



Power Sector Decarbonization in North Carolina

An Evaluation of the Interplay Between HB 951 and RGGI

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Executive Summary

North Carolina is seeking to significantly reduce its carbon emissions by accelerating the transition to clean energy in the electric power sector. Electricity is the second leading source of GHG emissions in North Carolina, contributing over one-third of the state's climate pollution.¹ In October 2021, Governor Roy Cooper signed House Bill 951 (HB 951) into law, which calls for a 70 percent reduction in carbon emissions from the power sector by 2030 and carbon neutrality in the power sector by 2050. This will require new programs and policies to drive transformation in the sector, and critical regulatory reforms to create the right incentives for utility companies to invest in the clean technologies necessary to cut emissions.

Previously, in July 2021, the North Carolina Environmental Management Commission (EMC) voted to begin a rulemaking process that would establish declining regulatory limits for carbon pollution from electric power generation and link North Carolina with the Regional Green House Gas Initiative (RGGI). RGGI was established in 2009 by states in the northeast and mid-Atlantic to reduce carbon emissions from power plants. In operation for more than a decade, RGGI has proven to be highly successful. The design of the program, a "cap-and-invest" approach, ensures that emissions reductions are secured through the implementation of an emissions cap and financially benefits customers. Electricity consumers in RGGI states are on track to save \$15 billion on their utility bills.²

Additionally, in January of this year, Governor Cooper signed Executive Order 246 (EO 246), which acknowledges that "climate change disproportionately impacts people of color, low-income communities and indigenous communities, and that responsible solutions to climate change must equitably reduce GHG emissions, increase community resilience, advance sustainable economic recovery and infrastructure investment efforts, promote public health and equity, and ensure fair treatment and meaningful engagement in decision-making and implementation."³

As noted in both the state's own greenhouse gas inventory, and EDF's climate emissions analysis, North Carolina is not on track to meet its critical 2030 or 2050 carbon pollution reduction targets. In the power sector alone, a 12% to 22% gap from a 2005 baseline exists to reach the 2030 power sector emissions targets outlined in state law.^{4,5}

This paper demonstrates that, implemented alongside HB 951, joining RGGI can be an integral part of achieving the goals outlined in the new law. Further, informed by actual results observed in the existing RGGI region and supported by key findings of the NC Clean Energy Plan's "A-1" Report, this paper explores the beneficial interplay resulting from the combination of HB 951 and North Carolina's potential participation in the RGGI program.

Participating in RGGI would reduce the administrative burden for state regulators to achieve their emissions reduction goals and take advantage of the lessons learned from more than a decade of RGGI program administration in nearby states. In addition, HB 951 has directed the North Carolina Utilities Commission to pursue complementary programs and regulatory

¹ North Carolina Department of Environmental Quality, Greenhouse Gas Inventory, <https://deq.nc.gov/energy-climate/climate-change/greenhouse-gas-inventory>.

² RGGI Proceeds Report: https://www.rggi.org/sites/default/files/Uploads/Proceeds/RGGI_Proceeds_Report_2020.pdf

³ Executive Order No. 246: <https://governor.nc.gov/media/2907/open>

⁴ https://www.edf.org/sites/default/files/documents/EDF_NC%20Emissions%20Gap%20Report_2022.pdf

⁵ Ibid

reforms to help in achieving North Carolina's carbon reduction goals. Participation in the RGGI carbon trading program would ensure that emissions reductions needed to comply with HB 951 are achieved at least-cost, while EO 246 requires state agencies to incorporate environmental justice and equity into climate solutions.

While HB 951 and RGGI promote reducing carbon pollution and accelerating the transition to a clean economy, serious consideration must be given to ensure that policies do not perpetuate disproportionate impacts and that substantial benefits flow directly to disproportionately burdened communities.

For these reasons, emissions-reduction programs must be deliberately and thoughtfully designed to ensure that polluters are unable to simply pay to continue polluting in disproportionately burdened communities. Some market-based GHG reduction programs, including cap-and-invest programs like RGGI, have been criticized for enabling polluters to simply pay to continue to pollute in disproportionately burdened communities, leading to hot-spotting—where energy producers respond to mandated emissions reductions by shifting generation and associated pollution to resources located in frontline communities especially vulnerable to harmful pollution, even while decreasing emissions statewide.

In addition, careful steps need to be taken to ensure engagement with disproportionately burdened communities to inform HB 951 and RGGI implementation in North Carolina. Prioritization must also be given to ensuring RGGI revenues, to the greatest extent possible, facilitate an equitable clean energy transition through targeted investments for low-income residents and pollution-burdened communities. Many states currently participating in RGGI or who are in the process of joining have taken steps to ensure that RGGI is capable of addressing environmental justice concerns at the same time that it enables emissions reduction and clean energy expansion. North Carolina must do the same.

Participating in RGGI complements HB 951 in advancing carbon goals while helping to ensure greater overall emission reductions, increased economic and health benefits, and provide a potential funding stream to enable investment in frontline and disadvantaged communities.

North Carolina has an opportunity to transform its energy system for the benefit of residents and communities throughout the state. HB 951 provides the regulatory framework to make this a reality, and RGGI can provide the tools necessary to realize emissions reductions in a way that is durable, cost-effective, and environmentally just.

Introduction

The United States has set a goal to reach 100% carbon pollution-free electricity by 2035, as outlined by the Nationally Determined Commitment (NDC) submitted April 22, 2021, after rejoining the Paris Climate Agreement.⁶ This is part of the nation's larger goal to achieve an economy-wide target of reducing greenhouse gas emissions by 50-52% below 2005 levels in 2030. To reduce carbon emissions at the pace necessary to achieve these national targets, states must also adopt emissions reduction goals, especially in the near-term. Given the ever-increasing costs of climate change and the Supreme Court's recent decision limiting EPA's ability to reduce power plant emissions, it is critical for states to take all available action to secure durable progress now^{7,8}

In addition to commitments in the electric sector, North Carolina is joining a growing list of jurisdictions seeking to achieve carbon neutrality economy-wide by mid-century. As a state on the frontlines of the changing climate, North Carolina has much to gain by taking action to limit the impacts of global warming. In the four years since Governor Cooper's Executive Order 80 in 2018, North Carolinians have lived through 24 different billion-dollar weather disasters – including extensive and damaging flooding from 10 hurricanes and tropical cyclones.⁹ Climate change is costing North Carolina's economy right now – and those costs will rise if climate pollution continues unchecked.

The science is clear: in order to avert the worst impacts of climate change and preserve a livable planet, global temperature increase needs to be limited to 1.5°C above pre-industrial levels. The electric power sector is critical in supporting deep decarbonization in order to unlock reductions in other sectors that rely on electricity, such as cars and buildings.¹⁰ North Carolina has started to put the plans and policies in place to help achieve these emissions reduction goals:

- In October 2018, Governor Roy Cooper signed Executive Order No. 80 (EO 80), setting a statewide goal to reduce greenhouse gas (GHG) emissions 40% below 2005 levels by 2025, increase the number of registered zero-emission vehicles, and reduce energy consumption.¹¹ EO 80 directed North Carolina's Department of Environmental Quality (DEQ) to develop a Clean Energy Plan to evaluate ways to increase in-state clean energy resources and energy efficiency, and analyze other ways to create a modern and resilient electric grid.
- The Clean Energy Plan, designed in scope and substance by the Cooper Administration, was published in October 2019 and recommended the development of a report to consider carbon-reduction policies such as accelerated coal retirements and market-based carbon reduction programs like RGGI.¹² This report, completed in 2021 by researchers at the Nicholas Institute for Environmental Policy Solutions and the UNC Center for Energy, Environment and Economics entitled "Power Sector Carbon Reduction: An Evaluation of Policies for North Carolina" considers the benefits and costs

⁶ NDC commitment: <https://unfccc.int/sites/default/files/NDC/2022-06/United%20States%20NDC%20April%202021%202021%20Final.pdf>

⁷ EDF, 2020, <https://www.edf.org/climate/costofinaction/northcarolina>

⁸ Supreme Court of the United States, West Virginia v. EPA, https://www.supremecourt.gov/opinions/21pdf/20-1530_n758.pdf

⁹ NOAA, <https://www.ncei.noaa.gov/access/billions/events/NC/2018-2022>

¹⁰ McKinsey & Company, The 1.5 degree challenge, 2021, <https://www.mckinsey.com/business-functions/sustainability/our-insights/interactive-the-1-point-5-degree-challenge>.

