



Using Energy Markets to Enhance RGGI:

RTO Leakage Mitigation for Carbon Reduction

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Energy Markets Can Improve State Carbon Policy

- Some PJM states have been directly using the power of the energy markets to reduce carbon emissions from power plants since 2009
- The Regional Greenhouse Gas Initiative (RGGI) is a proven model for how to align state carbon reduction goals with the efficiency of RTO energy markets
 - States have complementary policies to achieve environmental goals, all of which work with RGGI/carbon pricing
- More PJM states are joining/rejoining RGGI
 - States comprising 55% of current PJM load intend to participate in PJM by 2022
- However, leakage undermines use of the energy markets for a substantial share of desired emissions reductions from electricity generation
 - PJM’s least-cost energy dispatch selects lower-cost, polluting generation in a neighboring state
 - Therefore, energy price signals and emissions levels fail to reflect the impact of a state’s policy choice
 - This leads states to further their environmental goals and ensure the financial viability of emissions-free generation using other means
- Timing is urgent – like climate change, state policy decisions are not waiting

Carbon border adjustments improve PJM energy market price signals and facilitate state environmental policy choices

Key Features of the Regional Greenhouse Gas Initiative (RGGI)

- RGGI is a multi-state, cap-and-invest emissions reduction program to reduce CO₂ emissions from fossil power plants
 - Polluters must purchase allowances equal to emissions
 - States invest this revenue in actions that benefit customers and/or further reduce CO₂ pollution like energy efficiency, weatherization, bill credits, and other priorities by state
 - Generating units that must purchase allowances add this cost to their energy market bids, just like any other variable cost of operation (e.g., fuel)

Regional Greenhouse Gas Initiative

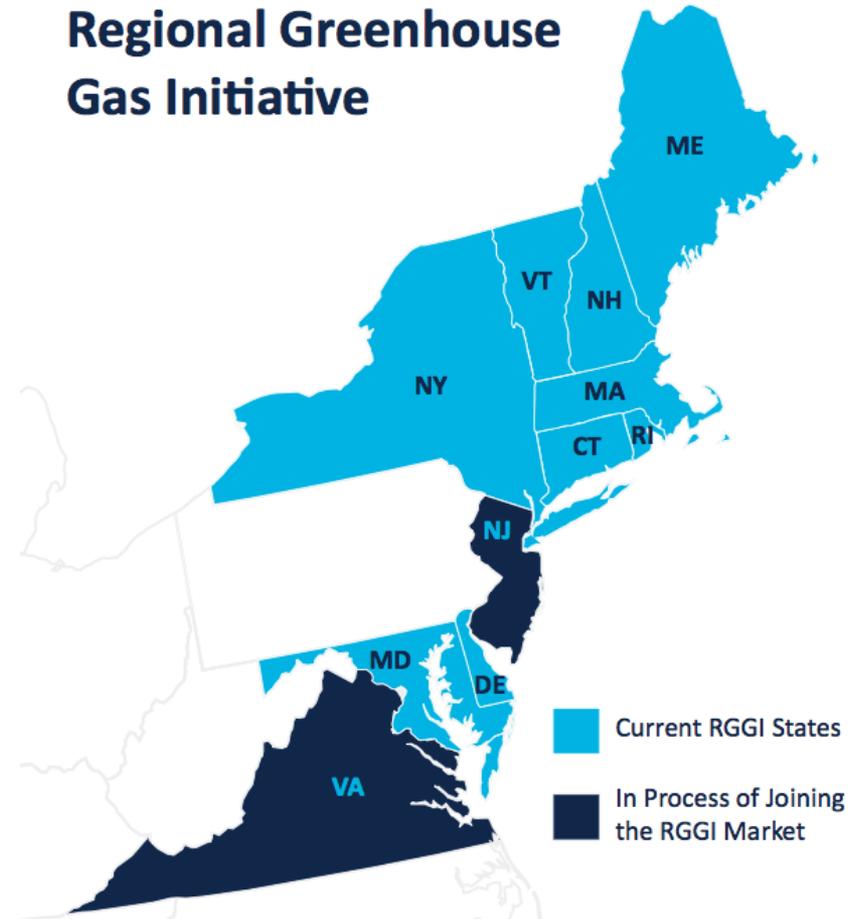
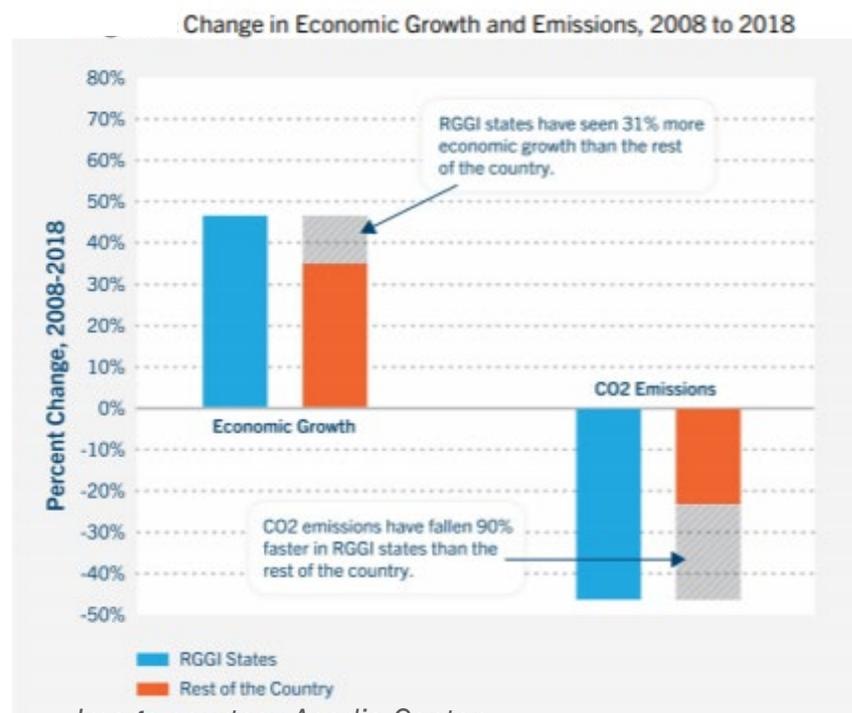


