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# The Regional Greenhouse Gas Initiative

## Pennsylvania Climate Change Advisory Committee

Chris Hoagland

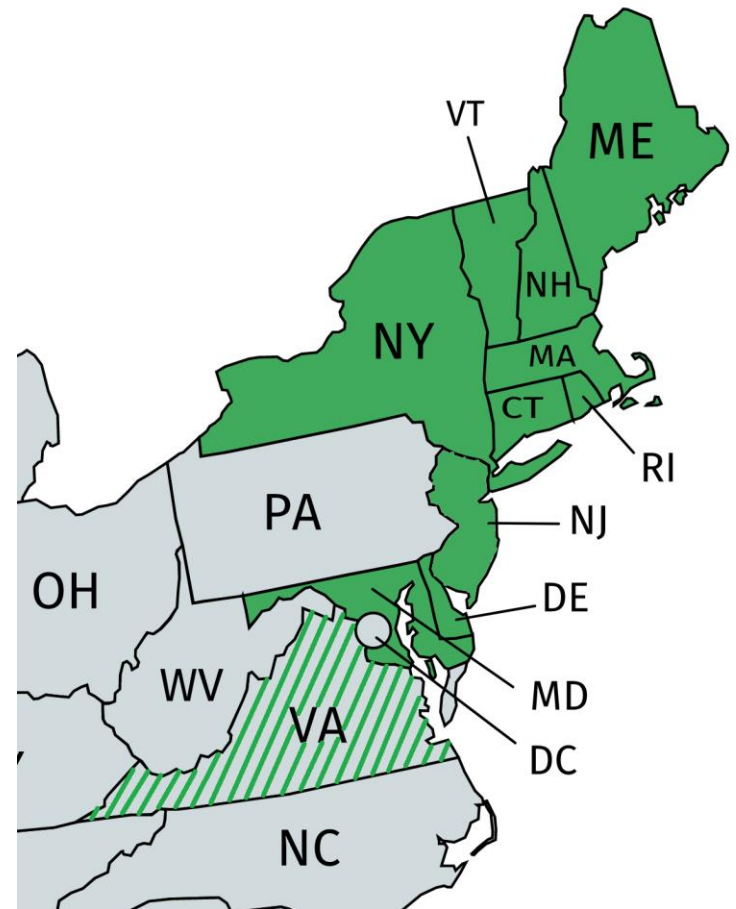
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October 1, 2019

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# The Regional Greenhouse Gas Initiative

- Carbon Cap on Power Plants
- 10 States Participate
  - NJ now participating
  - VA promulgated regulation but not participating
- Most allowances sold at auction
- Auction proceeds fund energy programs



# Cap and Invest

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1. Require sources to turn in **allowances** for CO2 emissions.
2. Only issue a limited number of allowances.
3. Let sources trade allowances.
4. Invest proceeds from allowance auctions into energy programs.

