Benefits and Costs of Power Plant Carbon Emissions Pricing in New York: Overview and Summary

Daniel Shawhan, Paul Picciano, and Karen Palmer

July 2019

The electricity sector has historically been a major contributor to US greenhouse gas emissions and continues to play an important role, having contributed roughly **28 percent** of total greenhouse gas emissions in 2017. While policies to promote generation from renewables and coincident reductions in renewables costs have contributed to recent declines in CO_2 emissions, an even bigger contributor over the past decade has been the change in relative prices of natural gas versus coal resulting from the widespread use of fracking technology. Imposing a financial cost on CO_2 emissions could contribute to a further differentiation among the costs of coal, gas and non-emitting sources of generation that would encourage investment in clean generators and prompt further reductions in emissions of carbon and other related pollutants. Emission pricing could be used to help meet the ambitious New York clean power goals in the Climate Leadership and Community Protection Act recently passed by New York's legislature. Furthermore, it could prevent the Federal Energy Regulatory Commission from imposing a minimum-offer-price rule on clean energy resources in New York's generation capacity market—a rule that would likely make the goals more costly to meet.

New York State and the New York Independent System Operator (NYISO) are in the process of evaluating whether to move forward with a proposed "carbon adder" policy to price carbon in the NYISO's wholesale electricity markets in order to improve the price signals in its energy and related capacity markets. The proposed policy ("the Policy"), introduced by the NYISO in April of 2018 in the form of a **straw proposal** and further refined in response to stakeholder input in a **proposal released in December of 2018**, involves pricing carbon emissions from New York power plants at the social cost of carbon (SCC) minus the relevant allowance price from the Regional Greenhouse Gas Initiative (RGGI) cap and trade program. Imports would be charged, and exports credited, based on an estimate of the carbon component of the NYISO wholesale electricity price at the import/export location. The value of the SCC that would play a role in such a policy would ultimately be determined by the State of New

York, but it is expected that the State would consider using one of the SCC estimates developed by the Obama Administration Interagency Working Group. We assume that the State's chosen carbon dioxide (CO_2) emission price would be $51 in 2025 (measured in 2013 dollars, like all dollar values in this report).

The NYISO carbon pricing Policy proposal arises within a pre-existing clean energy and climate policy regime that seeks a substantial change in how electricity is produced within New York. New York State's 2015 Energy Plan includes a goal of reducing statewide CO_2 emissions by 40 percent from 1990 levels by 2030 and having 50 percent of its electricity supplied by renewable generators within that same time frame. New York has adopted a number of policies intended to help meet these targets including (1) participating in RGGI, (2) a renewable energy standard requiring load serving entities to purchase renewable energy credits (RECs) in sufficient quantities to meet their renewable generation share obligation, and (3) a zero energy credit (ZEC) program to support the continued operation of three upstate nuclear generating plants that have insufficient wholesale market revenue to remain financially solvent. Items (2) and (3) are the two main components of New York's overarching Clean Energy Standard (CES) adopted in 2016. The proposed NYISO carbon pricing Policy would reinforce these program goals and more fully internalize the social costs associated with carbon emissions into electricity system operations and investment decisions.

To help inform the Policy development process and associated efforts to reduce carbon emissions from electricity generation in New York, we undertook a detailed modeling analysis of how the carbon pricing Policy might affect the New York electricity sector. We used the Engineering, Economic, and Environmental Electricity Simulation Tool (E4ST), which incorporates a realistic model of the power grid, detailed generator and renewable resource data, and comprehensive benefit-cost analysis capabilities. An earlier round of this analysis was presented to the NYISO Integrated Public Policy Task Force (IPPTF) in September of 2018. More recently, we updated our analysis to incorporate the planned application of RGGI to New York generators with capacities between 15 and 25 megawatts (MW) and updated estimates of renewables technology costs and natural gas fuel prices, including two sets of estimates for each ("Low" for relatively lower renewables costs married with relatively higher natural gas prices to achieve a lower RGGI price, and "High" for relatively higher renewables costs married with lower natural gas prices leading to higher RGGI prices). Our analysis explores the interaction between the proposed NY Policy and the NY RPS, ZEC and RGGI cap and trade policies and yields insights about

implications of the Policy for electricity markets, electricity generation by fuel, electricity prices and emissions of carbon dioxide and other pollutants within New York, within RGGI and within the broader Eastern Interconnection.

