Providing appropriate and constructive financial incentives in private markets
- Reducing leakage of CO₂