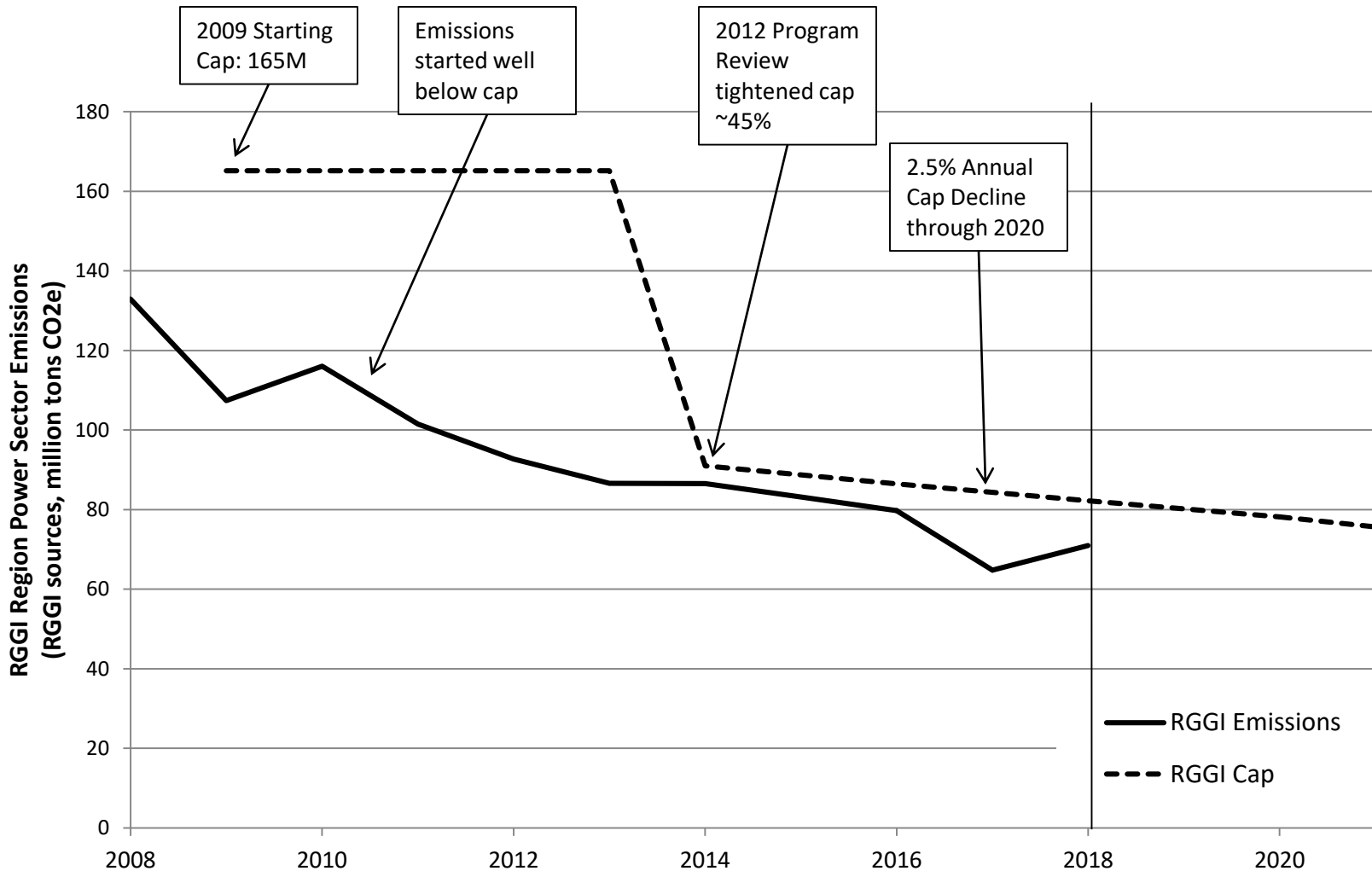
“Cap and Trade”

“Cap and Invest”



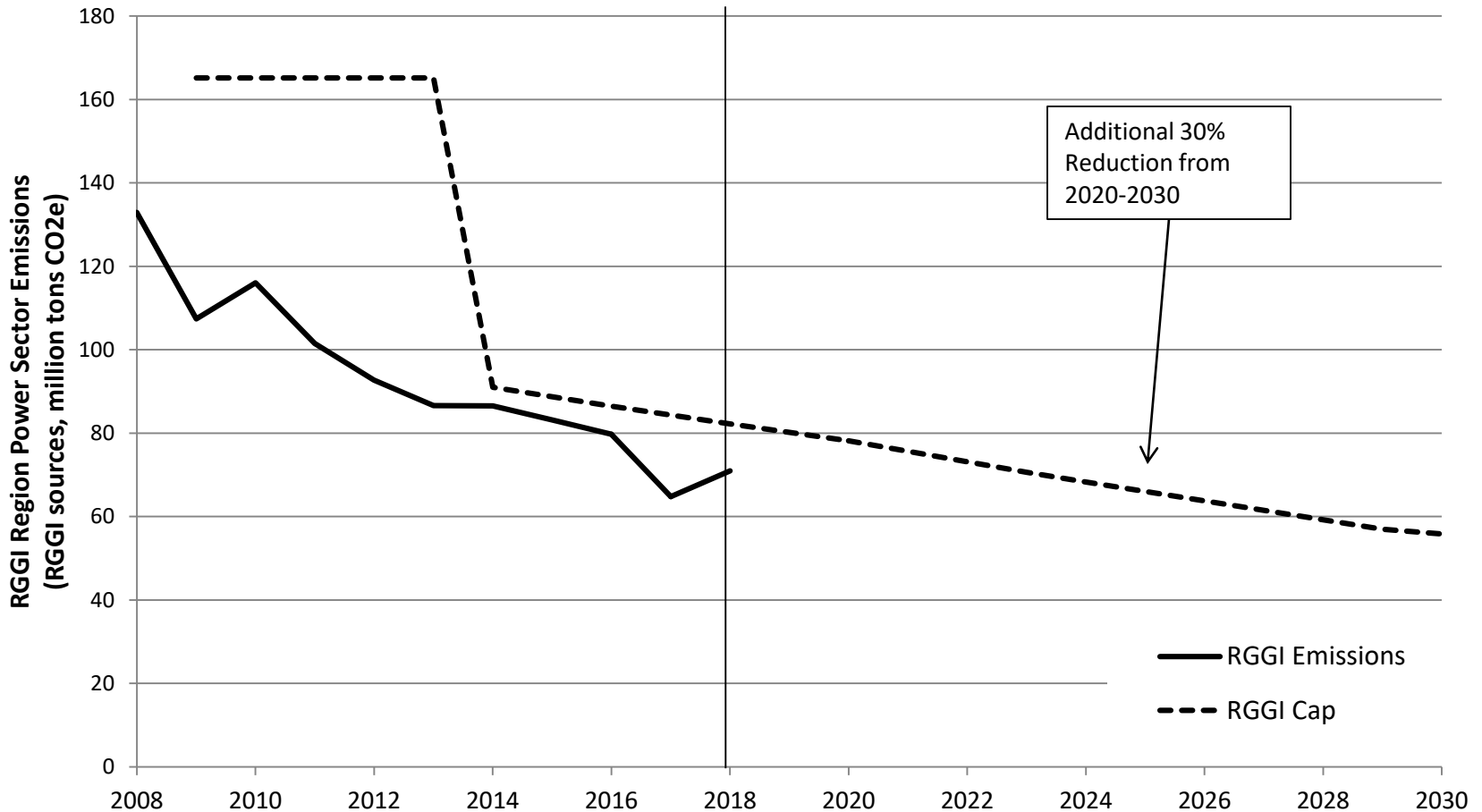
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# RGGI Caps & Emissions: through 2020



