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Glendon King  
Executive Director, House Environmental Resources & Energy Committee  
Pamela Neugard  
Administrative Assistant II to State Representative Daryl Metcalfe  
Harrisburg, PA

2/3/2020

RE: February 5, 2020 hearing on Pennsylvania's Participation in the Regional Greenhouse Gas Initiative (RGGI)

Dear Mr. King and Ms. Neugard,

Thank you for the invitation to participate on the above mentioned hearing panel on behalf of the Commonwealth Foundation. Following is my proposed testimony.

**What is RGGI?**

Ten northeast states joined together to require electric power plants to buy emission allowances for each ton of carbon dioxide emissions. Each participating state adopted RGGI with the legislative vote required for a revenue bill. The allowances were sold in quarterly auctions beginning in 2008. The initial plan was to gradually reduce the number of allowances available to achieve a 10 percent emission reduction by 2018. In 2013, RGGI, Inc. announced plans for a 53 percent reduction in the number of allowances available. In 2019, the program was extended to 2030, with a new net reduction goal of 65 percent. Pennsylvania, and Virginia are considering joining RGGI, and would be tasked with a 30 percent reduction from current emission levels by 2030.

**What will it cost Pennsylvania citizens?**

The latest auction price for RGGI allowances was \$5.61/ton<sup>1</sup>, and in 2018 Pennsylvania electric generators emitted 77 million tons<sup>2</sup> of carbon dioxide. The 2020 annual cost of allowances would be about \$432 million per year added to electric bills from these direct costs. Over the next decade Pennsylvania's economy could see an average \$5.5 billion a year hit, or about \$1,150 a year per household based on the following:

- RGGI, Inc. forecasts auction prices will rise to between \$12 and \$24/ton<sup>3</sup> which could cost between \$0.7 and \$1.3 billion per year, so the average allowance cost might be about \$1 billion a year.
- To meet the 30 percent emissions reduction goal by 2030, would require cutting coal-fired generation by half, or by about 23 million megawatt-hours. In 2017, the average wholesale price for electricity plus transmission cost was about \$44/megawatt-hour<sup>4</sup> so lost electricity sales would total about \$1 billion a year by 2030, averaging \$.5 billion a year over the decade.
- In addition, coal production in Pennsylvania would be cut by about a quarter from the 49 million tons produced in 2017<sup>5</sup>, a loss of about \$0.7 billion in coal sales a year by 2030, or \$0.35 billion a year average.
- RGGI may add an average of 7 percent by 2030 to electric bill impacts by allowance cost, capacity cost, and overall PJM pricing. With an industrial elasticity of -0.44 percent loss for each percent of



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higher price, and Pennsylvania's \$81.5 billion in manufacturing business in 2017, there is a potential loss of \$3 billion over the next decade, or \$1.5 billion average per year.

- Indirect economic impact would magnify these direct losses by 1.5 times to about \$5.5 billion a year.

### **What are the expected benefits?**

RGGI assumes Pennsylvania electric industry carbon dioxide emissions will drop 30 percent by 2030, or about 23 million tons/year. Based on RGGI records<sup>6</sup> I calculated the invested revenues may reduce emissions an additional 1.5 million tons/year, and reduce electric bills by about \$0.4 billion from energy efficiency gains. A separate study by the Acadia Center has been quoted by Governor Wolf. The Acadia Center claims electric prices grew by half the national rate, GDP grew 3.6 percent faster in the RGGI states than the nation. The information below indicates these alleged benefits will probably not materialize as the RGGI program is not working as advertised.

### **Carbon dioxide reduction claims**

Emissions have fallen across the country because of lower priced, lower emission natural gas, EPA regulations that closed 23 percent of our coal-fired power plants, and the increased use of wind and solar power. A peer reviewed study by me<sup>7</sup>, and a similar study by the Congressional Research Center<sup>8</sup> concluded RGGI did not reduce carbon dioxide emissions, or have associated health benefits, when compared to non-RGGI states with similar energy policies. State energy policies have varied greatly, such as, deregulating electric supply, mandating the use of wind and solar power, and participating in RGGI. The RGGI states all had renewable mandates, and deregulated electric supply, so I compared them to non-RGGI states that had deregulated, and had renewable mandates. Adjustments were made to account for the RGGI states increasing power imports from outside the region, and for RGGI state loss of an outsized amount of energy intense manufacturing. Goods production dropped 12 percent in RGGI states, but rose 20 percent in Non-RGGI states. I found both RGGI and non-RGGI comparison states reduced coal-fired generation 16 percentage points while increasing natural gas fired generation about 10 percentage points. The non-RGGI states added in-state wind and solar power at twice the rate of the RGGI states.