¹¹ State of North Carolina, Executive Order No. 80, North Carolina's Commitment to Address Climate Change and Transition to a Clean Energy Economy, October 29, 2018, <https://governor.nc.gov/media/967/open>.

¹² NC Clean Energy Plan, https://files.nc.gov/ncdeq/climate-change/clean-energy-plan/NC_Clean_Energy_Plan_OCT_2019_.pdf

of joining the Regional Greenhouse Gas Initiative (RGGI) . That analysis, conducted by and on behalf of the state of North Carolina, provides key insights and is referenced throughout this whitepaper.¹³

- In July 2021, the North Carolina Environmental Management Commission (EMC) approved a petition directing the Department of Environmental Quality (DEQ) to launch a rulemaking process to limit carbon dioxide (CO₂) emissions from the state’s electric power sector. Specifically, the rule proposed by the petition would have North Carolina participate in RGGI, an existing regional trading program to limit CO₂ emissions from fossil-fired power plants in twelve states, with Virginia and Pennsylvania as the most recent states to join.
- In October 2021, Governor Roy Cooper signed HB 951 into law, setting a goal to reduce power sector carbon emissions 70% from 2005 levels by the year 2030 and achieve carbon neutrality by 2050.¹⁴ HB 951 has a clear set of goals, but the specifics of how the goals are to be achieved is left, in large part, to the North Carolina Utilities Commission (NCUC) to be developed with utility and stakeholder input. Duke Energy filed its draft Carbon Plan on May 16, 2022, outlining its path towards meeting the goals of HB 951.¹⁵ *Three of the four proposed portfolios miss the 2030 deadline*, but could achieve a 70% reduction by 2032 or 2034. The NCUC is required to finalize the Carbon Plan by December 2022.
- In January 2022, Governor Cooper signed Executive Order No. 246 (EO 246), which established the goals of reducing statewide emissions 50% by 2030, relative to 2005 levels, and reaching net-zero emissions by 2050. Critically, EO 246 clearly articulates the link between North Carolina’s transition to a clean economy and climate justice, stating that “climate change disproportionately impacts people of color, low-income communities, and indigenous communities” and affirming that it is the policy of the state of North Carolina to pursue climate solutions that meaningfully address environmental injustice and support a just transition to a zero-carbon economy. Importantly, EO 246 identifies state and federal investment as an important tool for fighting climate change and environmental injustice, requiring cabinet agencies to invest applicable federal and state funding in ways that reduce GHG emissions and air pollution, promote resiliency, invest in historically underserved communities, increase affordability for low- and moderate-income households, advance health equity, and create jobs and economic growth through a clean North Carolina economy.

Joining the RGGI program while simultaneously implementing HB 951, North Carolina could reap the benefits of multiple approaches to decarbonizing the electric sector, while ensuring climate benefits are maximized in the near-term, when they are most impactful.¹⁶ In addition, reaching emissions reduction goals in the power sector will unlock the potential to achieve

¹³ Konschnik, K., M. Ross, J. Monast, J. Weiss, and G. Wilson. Power Sector Carbon Reduction: An Evaluation of Policies for North Carolina. NI R 21-01. Durham, NC: Duke University. https://nicholasinstitute.duke.edu/sites/default/files/publications/Power-Sector-Carbon-Reduction-An-Evaluation-of-Policies-for-North-Carolina-Revised_0.pdf.

¹⁴ NC Gov. Cooper, Governor Cooper Signs Energy Bill Including Carbon Reduction Goals Into Law, Press Release, October, 13, 2021, <https://governor.nc.gov/news/press-releases/2021/10/13/governor-cooper-signs-energy-bill-including-carbon-reduction-goals-law>.

¹⁵ Duke Energy, Carolinas Carbon Plan, 2022, <https://www.duke-energy.com/our-company/about-us/carolinas-carbon-plan>.

¹⁶ See Appendix A for summaries of RGGI and HB 951

economy-wide goals in future years. Given current technology, those goals are difficult, if not impossible to achieve, without near carbon-free electricity generation.

Two Policies, One Goal

The petition to join RGGI and the passage of HB 951 have initiated parallel and complementary regulatory proceedings, within different government agencies, with the same goal of reducing carbon emissions from the power sector 70% from 2005 levels by 2030. NC DEQ is developing a rule to establish limits on power-sector carbon pollution and enable the state to participate in RGGI; while at the same time, the NCUC is required by HB 951 to develop a “Carbon Plan” outlining a least-cost path to reduce power plant emissions 70% by 2030 compared to a 2005 baseline and reach carbon neutrality by 2050.¹⁷ **Part of NCUC’s plan could include North Carolina participating in the RGGI trading program, a pathway assessed in the state’s Clean Energy Plan.** The DEQ and NCUC could pursue a coordinated approach that takes advantage of the unique mechanisms in RGGI and HB 951 to better ensure the best outcome for the state and its ratepayers.

Key aspects of participating in the RGGI program include:

- Utilities and other electricity providers are incentivized to reduce power plant emissions under a declining annual cap at least cost, with flexibility in terms of how they meet requirements.
- Utility customers may benefit from the auction proceeds through rebates or other clean energy programs, such as energy efficiency, renewables, and environmental justice.
- The administrative burden for the state is reduced by joining an existing program.

Key aspects pertaining to carbon emissions reductions within HB 951 include:

- The NCUC must develop a “Carbon Plan” outlining a path to reduce carbon pollution from North Carolina generating facilities 70 percent by 2030, relative to 2005 levels, and reach net-zero carbon emissions by 2050. The law does not require specific reductions in other years.
- Given the authorities and tools provided to the NCUC, HB 951 acts functionally like a Clean Electricity Standard (CES), in that the NCUC makes decisions related to capacity and generation planning. A CES requires a specific amount of clean generating resources, which is analogous to the “resource portfolio” approach of the Carbon Plan. This resource approach can serve to incentivize in-state investments in clean energy.
- HB 951 allows the NCUC to delay the 2030 and 2050 deadlines by no more than two years, except if the authorized construction of a new wind energy or nuclear facility requires additional time for completion or in the event necessary to maintain adequacy and reliability of the grid. HB 951 does not provide a maximum number of years that carbon reduction goals may remain unmet in those circumstances, nor does it restrict the utility from achieving faster or deeper emissions reductions.

¹⁷ Environmental Management Commission Special Air Quality Committee Meeting Summary, June 15, 2021, <https://deq.nc.gov/media/20346/download?attachment>.

Layering multiple policies that are complementary and mutually-reinforcing can be more effective in achieving state goals than when one is adopted alone. ICF analysis found that **“CES + RGGI combination policy yields nearly twice the cumulative CO₂ reductions to 2050 than either policy alone... residential bills are lowest – and lower than business as usual – under a combination of CES + RGGI policy.”**¹⁸

For North Carolina, this is demonstrated in the state’s A-1 carbon pathways modeling. The benefit of a combined approach is also seen across existing RGGI participating states – every RGGI state has adopted a combination of policy approaches to drive emissions reductions, encourage clean energy investments within the region, and enhance energy efficiency.^{19,20}

Examples of Complimentary Clean Energy Programs in RGGI States

In 2019 New York passed the Climate Leadership and Community Protection Act, which sets economy-wide GHG emissions limits of 40 percent by 2030 compared to a 1990 baseline and net-zero emissions by 2050. New York also has a statutory goal, specific to the power sector, that requires a zero-emission electric grid by 2040.

Rhode Island’s 2021 Act on Climate established GHG emissions reduction goals of 45 percent by 2030 and 80 percent by 2040 compared to a 1990 baseline and net-zero emissions by 2050. Additionally, current statute sets a renewable portfolio standard (RPS) of 38.5 percent by 2035 and Executive Order 20-01 directs the state’s Office of Energy Resources to develop a plan to meet 100 percent of electricity demand with renewables by 2030.

Relatedly, all current participating RGGI states have an RPS, with New York and Massachusetts each also implementing a CES to further support procurement of zero-emitting resources.