Our analysis, which focuses on the differences in 2025 between scenarios with the proposed New York carbon pricing Policy and otherwise identical scenarios without it, finds that the Policy reduces carbon emissions from electricity generation within New York State and throughout the Eastern Interconnection, under both sets of technology and fuel cost assumptions. There is less than 100 percent emissions leakage (i.e., emissions increases in other jurisdictions or by other sources not covered by a policy) to the rest of the RGGI states due to the implementation of the RGGI Emissions Containment Reserve (ECR), which provides a mechanism for reducing the emissions cap if the RGGI allowance price falls to the reserve trigger price. As a result, the proposed Policy reduces total power-sector emissions from the RGGI states taken together. In fact, under the High cost assumptions, the Policy even reduces emissions in the rest of the RGGI states (outside New York).

The Policy also has important effects on emissions beyond RGGI that differ substantially depending on the technology and fuel price assumptions. With the "High" costs, net power imports to the RGGI states from the rest of the Eastern Interconnection change very little, so emissions in the rest of the Eastern Interconnection change very little. However, with the Low costs, the Policy increases New York solar and wind capacity and generation enough to appreciably reduce total net electricity imports to the RGGI states. As a result, the New York Policy reduces total Eastern Interconnection carbon emissions by almost twice as much as it reduces carbon emissions in New York. It also reduces sulfur dioxide and nitrogen oxide emissions, which reduces premature deaths and illness from air pollution in New York and in other states and provinces.

The Policy lowers the RGGI allowance price under the Low cost assumptions and reduces the allowances available in the market (tighter CO_2 cap) under both sets of cost assumptions due to the ECR, which, in turn, reduces government revenue to the states. The Policy drives New York REC and ZEC prices to zero, bringing the incentives necessary to encourage renewables investment and continued upstate nuclear generation back into the energy markets. It also substantially reduces the New York installed capacity price. The Policy increases zonal average wholesale electricity prices in New York by $20 to $24 per megawatt-hour (MWh), or 2.0 to 2.4 cents per kilowatt-hour (kWh), with the largest effects in zone J (New York City). However, the revenue from the carbon price is rebated to electricity end-users, and the end-users save from the lowering of the capacity, REC, and ZEC prices. These rebates and

savings almost completely nullify the average cost of the policy to end-users. They reduce it to only $0.09 to $1.21 per MWh ($0.0009 to $0.00121 per kWh), equal to about 0.1 percent to 1.1 percent of average retail price under the Low and High cost assumptions, respectively. Overall, the policy has negligible impacts on the estimated social welfare of New York residents and positive impact on estimated global social welfare of $108 to $691 million per year.

In June of 2019, the New York State legislature passed the State Climate Leadership and Community Protection Act (S6499, A8429), one of the most aggressive state level clean energy policies in the country. This legislation, which the governor is expected to sign, proposes to increase the share of renewables in electricity generation to 70 percent by 2030 implying an increase in the share of non-emitting generation from its current level of approximately 60 percent (46 percent not including Indian Point, which is slated to retire in 2021) to roughly 88 percent in 2030 (for load-serving entities under the jurisdiction of the NY Public Service Commission) and 100 percent by 2040.

The passage of this bill changes the prospects for the Policy that we analyze in this report. Carbon emission pricing, like in the Policy, could be used to meet the new clean energy goals. One advantage of using emission pricing to meet New York's clean energy goals is that it may prevent the imposition of a minimum-offer-price rule that makes the goals more costly to achieve. Another is that, for a given amount of zero-emitting generation achieved, carbon emissions are lower with a carbon emission price than they are without such a price, because the emission price incentivizes the use of lower-emitting generators over higher-emitting generators. Pricing carbon also encourages the siting of new non-emitting generators in locations where they most effectively reduce the need for emitting generation. Our analysis affirms this result; in our simulation results, the proposed NY carbon pricing Policy reduces the carbon emission intensity of New York's natural gas-fueled generation by four percent.

Our findings suggest that pricing carbon at $63 in 2025 ($51 in 2013 dollars) could lead to the share of clean energy rising to as high as 64 percent of total New York generation by 2025, well on the way to the 88 percent requirement, although the increase in non-emitting generation due to the Policy is smaller under the High renewables costs assumption. This analysis suggests that pricing carbon within New York electricity markets could help to advance the adoption of clean energy but that a higher carbon price, additional companion policies, or different policies will likely be necessary to hit the clean energy goals that New York State has set for 2030.