### **Energy efficiency improvement claims**

My study shows energy intensity, a measure of actual energy efficiency improvements, improved 11.5 percent in non-RGGI states compared to only 9.6 percent in RGGI states. RGGI claims 27 percent of revenues were spent on energy efficiency projects. However, verification of actual efficiency gains are not robust. The only true verification is before and after, weather adjusted meter readings that are very seldom used. Energy efficiency programs tend to focus on quick payback items such as coupons for LED lightbulbs, and Energy Star rated refrigerators. Savings are considered "deemed", meaning no actual measurement is taken. The reality is LED lightbulbs have become so inexpensive they don't need coupons, and the refrigerator coupons get used for feature upgrades that actually increase energy use. There is not enough time to go into this topic in greater depth, but other problems exist.

### **Economic growth claims**

The Acadia Center used a study by the Analysis Group for its GDP growth claims. That report ignored the cost impact of increasing electricity imports, about \$3 billion a year to RGGI states as they cut



generation. It also ignored the cost impact of higher RGGI state bids for wholesale electricity prices raising the cost of electricity in non-RGGI states. That might total \$1.8 billion/year now, potentially rising to \$3 to \$7 billion by 2030<sup>9</sup>. Acadia touted GDP growth in RGGI states without explaining why there was so much state to state variation, -7% to +8.2%. RGGI annual allowance sales only amounted to about 0.1% of GDP, and cannot have a substantive impact on GDP. GDP growth comparisons are highly suspect, and RGGI, Inc. makes no claims about GDP growth. My study showed Real GDP growth from 2007 to 2015 was slower in the RGGI states (7.2 percent) than the 17.2 percent growth rate in non-RGGI comparison states. However, it is questionable to blame state to state differences on RGGI alone. It is more likely RGGI is a marker for a wide range of policy choices made by the two groups of states.

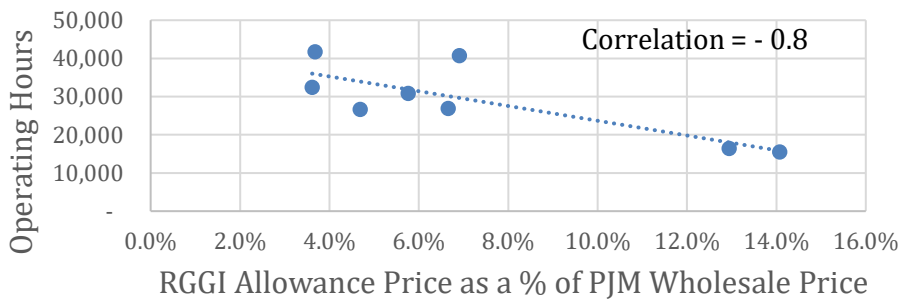
**Electricity price claims**

In my study prices rose 4.6 percent in RGGI states from 2007 to 2015, but only 2.8 percent in non-RGGI states. The Acadia Center accepted the assumption small decreases in electric demand will lead to lower electric prices. First, we have already shown energy efficiency improved faster in non-RGGI states thus lowering electric demand faster. Second, demand for electricity is very inelastic, price has little impact on demand. For example electricity prices rose 63 percent in Delaware from 2003 to 2007, but demand fell only 5.8 percent, for a rate of -0.09 percent for each one percent increase in price. Residential and commercial demand actually went up over the period by 7 and 11 percent respectively, but industrial demand fell by almost a third as energy intense companies left the state.