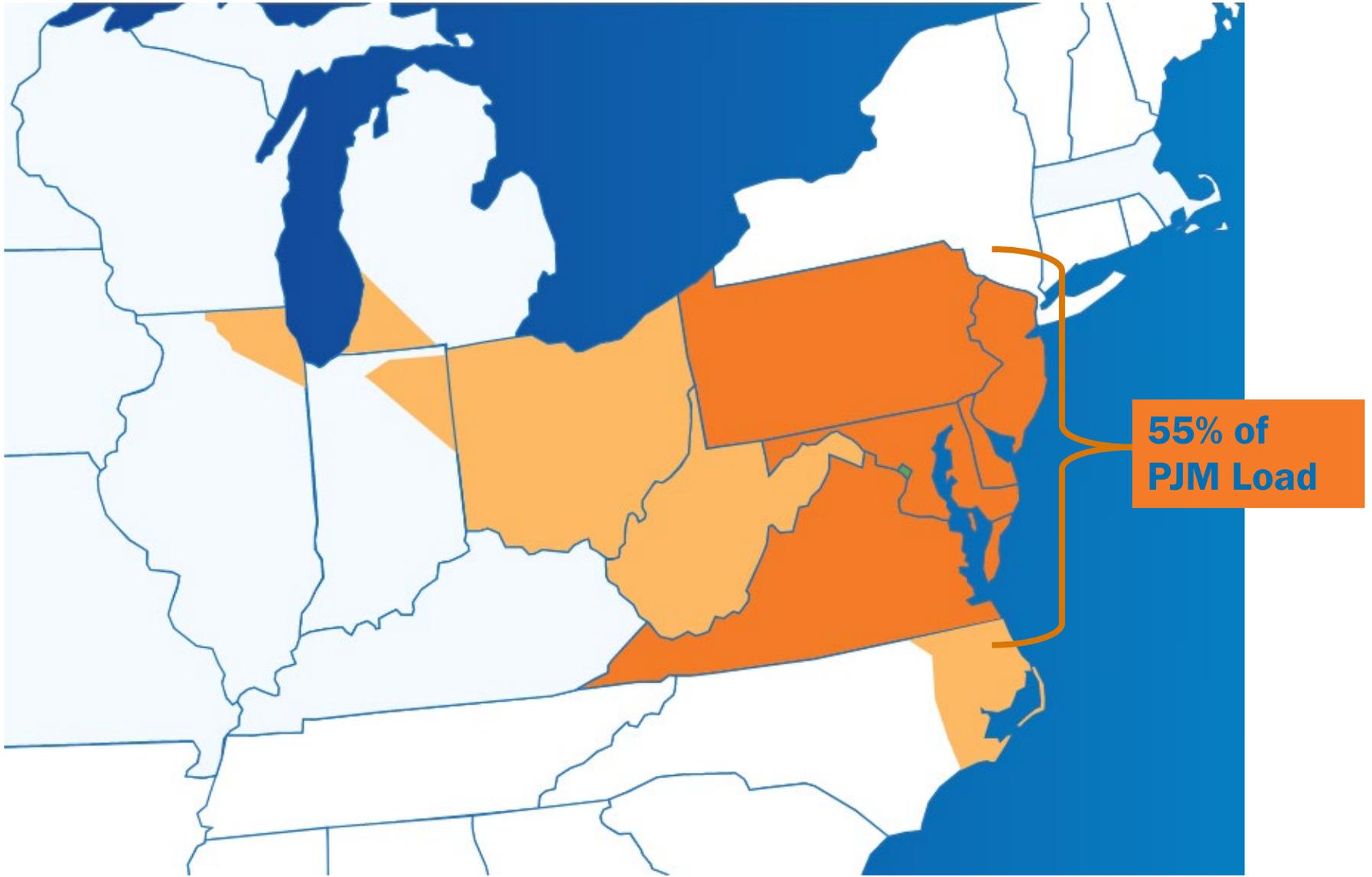
Image courtesy NRDC

RGGI is Effective

- On the 10th anniversary of RGGI implementation, Acadia Center produced a [report](#), which found that, compared to the rest of the country:
 - CO₂ emissions from power plants in RGGI states have fallen 90% faster
 - Economic growth outpaced the rest of the country by 31%
 - Electricity prices fell by 5.7%, compared to an 8.6% increase in other states
 - GDP grew 47%, outpacing the rest of the country by 31%
 - RGGI states have generated \$3.2 billion in allowance auction proceeds
 - Analysis Group's [study](#) of the effect of investment of these proceeds estimated that RGGI states realized \$1.4 billion in net economic value during just the most recent 2015-2017 compliance period (RGGI operates on three-year compliance periods)
 - Co-pollutant emissions reductions have resulted in over \$5.7 billion in health and productivity benefits



RGGI in PJM (by 2022)



Leakage Undermines RGGI Effectiveness

- Leakage undermines any pollutant-reduction program that does not cover all sources or geography
 - Leakage occurs in all market designs that fail to fully value carbon and that ignore emissions in dispatch decisions
- Here, “leakage” refers to generation emissions that shift from a RGGI state to a non-RGGI state within PJM as a consequence of PJM’s least-cost energy dispatch. Generation emissions that move from one RGGI state to another are not considered leakage
 - Border adjustments would ensure all states within PJM get the carbon price they intend while remaining within the same energy markets

Leakage Mitigation Can Take Many Forms

1. Don't mitigate leakage – environmental and market consequences
 - Status quo; no state gets their intended carbon price
 - RGGI states do not get full environmental value of RGGI
 - Non-RGGI states see an unwanted economic impact as a result of leakage