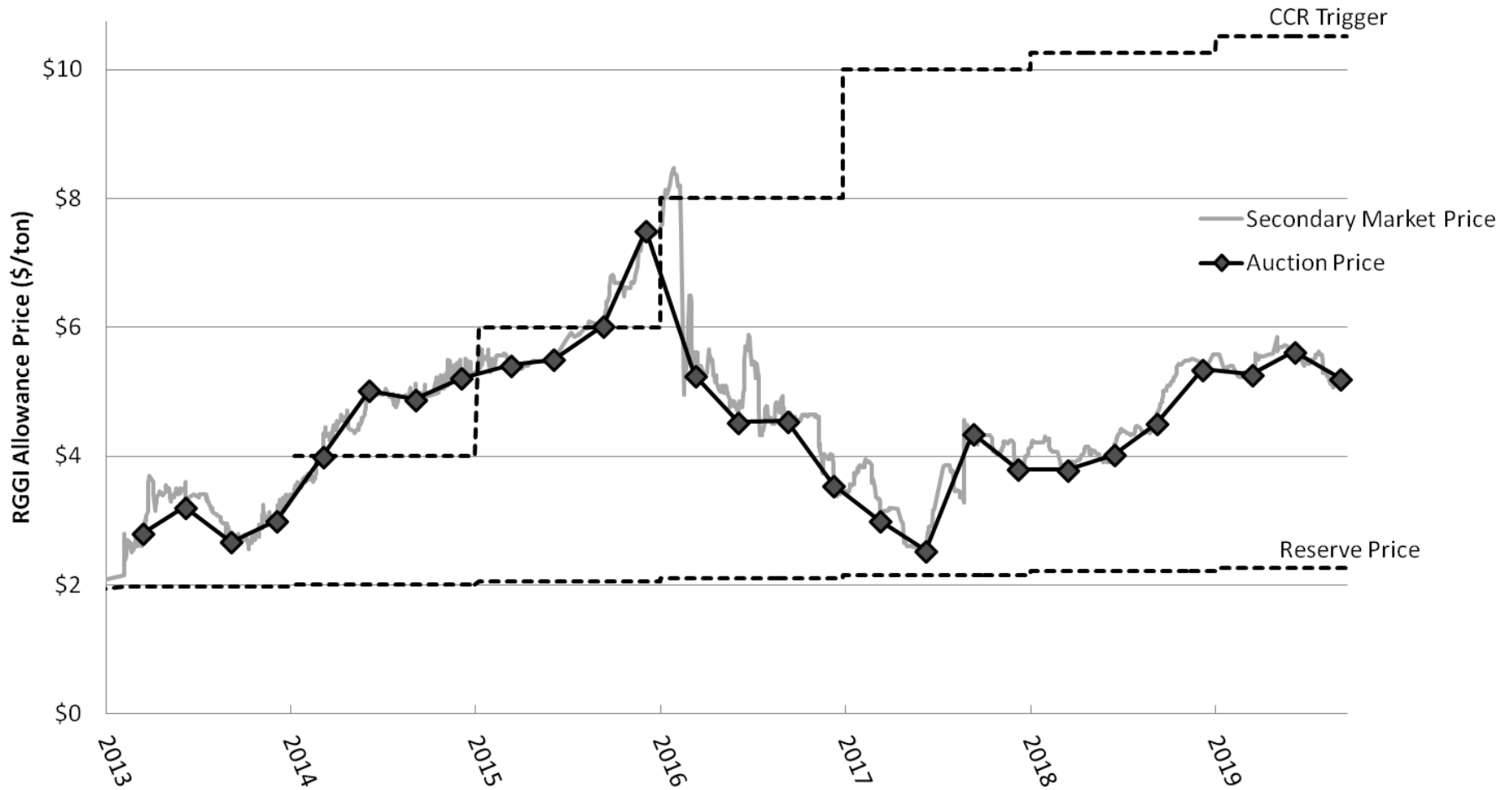
NOTE: Does not include New Jersey, which participated from 2009-2011.