The following sections explore how by advancing both RGGI and HB 951, North Carolina could accelerate achievement of the state’s carbon reduction goals and deliver additional benefits to the state. The discussion is informed by past and current outcomes observed in RGGI participating states, further supported by key findings of the state’s Clean Energy Plan “A-1” report.

Accelerating and Securing Carbon Reductions

HB 951 has established emissions reduction goals for the electric power sector in North Carolina, and while mechanisms to achieve these goals may be included in the NCUC’s Carbon Plan, none are prescribed by the law. The first draft Carbon Plan filed by Duke Energy on May 16, 2022 proposes four portfolios to reduce carbon emissions, with only one achieving the goal

¹⁸ https://nicholasinstitute.duke.edu/sites/default/files/publications/Power-Sector-Carbon-Reduction-An-Evaluation-of-Policies-for-North-Carolina-Revised_0.pdf, pg 129-130

¹⁹ Konschnik, K., M. Ross, J. Monast, J. Weiss, and G. Wilson. Power Sector Carbon Reduction: An Evaluation of Policies for North Carolina. NI R 21-01. Durham, NC: Duke University. https://nicholasinstitute.duke.edu/sites/default/files/publications/Power-Sector-Carbon-Reduction-An-Evaluation-of-Policies-for-North-Carolina-Revised_0.pdf.

²⁰ The Regional Greenhouse Gas Initiative, Climate Goals and Commitments of the RGGI Participating States, https://www.rggi.org/sites/default/files/Uploads/Climate-Commitments/RGGI_State_Climate_Commitments.pdf.

by the 2030 deadline outlined by HB 951.²¹ The law provides flexibility for achieving the emissions reductions on timelines that go beyond the 2030 or 2050 compliance dates by more than two years, and with no upper limit, in order to construct new nuclear or wind energy facilities or if deemed necessary to maintain grid adequacy and reliability. This leaves room for delays in decarbonization in early years and for target dates to be missed - causing increased cumulative emissions, for emissions reductions to stall or plateau, or potentially for emissions to increase between target years.

Participation in a state or regional carbon market with an overall cap on emissions, like RGGI, provides a high degree of certainty and durability that emissions reductions will be achieved year-over-year. The RGGI program sets annual emissions caps ensuring a gradual decline in emissions across the participating states. Because emissions are not allowed to exceed the allotted amount, the cap creates a high level of certainty that emissions are reduced consistent with program design. Since the beginning of the program through 2020, RGGI has avoided more than 49.5 million short tons of carbon emissions in participating states.²²

A retrospective analysis published in 2015 that evaluated the first four years of the RGGI program found that carbon emissions would have been 24% higher across those states without the RGGI program in place, controlling for external factors such as the Great Recession.²³

...if North Carolina were to reduce power sector emissions at a rate consistent with current RGGI caps, then cumulative emissions through 2030 could be reduced roughly three times greater with RGGI than if just the HB 951 goal for 2030 was met.

Participation in RGGI would provide North Carolina significantly greater certainty that its carbon reduction goals are met on time and at least cost. This finding is also consistent with the state's A-1 report as part of the state's Clean Energy Plan process, which analyzed a number of different carbon reduction policy pathways and found that participating in RGGI was the most cost-effective approach for achieving emissions reduction by 2030.²⁴ This report also found that a CES or RGGI policy alone would not reach the 70% emissions reductions by 2030 goal, although combining the policies together does achieve the goal.²⁵

Setting firm annual emissions reduction standards by participating in RGGI could also drive greater cumulative emissions reductions over time. Because the majority of climate change results from the cumulative buildup of GHGs in the atmosphere over time, immediate and persistent reductions are essential to limiting the most catastrophic impacts of climate change. Nearer-term reductions will support greater climate benefits in the long-term and RGGI could better support achieving more emissions reductions sooner and with more certainty. Beginning next year, if North Carolina

²¹Duke Energy, Carolinas Carbon Plan, 2022, <https://www.duke-energy.com/our-company/about-us/carolinas-carbon-plan>.

²² The Regional Greenhouse Gas Initiative, Investments of RGGI Proceeds in 2020, 2022, https://www.rggi.org/sites/default/files/Uploads/Proceeds/RGGI_Proceeds_Report_2020.pdf.

²³ Murray, B. and P.T. Maniloff, Why have greenhouse emissions in RGGI states declined? An econometric attribution to economic, energy market, and policy factors, Energy Economics, Volume 51, 2015, Pages 581-589, ISSN 0140-9883, <https://doi.org/10.1016/j.eneco.2015.07.013>.

²⁴ Kunschik, K., M. Ross, J. Monast, J. Weiss, and G. Wilson. Power Sector Carbon Reduction: An Evaluation of Policies for North Carolina. NI R 21-01. Durham, NC: Duke University. https://nicholasinstitute.duke.edu/sites/default/files/publications/Power-Sector-Carbon-Reduction-An-Evaluation-of-Policies-for-North-Carolina-Revised_0.pdf.

²⁵ *Ibid.*

were to reduce power sector emissions at a rate consistent with current RGGI caps, then cumulative emissions through 2030 could be reduced roughly three times greater with RGGI than if just the HB 951 goal for 2030 was met.^{26, 27}

While the Carbon Plan is not finalized at the time of this paper's publication, rough estimates from the four draft plans filed by Duke Energy were used to conduct this analysis. Those estimates did not disclose year-over-year emissions projections for Duke Energy. Rather, a simple chart was provided for illustrative purposes. For purposes of this analysis, we assume North Carolina joins RGGI in 2023, and reductions from the Carbon Plan do not occur until the first required year of compliance in 2030.

More conservative estimates on RGGI participation coupled with more aggressive assumptions on emissions reductions from the Carbon Plan yield a different total amount of cumulative emissions reductions, but a similar magnitude and vector. For instance, if RGGI participation did not begin until 2024, or even 2025, participation in the program could still yield *at least two times* greater cumulative emissions reductions by 2030. At a minimum, RGGI guarantees 70% emissions reductions by 2030, cumulatively saving North Carolina the 7% gap between the Carbon Plan P1 and P4 scenarios (70% - 64% emissions reduction range)²⁸. The only case in which this would not be true is if Duke Energy were to drastically reduce emissions in the near-term, which is not a part of their current proposal.

Related to securing real emissions reductions is the potential concern of emissions leakage resulting from carbon regulations, meaning the movement of emissions to jurisdictions that are not subject to a similar regulation. This could then appear as if the regulated state or region is reducing emissions in alignment with requirements, while a portion of those emissions may have shifted to facilities located elsewhere and not subject to the regulation. HB 951, which explicitly mandates only in-state emissions reductions, does not include provisions to directly address potential leakage.²⁹ The RGGI program identified the issue of leakage early in the program development process and sought possible ways to address it. RGGI states agreed to establish a multi-state working group to consider options to address leakage. States began to track electricity imports beginning in 2010, and if an increase in emissions from non-RGGI states is found, implement appropriate measures to address those emissions.³⁰ Joining RGGI would give North Carolina access to additional resources, tools, and knowledge such as through the multi-state working group to consider how best to address leakage if it does occur. RGGI participation would also expand the scope of the eastern U.S. interconnected electric grid that is covered by RGGI, which helps decrease leakage risks as it broadly decreases the ability to shift generation to non-regulated states when more states are covered.

By joining RGGI, North Carolina would have the opportunity to secure greater carbon emissions reductions and sooner, while simultaneously considering implications for the broader eastern U.S. electric grid to work to avoid unintended impacts.

²⁶ 3.5 percent reduction per year; roughly 1.5 million short tons reduced in the state each year

²⁷ Analysis based on EPA Clean Air Markets data for North Carolina for years 2005 and 2021, accessed April 19, 2022. Analysis of HB 951 assumes no emission reduction is achieved prior to 2030.

²⁸ Duke Energy, Carolinas Carbon Plan, 2022, <https://www.duke-energy.com/our-company/about-us/carolinas-carbon-plan>.

²⁹ The A-1 report finds that a combination CES + RGGI policy scenario resulted in some of the lowest predicted levels of electricity imports compared to BAU

³⁰ Regional Greenhouse Gas Initiative Memorandum of Understanding, 2005, https://www.rggi.org/sites/default/files/Uploads/Design-Archive/MOU/MOU_12_20_05.pdf.