**What else needs to be considered?**

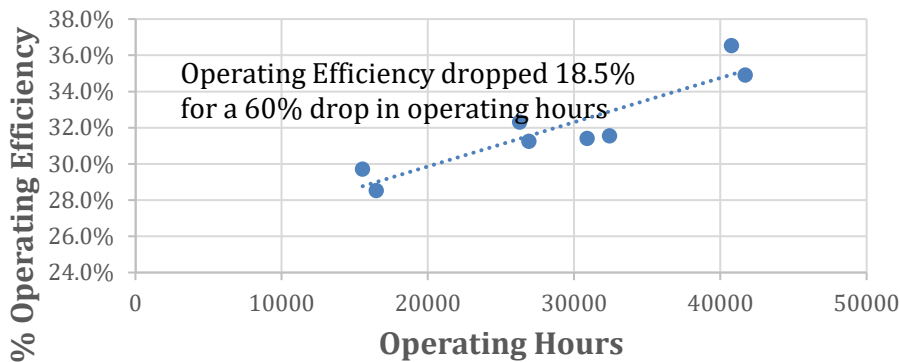
- Coal fired power plants were designed to be base load providers running essentially all the time. Before RGGI these plants were running over 70 percent of the time. A review of six merchant plants in Delaware and Maryland shows they now run only about 20 to 25 percent of the time. Power plant efficiency falls and costs and emissions rise. More coal is needed, and the cost to run the pollution scrubbers goes up. See the graphs below for the impact. If RGGI allowances hit \$10 to \$12 each it is likely coal-fired plants will close their doors completely eliminating one of the few reliable power choices with fuel stored on site.

**DE/MD Merchant Coal-Fired Generating Units**  
**Operating Hours vs. RGGI Allowance Cost**





**Six Merchant Coal Fired Power Plants in MD & DE**  
**Operating Efficiency v. Operating Hours**



- RGGI is often touted as a market based solution to reducing emissions as fewer allowances are auctioned. In truth the RGGI states are out for the revenue that is outside of legislative control. Environmental departments get to spend the money anyway they want. At the beginning the auctions had a minimum reserve price. In 2013, a cost cap reserve was added where if the auction price was above a target price extra allowances would be made available. This sent a price signal to the auction and prices tracked the target price. In the latest review an Emissions Containment Reserve was created to remove allowances from an auction if the auction price falls below the target price. RGGI expects the allowance price to track between the CCR and ECR prices. Speculator activity comes and goes, but they have bought about a quarter of the allowances over the last decade hoping to make money on the resale to compliance entities.
- Meeting any emission reduction goal is just transitory. The ultimate goal of RGGI promoters is to eliminate all emissions. Meeting that goal would shut down another 97 million MWh of coal, natural gas and other generation. Lost generation and transmission sales would be \$4.3 billion in electricity sales by 2030, or \$2.2 billion a year average, and a lost \$1.8 billion in natural gas and coal sales by 2030, or \$0.9 billion a year average. Additional allowance costs can be assumed to be similar to the first phase of cut backs, \$1 billion a year. In addition, 69 million MWh of zero emission generation would be needed to meet electric demand. Wind and solar power will cost about \$48/MWh<sup>10</sup> more than the abandoned natural gas power, or \$3.3 billion phased in over ten years at an average cost of about \$1.6 billion a year. Another \$1.5 billion a year in manufacturing could be lost. A second decade program might cost another \$14 billion a year when marked up for indirect cost.

**What does Pennsylvania contribute to carbon dioxide emission reduction?**

- Emissions were cut by 64 million tons from 2005 to 2017, or 23 percent while US emissions fell 14 percent, with the rest of the developed world cutting only 5 percent. Electric industry emissions fell another 8 million tons by 2018 bringing the total reductions to 25 percent. It is likely the Governor's 26 percent goal by 2025 was met in 2019, six years early.



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- Pennsylvania natural gas production has risen by 6 trillion cubic feet from 2009 to 2018<sup>11</sup>, replacing higher emitting coal saving 308 million tons of emissions<sup>12</sup>. In addition, it is estimated the natural gas revolution has reduced energy costs \$2,000 a year for the typical American family<sup>13</sup>.
- Pennsylvania has over 15 million acres of forest cover absorbing 15 to 38 million tons of carbon dioxide a year<sup>14</sup>.
- Pennsylvania is easily covering its current 215 million tons of emissions.

### Conclusion

Lost manufacturing jobs significantly reduce median household income. While Pennsylvania households have seen a real household income increase of \$3,000 a year this century, Delaware saw income drop \$9,500 a year<sup>15</sup>. The combined difference is about \$1,000 a month! Please don't follow Delaware down a destructive policy path. With a likely \$7 billion a year negative impact on the economy totaling about \$1,150 per household, and no significant reduction in carbon dioxide emissions expected, clearly RGGI is not a winning policy for Pennsylvania.