2. Expand geography or sectoral coverage (i.e., internalize the leakage)
 - Some current RGGI leakage goes to Virginia and Pennsylvania; these states are considering joining and then generators will see consistent carbon signals within these states
3. Reduce impact of leakage via
 - Compensating clean (i.e. emissions-free) generation sources (e.g., offshore wind) or
 - Allocating free allowances to select emitting generation sources
4. Include emissions associated with imported electricity under RGGI states' caps (e.g., [EDF proposal](#))
5. Border adjustments similar to NYISO's proposal
 - While NYISO is a single-state RTO, it would face significant leakage to ISO-NE and PJM without mitigating leakage
 - For our internal analysis, we adapted NYISO's design to PJM
 - Add carbon cost to electricity flowing from non-RGGI to RGGI within PJM
 - Did not remove carbon cost from exported electricity from RGGI states as generation maintains compliance obligation under RGGI regardless of where load is served

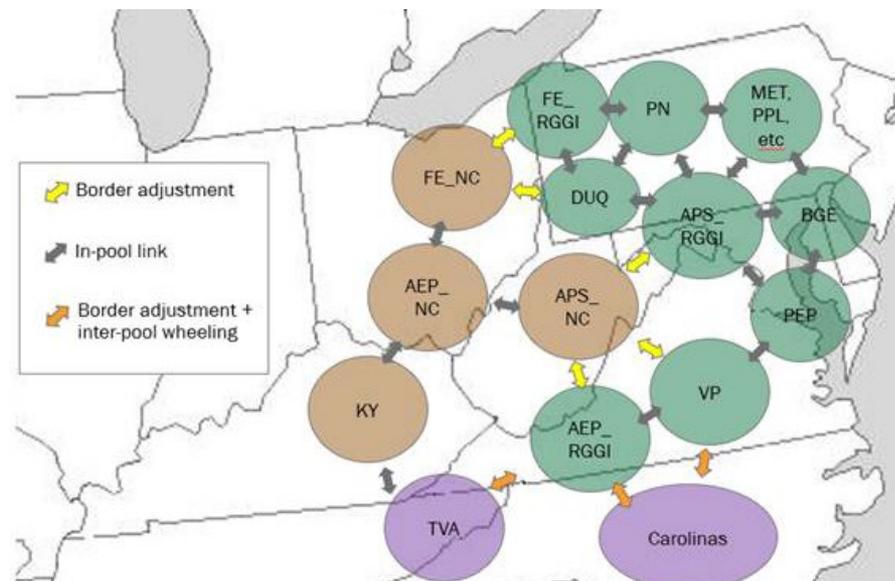
RGGI With Border Adjustments

Consistent with other studies, Exelon found that border adjustments:

- Preserve efficiencies of regional energy markets,
- Reduce emissions regionwide, and
- Preserve state policy choices

How we modeled PJM border adjustments:

- All RGGI generators have carbon costs built into their bids; non-RGGI generators do not
- Power flowing across ISO borders from a non-carbon to a carbon region (e.g., Carolinas to PJM) sees an additional wheeling cost



Next Steps for Task Force

PJM should move forward to develop border adjustments for RGGI

- Given the design lead time, PJM should begin now
- Could be used for a future RTO-wide price if needed
- Designing does not have to mean implementing, but implementing does need designing
- Would facilitate states accomplishing more of their carbon goals via the energy markets

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