Achieving Lowest-Cost Emissions Reductions

The RGGI program establishes certainty in emissions reductions through annual caps, and also provides the benefit and flexibility of a trading platform. One of the key advantages of a market-based trading system – and one reason that a cap-and-invest program was chosen by RGGI states and has been utilized around the world to achieve climate outcomes – is that it allows companies to plan investments based on the prevailing carbon price.³¹ The market-based approach allows flexibility across all RGGI states to collectively find the least-cost emissions reductions, rather than imposing specific mandates that can raise compliance costs.³² Under RGGI, all fossil-fuel generating units with capacity greater than or equal to 25 MW would be subject to the program. By joining a broader multi-state market, North Carolina would have more opportunities for covered entities to collectively find the least-cost path to compliance with caps.

RGGI relies on market forces to guide investment and abatement choices, which in turn helps support the most cost-effective emissions reductions.³³ RGGI's market-based approach ensures that different energy resources incorporate carbon emissions into their valuation in the energy market. The state's A-1 report found that participation in RGGI, in addition to accelerating emission reductions, also resulted in the lowest cost per ton reduced for North Carolina to achieve a 70% reduction in power sector emissions by 2030.³⁴

RGGI supports more efficient and cost-effective emissions reductions compared to command and control because regulated entities and investors know what cap levels will be in advance and are able to estimate the cost of compliance, which allows them to consider these costs in their decision-making and planning for how electricity demand is met. **Internalizing the price associated with carbon emissions could mean reducing the risk of over investment in new or existing polluting assets that aren't as useful toward meeting the carbon regulatory requirements, which helps protect against stranded assets and higher costs for consumers.**

If North Carolina were to participate in RGGI, NCUC regulators would be better informed on utilities' least-cost planning as the RGGI program establishes the cost of allowances on a quarterly basis, providing more regular, detailed information to achieve the goals of HB 951 in real-time. The A-1 analysis estimated an average price of \$5.10 per metric ton of CO₂ emissions reduced, lower than Duke's estimated carbon price used for scenario planning in its 2020 integrated resource plans. The study also found near-term average bill increases of 0.8%; less than an increase of two dollars per month. However, when accounting for savings resulting from direct bill assistance using RGGI revenues, the study estimated bill savings of 0.4% or \$0.87 each month in 2030 compared to baseline electricity bills.³⁵ This highlights the benefits the state could see from reinvestment of proceeds from auction of RGGI allowances. In other words, **RGGI can be a net benefit to the state not only in terms of emissions reductions, but also by lowering costs for ratepayers.** RGGI states have used their auction allowance

³¹ RGGI Memorandum of Understanding, 2005, https://www.rggi.org/sites/default/files/Uploads/Design-Archive/MOU/MOU_12_20_05.pdf.

³² Marc Hafstead, Carbon Pricing 101, Resources for the Future, March 5, 2019, https://media.rff.org/documents/Carbon_Pricing_Explainer.pdf.

³³ *Ibid.*

³⁴ Konschnik, K., M. Ross, J. Monast, J. Weiss, and G. Wilson. Power Sector Carbon Reduction: An Evaluation of Policies for North Carolina. NI R 21-01. Durham, NC: Duke University. https://nicholasinstitute.duke.edu/sites/default/files/publications/Power-Sector-Carbon-Reduction-An-Evaluation-of-Policies-for-North-Carolina-Revised_0.pdf.

³⁵ *Ibid.*

proceeds to support direct bill assistance, energy efficiency programs, and additional GHG abatement measures. This is discussed further in the next section.

Without explicit guidelines, which North Carolina regulators can and should implement, low-income households will continue to suffer from disproportionately high electricity bills. HB 951 has been critiqued for lacking protections for low- and moderate-income (LMI) ratepayers despite regulatory reform changes, such as allowing multi-year rate plans (MYRPs) that allow the NCUC to approve rate increases for three years at a time. As part of these plans, Duke will be allowed to increase rates up to 4% every year. For LMI households who already spend a disproportionate amount of their paycheck on electricity bills, these increases could be devastating. Similarly, RGGI as a stand-alone policy and without reinvestment of revenue could similarly lead to rate increases. But, through the ability to return revenues earned through the RGGI allowance auction, RGGI can provide a measure of relief for ratepayers. The state's A-1 report found that CES + RGGI combination resulted in the lowest future electricity bills for all customers classes - and could even result in cost-savings when paired with investments in energy efficiency or direct bill assistance. However, this requires North Carolina regulators to require targeted investments of RGGI proceeds in addition to implementing specific policies to reduce those with the highest energy-burden.

In addition to increasing the economic efficiency of emission reductions via pricing carbon and thus incentivizing investment in lowest-cost clean energy resources, the RGGI market also lowers the cost of emissions reductions by expanding potential compliance pathways for utilities or other covered entities. The RGGI market requires that covered entities must surrender emissions allowances to demonstrate compliance with the program's emissions caps. If a covered entity has excess allowances, they have the option to trade allowances with other covered entities or bank them for use in future years. A larger pool of participants in the program provides greater opportunity for rooting out lower-cost emissions reductions. The inclusion of more participants within a market allows for credit trading to support increased clean energy production where it can be done at a lower cost. The purchase and trade of allowances reveals a market price for allowances, which informs how covered entities comply and make investment decisions. Companies that can reduce emissions at least cost are encouraged to do so. Companies that face higher costs to reduce emissions, will instead choose to purchase allowances.

For example, if utility-scale solar owned by Duke Energy in North Carolina can be produced at lower cost than similar zero-carbon resources in Virginia or New York, Duke Energy could over-comply with RGGI cap requirements for North Carolina by lowering its emissions beyond what the cap requires, and subsequently sell emissions credits to utilities in Virginia or New York who are seeking credits because they cannot produce comparably cheap zero-carbon electricity. This process of minimizing costs ultimately benefits electricity consumers and ratepayers - in the example above, for ratepayers in both North Carolina and Virginia or New York.

Supporting Economic Development

RGGI states have experienced significant economic benefits from program participation. Quarterly allowance auctions result in funding that participating RGGI states individually decide how to allocate toward additional beneficial programs, like investments in energy efficiency. RGGI, Inc., the organization that provides technical and administrative support to

participating states, publishes an annual report on the investment of auction proceeds, summarizing the benefits of state reinvestment of RGGI funds.³⁶ In 2020, states collectively reinvested \$196 million of auction proceeds into programs to further reduce carbon emissions and help save residential customers money on energy bills. The same year, 35% of the proceeds were invested in energy efficiency programs that help to reduce demand for electricity and can lead to lower electricity bills and greater emissions reductions. The 2020 energy efficiency investments are estimated to return about \$1.2 billion (2020\$) in lifetime energy bill savings, a return of over six times, to participating households and businesses in the RGGI region, in addition to saving more than 4.6 million short tons of CO₂ from being emitted.³⁷ By reducing demand for electricity, energy efficiency investments have also reduced the costs associated with importing fossil fuels to the region. A study by the Analysis Group found that from 2015 through 2017, the RGGI region saved \$1.4 billion (2018\$) by reducing its imports of fossil fuels.³⁸ RGGI investments for energy efficiency programs also create jobs. The investments in energy efficiency programs made in 2020 created an estimated 1,400 to 1,500 additional job-years in RGGI states, in industries such as housing and construction.³⁹

2020 energy efficiency investments are estimated to return about \$1.2 billion (2020\$) in lifetime energy bill savings, a return of over six times, to participating households and businesses in the RGGI region.

Of the \$196 million in auction proceeds invested in 2020, 18% went toward clean and renewable energy, which is expected to return nearly \$600 million (2020\$), in lifetime energy bill savings, a greater than 17 times return with and avoided release of 1.7 million short tons of CO₂ emissions.⁴⁰ 2020 project funding also went towards other GHG abatement programs, and an additional 19% toward direct bill assistance, which resulted in returning over \$37 million directly to electricity ratepayers through credits or assistance programs.