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### Notes:

- 1) Regional Greenhouse Gas Initiative Auction Results, Auction 45, <https://www.rggi.org/auctions/auction-results>
- 2) US EIA Carbon dioxide emissions by fuel, <https://www.eia.gov/tools/faqs/faq.php?id=73&t=11>
- 3) DRAFT 2017 Model Rule Policy Scenario Overview Sept. 25, 2017, page 13 [https://www.rggi.org/sites/default/files/Uploads/Program-Review/9-25-2017/Draft\\_IPM\\_Model\\_Rule\\_Results\\_Overview\\_09\\_25\\_17.pdf](https://www.rggi.org/sites/default/files/Uploads/Program-Review/9-25-2017/Draft_IPM_Model_Rule_Results_Overview_09_25_17.pdf)
- 4) PJM Interconnection, Average load weighted average electricity cost 2018, <https://annualmeeting.pjm.com/-/media/pjm-annualmeeting/postings/2019-pjm-fact-sheet.ashx?la=en>, Constellation Energy average transmission rate by region, <https://blogs.constellation.com/energy-management/understanding-transmission-costs-in-your-power-bill-2/>
- 5) U.S. Energy Information Agency, Annual Coal Production by State, <https://www.eia.gov/coal/production/weekly/>
- 6) RGGI, Inc., The Investment of RGGI Proceeds 2017, [file:///C:/Users/dtste/Pictures/RGGI\\_Proceeds\\_Report\\_2017.pdf](file:///C:/Users/dtste/Pictures/RGGI_Proceeds_Report_2017.pdf)
- 7) Cato Journal, Winter, 2018, "A Review of the Regional Greenhouse Gas Initiative", Summary, Page 2, David T. Stevenson, Director Center for Energy Competitiveness for the Caesar Rodney Institute, <https://object.cato.org/sites/cato.org/files/serials/files/cato-journal/2018/2/cato-journal-v38n1-chapter-11.pdf>



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- 8) Congressional Research Service, May 16, 2017, “The Regional Greenhouse Gas Initiative: Lessons Learned and Issues for Congress”, Summary, page 1, Jonathan L. Ramseur Specialist in Environmental Policy,  
<file:///C:/Users/dtste/Documents/RGGI%20Congressional%20Research%20Center%20Study.pdf>
- 9) DRAFT 2017 Model Rule Policy Scenario Overview Sept. 25, 2017, page 13  
[https://www.rggi.org/sites/default/files/Uploads/Program-Review/9-25-2017/Draft\\_IPM\\_Model\\_Rule\\_Results\\_Overview\\_09\\_25\\_17.pdf](https://www.rggi.org/sites/default/files/Uploads/Program-Review/9-25-2017/Draft_IPM_Model_Rule_Results_Overview_09_25_17.pdf)
- 10) Center of the American Experiment, Isaac M. Orr, Mitch Rolling, and John Phelan, “Doubling Down on Failure”, <https://www.americanexperiment.org/2019/03/american-experiment-releases-groundbreaking-new-study-high-cost-renewable-energy-mandates-minnesota/#>, Average wind power cost of \$92/MWh compared to \$44/MWh for existing power plants
- 11) US EIA, Pennsylvania natural gas production by year,  
<https://www.eia.gov/dnav/ng/hist/n9050pa2a.htm>
- 12) US EIA Carbon dioxide emissions by fuel, <https://www.eia.gov/tools/faqs/faq.php?id=73&t=11>
- 13) Council of Economic Advisers ,Oct. 2019, “The Value of US Energy Innovation and policies supporting the shale revolution”, <https://www.whitehouse.gov/wp-content/uploads/2019/10/The-Value-of-U.S.-Energy-Innovation-and-Policies-Supporting-the-Shale-Revolution.pdf>
- 14) Forestry Research and Engineering: International Journal, Carbon sequestration: how much can forestry sequester CO<sub>2</sub>?, Volume 2 Issue 3 – 2018, Egbuche Christian Tooche Department of Forestry and Wildlife Technology, Federal University of Technology Owerri, Nigeria,  
<https://medcraveonline.com/FREIJ/FREIJ-02-00040.pdf>
- 15) US Census, Table H8 Median Household Income by state, <https://www.census.gov/data/tables/time-series/demo/income-poverty/historical-income-households.html>



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# Should Pennsylvania Join the Regional Greenhouse Gas Initiative?