The sum total economic and employment impacts of programs and savings resulting from RGGI is considerable – a macroeconomic analysis of the program’s economic impacts from inception through 2017 found that RGGI created over \$4 billion in net economic gains and created over 44,000 job-years of employment.⁴¹

Economic growth in RGGI states outpaced the rest of the nation during the first decade of the program, from 2008 to 2018: **“RGGI states’ economies grew by 46.9% versus 35.8% in states that do not regulate or put a price on carbon emissions.”**⁴² **Over the same period, RGGI states’ emissions decreased by 46% compared to 24% for the rest of**

³⁶ The Regional Greenhouse Gas Initiative, Investments of RGGI Proceeds in 2020, 2022, https://www.rggi.org/sites/default/files/Uploads/Proceeds/RGGI_Proceeds_Report_2020.pdf.

³⁷ *Ibid.*

³⁸ Analysis Group, The Economic Impacts of The Regional Greenhouse Gas Initiative on Nine Northeast and Mid-Atlantic States: Review of RGGI’s Third Three-Year Compliance Period (2015-2017), 2018, https://www.analysisgroup.com/globalassets/uploadedfiles/content/insights/publishing/analysis_group_rggi_report_april_2018.pdf.

³⁹ The Regional Greenhouse Gas Initiative, Investments of RGGI Proceeds in 2020, 2022, https://www.rggi.org/sites/default/files/Uploads/Proceeds/RGGI_Proceeds_Report_2020.pdf.

⁴⁰ *Ibid.*

⁴¹ Acadia Center, The Regional Greenhouse Gas Initiative 10 Years in Review, 2019, https://acadiacenter.org/wp-content/uploads/2019/09/Acadia-Center_RGGI_10-Years-in-Review_2019-09-17.pdf.

⁴² *Ibid.*

the country. By participating in RGGI, North Carolina is more likely to accrue these types of economic benefits, which may not be as robust or meaningful in implementing HB 951 on its own.

RGGI states have funding for initiatives that might not be as readily available absent participation in the RGGI allowance auctions. North Carolina may similarly be able to utilize RGGI proceeds to expand investment in clean energy and energy efficiency programs and initiatives - a key element to supporting the energy transition that is not guaranteed through HB 951.

Examples of Energy Efficiency Investments in RGGI States

Since 2019, Vermont's efficiency programs supported by RGGI proceeds are estimated to result in lifetime energy savings of 4.4 million MMBtu. Vermont is estimated to avoid over 260,000 short tons of CO₂ emissions and have saved participants over \$100 million on their energy bills over the lifetime of the investments.⁴³

Delaware uses RGGI proceeds to support a variety of programs aimed at reducing energy usage, GHG emissions, and to assist low-income families with energy bills. The Delaware Sustainable Energy Utility receives 65% of RGGI proceeds to promote affordable clean energy and provide incentives for energy efficiency improvements. In addition, 10% of proceeds help fund the state's Weatherization Assistance Program which provides no-cost upgrades to decrease energy usage and lower energy bills.⁴⁴

In New York, RGGI proceeds help fund the Community Energy Engagement Program to provide energy awareness and education to residential, multi-family, and small business customers, with a special priority to provide these services to LMI households and communities. By 2019, the program had successfully helped over 2,000 customers to apply for clean energy opportunities. RGGI funding also helps support the EmPower New York program, which is focused on improving energy affordability through energy efficiency services to low-income New Yorkers. In 2019 alone, the EmPower program supported energy efficiency savings in 40 households, with average savings on energy bills for low-income customers of about \$495 per year.⁴⁵

Connecticut, Massachusetts, and Vermont have invested significant amounts of RGGI proceeds toward energy efficiency. These investments have helped these states become national leaders in energy efficiency efforts, as all three are ranked in the top ten of the American Council for an Energy Efficient Economy's 2020 State Energy Efficiency Scorecard.⁴⁶

⁴³ The Regional Greenhouse Gas Initiative, Investments of RGGI Proceeds in 2020, 2022, https://www.rggi.org/sites/default/files/Uploads/Proceeds/RGGI_Proceeds_Report_2020.pdf.

⁴⁴ The Regional Greenhouse Gas Initiative, Investments of RGGI Proceeds in 2019, 2021, https://www.rggi.org/sites/default/files/Uploads/Proceeds/RGGI_Proceeds_Report_2019.pdf.

⁴⁵ *Ibid.*

⁴⁶ American Council for an Energy-Efficient Economy, State Scorecard Rank, 2020, <https://database.aceee.org/state-scorecard-rank>.

Addressing Local Impacts

On January 7, 2022, Governor Cooper issued Executive Order No. 246, affirming commitments to a clean energy economy. The Executive Order directs next steps toward achieving net-zero emissions and aims to create economic opportunities for North Carolinians, especially in pollution-burdened communities.⁴⁷ Addressing disproportionate impacts of air pollution in impacted communities must be key to any conversation regarding the energy transition. These are communities that have been subject to redlining and other racist and discriminatory policies, putting them at risk for unintended consequences during the transition to a clean energy economy. The DEQ Secretary's Environmental Justice and Equity Advisory Board uses EPA's definition of environmental justice, defined as "the fair treatment and meaningful involvement of all people regardless of race, color, national origin, or income, with respect to the development, implementation, and enforcement of environmental laws, regulations, and policies."⁴⁸ As North Carolina moves away from dependence on fossil fuels and toward a clean energy economy, it must consider ways to equitably address environmental justice issues such as reducing localized pollution from power plant emissions, reducing the energy burden for low-income customers, fossil fuel industry worker displacement, and other challenges. While HB 951 on its own does not include specific provisions that would direct benefits or protections toward environmental justice communities, RGGI offers a number of different tools and opportunities that may help the state to enhance initiatives for these communities and be responsive to the state's commitments in advancing energy equity as established in EO 246.

Environmental justice and equity are key issues being considered during RGGI's ongoing Third Program Review, which began in late 2021. Specifically, the review seeks comments to inform how states might better address environmental justice and equity concerns, including through program design and the use of RGGI revenue to support impacted communities.^{49,50} Topics currently being considered by RGGI and stakeholders range from inclusive and expanded public participation to just transition and workforce development to air quality monitoring, and more.⁵¹ While there is no single program or policy that can address all environmental justice priorities, joining RGGI would allow North Carolina to participate in a larger conversation about how to foster an equitable transition to clean energy throughout the region.

Although RGGI is focused on reducing emissions of CO₂, non-GHG air pollutants are emitted from power plants alongside CO₂ and are associated with harmful air quality and health impacts. Areas with higher concentrations of certain pollutants are sometimes referred to as geographic "hotspots." Without careful safeguards included in the design of the clean energy transition, hotspots of health-hazardous non-GHG air pollutants could occur under any program that does not mandate point-source emission reductions.

Several RGGI states have modified their RGGI program rules to incorporate environmental justice principles, including to address the potential for hotspots. Several recent examples of

⁴⁷ State of North Carolina, Executive Order No. 246, North Carolina's Transformation to a Clean, Equitable Economy, January 7, 2022, <https://governor.nc.gov/media/2907/open>.

⁴⁸ North Carolina Department of Environmental Quality Secretary's Environmental Justice and Equity Advisory Board Charter, 2018, <https://deq.nc.gov/media/11386/download>.

⁴⁹ The Regional Greenhouse Gas Initiative, RGGI Program Review: Topics for Public Consideration, 2021, https://www.rggi.org/sites/default/files/Uploads/Program-Review/9-132021/RGGI%20Topics%20for%20Public%20Participation_2021-09-07.pdf

⁵⁰ Farber, D. A. (2012). Pollution markets and social equity: Analyzing the fairness of cap and trade. *Ecology LQ*, 39, 1.

⁵¹ The Regional Greenhouse Gas Initiative, RGGI Program Review: Topics for Public Consideration, 2021, https://www.rggi.org/sites/default/files/Uploads/Program-Review/9-132021/RGGI%20Topics%20for%20Public%20Participation_2021-09-07.pdf

incorporating environmental justice considerations, informed by engagement with disproportionately burdened communities, including the following:

- The Pennsylvania’s Department of Environmental Protection gathered public input using multiple methods to engage with environmental justice communities and meaningfully considered that input in establishing requirements for protecting public health, safety and welfare and seeking to ensure environmental and structural racism are not replicated in the engagement process. Under the rule, DEP is required to analyze and report on whether or not areas of the Commonwealth “have been disproportionately impacted by increased air pollution” from the implementation of RGGI annually.⁵² Virginia requires 50% of RGGI revenue be invested in energy efficiency, reducing electricity bills in low-income communities that are more likely to be energy-burdened. Virginia also requires an annual Environmental Justice Review to ensure that no one community is shouldering a disproportionate burden of the shift to 100% carbon-free power.
- New York, New Jersey and Maryland each have provisions in their program rules to ensure a set amount of auction proceeds bring direct benefits to disproportionately impacted communities through investments in climate resiliency programs, clean transportation, addressing health disparities, for direct bill assistance, or other clean energy or community programs.
- In New York, no less than 35% of auction proceeds must be directed to disadvantaged communities, with a target of at least 40%.