**David T. Stevenson, Director  
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# What is RGGI?

- Ten northeast states joined together to require electric power plants to buy emission allowances for each ton of carbon dioxide emissions
- Each participating state adopted RGGI with the legislative vote required for a revenue bill
- In 2008 the first emission reduction goal was 10 %, raised to 53 % in 2013, and 65 % in 2019
- The ultimate goal is zero emissions



# Did RGGI work? NO!

- Emissions Fell nationally because of lower priced, lower emission natural gas, EPA regulations that closed 23 percent of our coal-fired power plants, and the increased use of wind and solar power
- A peer reviewed study by me, and a similar study by the Congressional Research Center concluded RGGI did not reduce carbon dioxide emissions, or have associated health benefits, when compared to non-RGGI states with similar energy policies
- Both RGGI and non-RGGI comparison states reduced coal-fired generation 16 percentage points while increasing natural gas fired generation about 10 percentage points
- To maintain revenue RGGI has introduced auction price controls so it is not a market based system

# What has Pennsylvania done to reduce carbon dioxide emissions?

- Per capita emissions from Pennsylvania electric power plants fell 40 percent, the same as RGGI states
- Emissions were cut by 72 million tons from 2005 to 2018, or 25 percent while US emissions fell 14 percent, with the rest of the developed world cutting only 5 percent. **It is likely the Governor's 26 percent goal by 2025 was met in 2019**
- Pennsylvania natural gas production rose 6 trillion cubic feet replacing higher emitting coal saving 308 million tons of emissions, and reduced energy costs \$2,000 a year per American family
- Pennsylvania has over 15 million acres of forest cover absorbing 15 to 38 million tons of carbon dioxide a year
- Pennsylvania is easily covering its current 215 million tons of emissions

# What will RGGI's average cost per year be over the next decade?

- Allowance cost may average \$1 billion a year passed onto electric bills
- Lost electricity exports may cost \$0.5 billion a year
- Lost coal production may cost \$0.4 billion a year
- Lost manufacturing may cost \$1.5 billion
- Total direct cost could average almost \$3.5 billion a year, plus 50 % more in indirect effects raises the cost impact to \$5.5 billion a year
- Worst case, Pennsylvania households could see a \$1,150 a year hit
- A zero emission goal might cost an additional \$10.5 billion a year

# Did the investment of RGGI revenue increase energy efficiency?

- energy intensity, a measure of actual energy efficiency improvements, improved 11.5 % in non-RGGI comparison states compared to only 9.6 % in RGGI states
- 27 % of revenues were spent on energy efficiency projects. However, verification of actual efficiency gains are not robust
- The only true verification is before and after, weather adjusted meter readings that are very seldom used. Energy efficiency programs tend to focus on quick payback items such as coupons for LED lightbulbs, and Energy Star rated refrigerators

# Did electric prices rise more slowly in RGGI States?

- Real prices rose 4.6 percent in RGGI states from 2007 to 2015, but only 2.8 percent in non-RGGI comparison states
- Claims of electric bill savings accept the assumption small decreases in electric demand will lead to lower electric prices, but the price elasticity of total electric demand is quite inelastic,  $-0.09\%$  for each  $1\%$  rise in price
- Price has no impact on demand for residential and commercial customers, but a high impact on industrial customers who will relocate for lower prices

# Did economies grow faster in RGGI states?

- RGGI annual allowance sales only amounted to about 0.1% of GDP, and cannot have a substantive impact on GDP
- GDP growth comparisons are highly suspect, and RGGI, Inc. makes no claims about GDP growth
- My study showed Real GDP growth from 2007 to 2015 was slower in the RGGI states at 7.2 percent, than the 17.2 percent growth rate in non-RGGI comparison states
- Goods production dropped 12 percent in RGGI states, but rose 20 percent in non-RGGI comparison states

\$5.5 billion a year negative impact on the economy equaling a \$1,150 cost per household?

No significant reduction in carbon dioxide emissions?

RRGI is not a winning policy for Pennsylvania!