Washington’s recently passed cap-and-invest legislation, which operates similar to RGGI though covers all major emitting sectors in the state, includes significant environmental justice protections to ensure the program does not result in hotspots or other adverse impacts for environmental justice communities.⁵³ Similarly, North Carolina’s proposed rule requires monitoring and review of program impacts, including impacts on low-wealth communities and pollution-burdened communities.⁵⁴

RGGI participation has allowed states to support environmental justice initiatives through a state’s ability to set requirements for how auction proceeds will be reinvested, including setting aside use of funds to benefit environmental justice communities.

In 2020, 21% of total proceeds in all RGGI states were reinvested in low-income communities and for general rate relief, though contributions by participating states vary.⁵⁵ The impact of similar investments in environmental justice communities in North Carolina would be significant. To date, RGGI has saved consumers in participating states more than \$14.8 billion on energy bills (2020\$).⁵⁶

⁵² Pennsylvania Air Quality Technical Advisory Committee, Draft Rulemaking Update Chapter 145, Interstate Pollution Transportation Reduction Subchapter E. CO₂ Budget Trading Program, 2021, https://files.dep.state.pa.us/Air/AirQuality/AQPortalFiles/Advisory%20Committees/Air%20Quality%20Technical%20Advisory%20Committee/2021/4-8-21/FINAL_AQTAC_PA_CO2_Budget_Trading_Program.pdf.

⁵³ State of Washington, Senate Bill 5126, 2021.

⁵⁴ Petition for Rulemaking Pursuant to N.C.G.S. § 150B-20 and 15A NCAC 02I .0501 to Adopt Rules to Limit CO₂ Pollution for the Electric Power Sector, 2021, .2842. <https://files.nc.gov/ncdeq/Environmental%20Management%20Commission/air-quality-committee/2021/june/Attachment-A-2021-01-11---SELC-Petition-for-Rulemaking.pdf>

⁵⁵ The Regional Greenhouse Gas Initiative, Investments of RGGI Proceeds in 2020, 2022, https://www.rggi.org/sites/default/files/Uploads/Proceeds/RGGI_Proceeds_Report_2020.pdf.

⁵⁶ The Regional Greenhouse Gas Initiative, Investments of RGGI Proceeds in 2020, 2022, https://www.rggi.org/sites/default/files/Uploads/Proceeds/RGGI_Proceeds_Report_2020.pdf.

New York allocated \$8 million from RGGI auction revenues over three years for workforce development in clean energy jobs, with a focus on prioritizing disadvantaged communities.⁵⁷

New Jersey is developing an interactive dashboard to show where specific investments from auction proceeds are being made, focused on clean energy, clean transportation, and equity programs.⁵⁸

New Hampshire received \$18.8 million in RGGI auction proceeds in 2020 and used 84% to provide direct bill assistance to electricity consumers.⁵⁹

Historically, Maryland's Strategic Energy Investment Fund has mainly been supported by RGGI auction proceeds, and in 2019 over \$12 million from the fund was used for bill assistance for low-income households.⁶⁰

The Efficiency Maine Trust is funded in part by RGGI proceeds, and its Low-Income Initiatives program provides enhanced incentives for home weatherization and high-performance heat pumps targeting low- and moderate-income customers.⁶¹

North Carolina must lead in identifying ways to ensure that a portion of RGGI proceeds are directed to communities with the goal of enhancing environmental justice and equity. In North Carolina, 1.4 million people are sent energy bills every month they can't afford. Racial disparities exacerbate this energy poverty with energy-burdened households more likely to earn less than \$20,000 annually and be of African American or Latino descent.⁶²

Additionally, this energy inequity is exacerbated by a parallel disparity of representation in the clean economy. According to E2's recent Clean Jobs America 2021 report, clean energy sectors employed almost 100,000 North Carolinians at the end of 2020, despite setbacks due to COVID-19.⁶³ However, the later released "Clean Jobs, Better Jobs" report demonstrated inequities across the nation when it comes to who actually reaps personal financial rewards from these jobs—with black and brown individuals being significantly underrepresented in these fields.

Years of data shows that RGGI spurs investment and job growth in participating states. Specific protections for environmental justice communities and prioritizing equitable investment in

⁵⁷ 2022 RGGI Operating Plan Amendment, approved by NYSRDA Board of Directors, January 25, 2022.

⁵⁸ New Jersey RGGI Climate Investments, <https://njdep.maps.arcgis.com/apps/dashboards/71e62ee3de2d4a6585bf4766881406c6>.

⁵⁹ The Regional Greenhouse Gas Initiative, Investments of RGGI Proceeds in 2020, 2022, https://www.rggi.org/sites/default/files/Uploads/Proceeds/RGGI_Proceeds_Report_2020.pdf.

⁶⁰ Report on Strategic Energy Investment Fund Activities for FY19, Maryland Energy Administration, January 2020, <https://energy.maryland.gov/Reports/FY19%20SEIF%20Annual%20Report.pdf>.

⁶¹ The Regional Greenhouse Gas Initiative, Investments of RGGI Proceeds in 2020, 2022, https://www.rggi.org/sites/default/files/Uploads/Proceeds/RGGI_Proceeds_Report_2020.pdf.

⁶² NC Clean Energy Plan, 2019 <https://files.nc.gov/ncdeq/climate-change/clean-energy-plan/3.-Electricity-Rates-and-Energy-Burden-FINAL.pdf>

⁶³ <https://e2.org/reports/clean-jobs-america-2021/>

clean energy is key to maximizing RGGI's potential to spur economic growth while creating good paying jobs in clean energy, and to doing so in those communities that most need it.

The opportunity to establish its own protections in RGGI, and the fact that RGGI revenues specifically could be utilized for supporting these priorities, means that RGGI could provide North Carolina with a larger set of tools to better support an equitable clean energy transition, which are not provided directly by HB 951. **Even so, neither HB 951 nor the rulemaking for North Carolina to participate in RGGI are sufficient to solve environmental justice issues. North Carolina leaders must listen to communities, such as through some of the processes identified in EO 246, to implement meaningful solutions that promote a more equitable and prosperous future for all communities.**

Adding Health Benefits

Climate change is an urgent threat with adverse impacts to public health. More frequent extreme heat days, negative impacts to air quality, and increases in vector-borne diseases are all risks as the climate continues to change. Combustion of fossil fuels is also responsible for local air pollution, ozone, and particulate pollution, while the GHG emissions from fuel combustion also contribute to the broader climate change-related health risks.

Testimony from Dr. Drew Shindell - professor at Duke University, Coordinating Lead Author on multiple IPCC reports and Chair of the Scientific Advisory Panel to the Climate and Clean Air Coalition of nations and organizations - described to the House Committee on Oversight and Reform that air pollution currently leads to nearly 250,000 premature deaths per year within North Carolina and that achieving significant decarbonization in the next decade could reduce that death toll by 40%, saving roughly 1.4 million lives over 20 years.⁶⁴ As described in preceding sections, North Carolina's participation in RGGI could strengthen the existing state goals by providing more concrete annual regulatory requirements for reducing CO₂ emissions and in turn, reduce health-hazardous co-pollutants emitted from power plants alongside greenhouse gasses.

Abt Associates studied the public health benefits that the RGGI program provided from 2009 through 2014.⁶⁵ The analysis utilized EPA's Co-Benefits Risk Assessment (COBRA) screening tool and Benefits Mapping and Analysis Program (BenMAP) to quantify the reductions in co-pollutants emitted alongside GHGs including particulate fine matter (PM_{2.5}), sulfur dioxide (SO₂), and nitrogen oxides (NO_x) and their impact on human health. Changes in these types of air pollutants impact the incidence of a variety of different health outcomes, including premature mortality, heart attacks, asthma exacerbation, lost workdays, hospitalizations, and more. The analysis found that **the largest reductions in SO₂ and NO_x coincided with the most significant declines in electrical generation driven by the RGGI program.** SO₂ reductions were more significant due to a reduction in coal-fired generation, which is high in

⁶⁴ Drew Shindell, Health and Economic Benefits of a 2°C Climate Policy Testimony to the House Committee on Oversight and Reform Hearing on "The Devastating Impacts of Climate Change on Health," 2020, <https://oversight.house.gov/sites/democrats.oversight.house.gov/files/Testimony%20Shindell.pdf>

⁶⁵ Abt Associates, Analysis of the Public Health Impacts of the Regional Greenhouse Gas Initiative, 2009-2014, 2017, <https://www.abtassociates.com/sites/default/files/2018-06/Analysis%20of%20the%20public%20health%20impacts%20of%20regional%20greenhouse%20gas.pdf>.

sulfur content. Across the study period, RGGI states avoided 109,000 tons of SO₂ and 46,000 tons of NO_x.

The emissions reductions were also quantified in terms of avoided public health impacts and monetized health benefits. Key public health benefits over the six-year study period included the avoidance of 240 to 540 adult mortalities, 27 to 260 non-fatal heart attacks, 145 hospitalizations (respiratory or cardiovascular), and reduced cases of asthma ER visits, asthma exacerbations, and minor respiratory illnesses.⁶⁶ The monetized cumulative health benefits ranged from \$2.4 billion to \$5.4 billion (2015\$) over the years 2009 to 2014.⁶⁷ Additional health benefits occur outside of RGGI states due to the reductions in regional transport of air pollution across state lines. This analysis accounted for health benefits in nearby areas including Pennsylvania, the District of Columbia, Virginia, and West Virginia (at the time of the study, Pennsylvania and Virginia were not part of the RGGI program). Monetized cumulative health benefits to these non-RGGI jurisdictions ranged from \$1.3 billion to \$2.9 billion (2015\$) from 2009 through 2014.⁶⁸ The Abt Associates analysis did not include health benefits for children, health benefits related to investments in energy efficiency programs or associated with reductions in ozone. Therefore, these estimates may be conservative and the realized benefits from RGGI are likely even higher than described in the report.

A 2020 study from researchers at the Columbia Center for Children's Environmental Health at Columbia University Mailman School of Public Health analyzed health benefits for children from RGGI and found additional health benefits compared to the Abt Associates study. Columbia's study used new research that strengthened the ties between PM_{2.5} exposure and health impacts to children. The study reviewed the same period, between 2009 and 2014, and concluded that RGGI has benefited children's health and avoided 537 asthma cases, 112 preterm births, and 56 cases of term low birth weight. These monetized health benefits ranged from \$191 million to \$350 million (2015\$).⁶⁹ Although this study included additional RGGI benefits related to children's health, it is noted that the health effects from RGGI are still likely to be underestimated as the study only included health impacts from the reduction of PM_{2.5} formed through chemical reactions of NO_x and SO₂ but did not include impacts of directly emitted PM_{2.5} or other pollutants such as ozone nor nitrogen dioxide.

Broadly, the RGGI program has been found to improve air quality across the participating mid-Atlantic and northeastern states and has resulted in significant benefits to public health for all ages as well as the avoidance of hundreds of premature deaths and tens of thousands of lost workdays. North Carolinians could join in these health improvements as well as monetized benefits if the state were to join RGGI.

⁶⁶ *Ibid.*

⁶⁷ Based on a three percent discount rate.

⁶⁸ *Ibid.*

⁶⁹ Frederica Perera, David Cooley, Alique Berberian, David Mills, and Patrick Kinney, Co-Benefits to Children's Health of the U.S. Regional Greenhouse Gas Initiative, 2020, <https://ehp.niehs.nih.gov/doi/10.1289/EHP6706>.

Conclusion

By joining RGGI, North Carolina could harness a proven mechanism to better position itself to meet the carbon reduction goals of HB 951. The statute sets North Carolina on course to decarbonize the power grid but does not guarantee the state will achieve emissions reductions of 70% by 2030, or net zero by 2050. This paper shows that RGGI is a highly effective tool to ensure the electric sector carbon goals are met in a durable and binding manner. In fact, HB 951 paired with RGGI could:

- Increase the certainty of emissions reductions year-over-year and by 2030;
- Achieve greater cumulative emissions reductions in the near-term and therefore provide greater longer-term climate benefits;
- Support more cost-effective emissions reductions, saving utilities and customers money; and,
- Increase economic development including through potential investments in programs to invest in communities, enhance energy efficiency, and reduce ratepayer impacts.

Extensive research, including from the state of North Carolina, clearly demonstrates the benefits of RGGI participation alongside a CES-style policy like HB 951, including successfully reduced carbon emissions from participating states while growing local economies and bringing health benefits to residents. The RGGI program also provides states with a revenue stream from allowance auctions that could be reinvested to further advance climate and energy initiatives, as well as be returned for the benefit of ratepayers as direct bill assistance. By joining RGGI, North Carolina can better position itself to meet the pollution reduction targets set in statute through HB 951, while simultaneously lowering the cost of achieving those emissions reduction targets through a mature regional carbon marketplace.

Layering these different programs would deploy multiple mechanisms toward the same goal to better support a clean energy transition at lower costs and with greater benefits to communities and energy consumers.

Appendix A. Policy Summaries

The RGGI Trading Program

On January 11, 2021, the North Carolina DEQ received a Rulemaking Petition from the Southern Environmental Law Center on behalf of Clean Air Carolina (now CleanAire NC) and the North Carolina Coastal Federation.⁷⁰ The petition requests that the North Carolina Environmental Management Commission (EMC) develop a rule to limit CO₂ emissions from the state's power sector to avoid harm to the state's environment and economy and join the Regional Greenhouse Gas Initiative (RGGI). The petition outlined how North Carolina could join RGGI and proposed that the state establish a cap to reduce CO₂ emissions by 70% by 2030 from 2005 levels. This cap is more stringent than the current RGGI cap, ensuring that in-state emissions are reduced in line with state goals. On July 13, 2021, the EMC approved the petition, launching the rulemaking process at DEQ, which will include public input.⁷¹

RGGI was the nation's first regional cap-and-trade program to limit CO₂ emissions from power plants. The program launched in 2009 with ten participating states, including Connecticut, Delaware, Maine, Maryland, Massachusetts, New Hampshire, New Jersey, New York, Rhode Island, and Vermont.⁷² Since implementation, more states have expressed interest in participating in RGGI, with Virginia joining in 2021 and Pennsylvania joining in July 2022. Outside of RGGI, other states have also developed cap-and-invest programs, including California, Oregon, and Washington, to reduce CO₂ emissions from the electric power and other sectors of the economy. Internationally, 65 jurisdictions have implemented some form of carbon pricing initiatives such as emissions trading programs or carbon taxes.⁷³

China, the European Union, New Zealand, Nova Scotia, South Korea, Québec, and thirteen U.S. states (such as California and New York) have implemented some form of carbon pricing. A market-based, cap-and-invest system provides a technology-neutral approach for reducing emissions. The approach was first pioneered when Congress approved the Clean Air Act Amendments of 1990. The Acid Rain program (Title IV of the Clean Air Act) proved successful and cost-effective in reducing sulfur dioxide (SO₂) emissions from the electric power sector.⁷⁴

The RGGI states are subject to a collective regional limit, or cap, on CO₂ emissions from fossil fuel-fired power plants with a generating capacity of 25 megawatts (MWs) or greater. Each state has an annual allowance budget; the sum of these state budgets across all RGGI member states forms the regional cap. The annual cap declines over time to reduce emissions in a predictable way, with the current cap set to decline by 30% by 2030 (compared to 2020 baseline).⁷⁵ In order to implement the cap, the states either auction or directly distribute CO₂ allowances, where each allowance authorizes one short ton of CO₂ emissions. The program design allows flexibility for

⁷⁰ Petition for Rulemaking Pursuant to N.C.G.S. § 150B-20 and 15A NCAC 02I .0501 to Adopt Rules to Limit CO₂ Pollution for the Electric Power Sector, 2021, <https://files.nc.gov/ncdeq/Environmental%20Management%20Commission/air-quality-committee/2021/june/Attachment-A-2021-01-11---SELC-Petition-for-Rulemaking.pdf>.

⁷¹ Environmental Management Commission Meeting July 2021

https://files.nc.gov/ncdeq/Environmental%20Management%20Commission/EMC%20Meetings/2021/july_special-call-mtg/AG21-20-Petition-for-Rulemaking-final-002.pdf.

⁷² New Jersey withdrew from RGGI in 2012 and rejoined in 2020.

⁷³ The World Bank, April 1, 2021, https://carbonpricingdashboard.worldbank.org/map_data

⁷⁴ "Acid Rain Program," EPA, n.d., <https://www.epa.gov/acidrain/acid-rain-program>

⁷⁵ RGGI, Inc., RGGI States Announce Proposed Program Changes: Additional 30% Emissions Cap Decline by 2030, 2017, https://www.rggi.org/sites/default/files/Uploads/Program-Review/8-23-2017/Announcement_Proposed_Program_Changes.pdf.

market participants without compromising total emissions reductions, the most cost-effective reduction opportunities, as certain entities will likely be able to reduce emissions more easily and at lower cost than others.

RGGI is also known as a “cap-and-invest” program as allowances are auctioned on a quarterly basis, and states then invest the proceeds in consumer benefit programs to advance energy efficiency and accelerate the deployment of clean energy technologies. Historically, states have invested most auction proceeds in clean and renewable energy, energy efficiency, and ratepayer assistance programs, and to support environmental justice initiatives. Auction proceeds have also funded programs to increase resiliency and promote energy independence. In addition to the quarterly auctions, there is also an active secondary market through which allowances are bought and sold throughout the year.⁷⁶ The RGGI states publish annual reports detailing the investment of the RGGI auction proceeds.⁷⁷

Though the regional cap and state allowance budgets are yearly targets, compliance with the requirement is based on a three-year compliance period, or control period. During the first two years of a three-year control period, covered sources are required to hold allowances equal to 50% of their covered emissions. After each control period, covered sources are required to surrender allowances equal to their CO₂ emissions emitted over the entire three-year period. RGGI is in the midst of its fifth control period, which began on January 1, 2021, and will end on December 31, 2023.⁷⁸ This multi-year compliance approach provides added flexibility for the electric power plants subject to the cap.

Each participating state adopts its own detailed regulations for implementing the RGGI program based on the RGGI model rule, allowing custom elements to advance state-specific goals. Examples of unique provisions in the North Carolina petition to join RGGI include: a more stringent cap of 70% emissions reduction by 2030 (compared to 2005 levels); and utilizing a consignment auction approach, in which DEQ provides conditional allowances to the utility which may only be traded in the RGGI market. Under this approach, the electric utility receives the revenue from auctioning conditional allowances in the RGGI market, and the NCUC directs how the utility invests that revenue. Additionally, a state may choose to establish a set-aside of allowances, meaning holding allowances rather than submitting them to be available at auction, mainly to promote clean energy generation.

RGGI states undertake periodic reviews of the RGGI program roughly every three years to consider possible changes to the model rule. RGGI is currently undergoing its Third Program Review, initiated in Fall 2021 and likely to conclude in January 2023.⁷⁹

Summary of North Carolina’s HB 951

On October 13, 2021, Governor Roy Cooper signed HB 951 into law.⁸⁰ The new law authorizes North Carolina’s Utilities Commission to take all reasonable steps to achieve: (1) a 70% reduction in power sector CO₂ emissions from 2005 levels by the year 2030; and (2) carbon

⁷⁶ The Regional Greenhouse Gas Initiative: Elements of RGGI, 2022, <https://www.rggi.org/program-overview-and-design/elements>.

⁷⁷ RGGI Inc., Investments of Proceeds, <https://www.rggi.org/investments/proceeds-investments>.

⁷⁸ Interim control period requirements started during the third control period, where sources must now hold allowances equal to 50 percent of their emissions during the interim period, or the first two calendar years of the three-year control period.

⁷⁹ Regional Greenhouse Gas Initiative: Program Review, 2022, <https://www.rggi.org/program-overview-and-design/program-review>

⁸⁰ HB 951, 2021, <https://www.ncleg.gov/Sessions/2021/Bills/House/PDF/H951v6.pdf>.

neutrality by 2050. The emissions reduction goals in HB 951 apply to electric generating facilities owned or operated by electric utility companies serving at least 150,000 North Carolina retail customers; namely electric generating facilities owned or operated by Duke Energy.⁸¹ Duke Energy's power plants are estimated to account for more than 90% of the state's power sector CO₂ emissions.⁸² The law also includes several other regulatory changes.

HB 951 sets the high-level carbon reduction goals, but many of the details are to be determined by the NCUC (with stakeholder input). The NCUC is directed to develop a "Carbon Plan" by December 31, 2022, outlining a pathway to achieve the goals of HB 951. This plan will consider "power generation, transmission and distribution, grid modernization, storage, energy efficiency measures, demand-side management, and the latest technological breakthroughs to achieve the least cost [carbon reduction] path." The plan is to be reviewed and updated, if deemed necessary, every two years. There is some flexibility within the law which allows adoption of a Carbon Plan that exceeds the 2030 and/or 2050 compliance dates by no more than two years "except in the event the Commission authorizes construction of a nuclear facility or wind energy facility that would require additional time for completion due to technical, legal, logistical, or other factors beyond the control of the electric public utility, or in the event necessary to maintain the adequacy and reliability of the existing grid."⁸³

In addition to establishing carbon reduction goals, HB 951 requires the utilities to file with the Commission a plan to procure 2,600 megawatts (MW) of renewable energy. The Commission could also direct the utilities to procure additional solar energy resources, if required, to meet the state's carbon reduction goals. The law also authorizes, for the first time, electric utilities to submit multi-year performance-based rate plans for Commission review and approval. This form of utility regulation decouples utility profits from throughput of electricity sold and rewards utilities for delivering value to customers rather than simply meeting investment objectives. This approach could encourage investment in energy efficiency and renewable energy, which could in turn support progress toward the state's carbon reduction goals. The Commission can only approve a performance-based regulation if it "would result in just and reasonable rates [and] is in the public interest," and cannot approve environmental performance incentives that are more stringent than existing state or federal law.⁸⁴

Duke's utilities serve more than 3.4 million retail electric customers in North Carolina, making it the largest utility company in the state.⁸⁵ In 2019, Duke Energy announced a voluntary goal to achieve net-zero carbon emissions from electric generation by 2050.⁸⁶ However, a formal state regulation, such as HB 951, participation in RGGI, or a combination of these policies would provide legally binding requirements for emissions reductions, set key dates to keep the state's emissions reduction goals on track, and require planning and actionable steps.

⁸¹ The owners/operators subject to HB 951 are subsidiaries under Duke Energy parent company ownership, Duke Energy Carolinas and Duke Energy Progress. Duke Energy Carolinas owns 20,100 megawatts of energy capacity supplying electricity to 2.8 million residential, commercial and industrial customers across a 24,000-square-mile service area in North Carolina and South Carolina. Duke Energy Progress owns 12,500 megawatts of energy capacity, supplying electricity to 1.7 million residential, commercial and industrial customers across a 29,000-square-mile service area in North Carolina and South Carolina.

⁸² EPA Clean Air Markets Data, 2021 CO₂ emissions, accessed April 20, 2022.

⁸³ HB 951, 2021, <https://www.ncleg.gov/Sessions/2021/Bills/House/PDF/H951v6.pdf>.

⁸⁴ *Ibid.*

⁸⁵ Duke Energy, Fast Facts, April 1, 2022, <https://www.duke-energy.com/media/pdfs/our-company/duke-energy-fast-facts.pdf?la=en>.

⁸⁶ Duke Energy, Duke Energy aims to achieve net-zero carbon emissions by 2050, 2019, <https://news.duke-energy.com/releases/duke-energy-aims-to-achieve-net-zero-carbon-emissions-by-2050>.