# RGGI Caps & Emissions: through 2030



NOTE: The addition of New Jersey will increase the cap & covered emissions starting in 2020.

# RGGI Prices



# Allowance Allocation

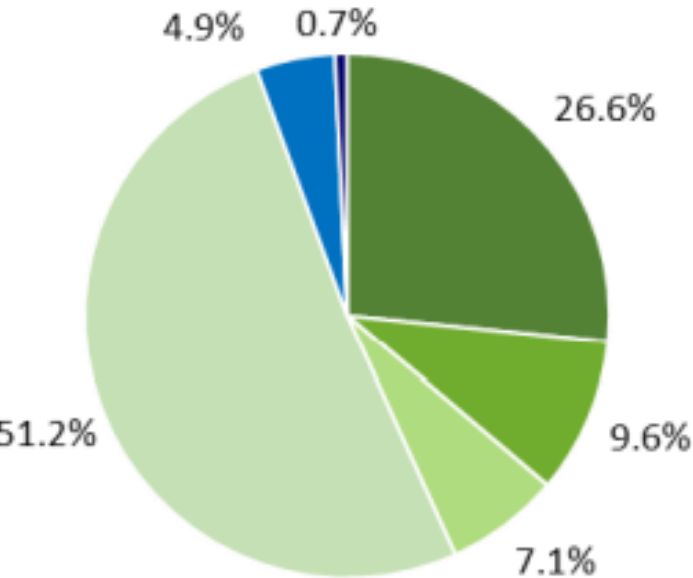
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- Most allowances sold at quarterly auctions
- Participating states receive the proceeds
- \$3.2 billion raised region-wide to-date
  - \$669 million in Maryland
- Each state receives proceeds from sale of its allowances
  - The regional cap is just the sum of individual state allowance budgets.

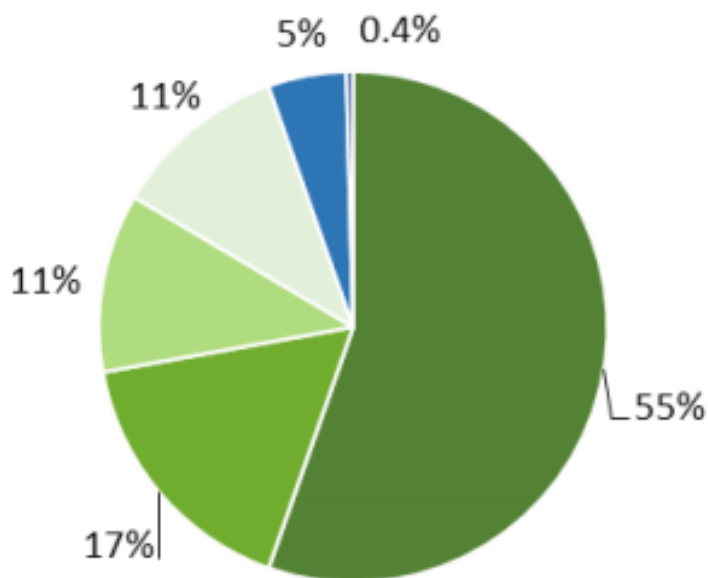


# Auction Proceeds Investment

Maryland:



Region-wide:



- Energy Efficiency
- Clean & Renewable Energy
- GHG Abatement
- Direct Bill Assistance
- Administration
- RGGI, Inc.











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# Auction Proceeds Impacts

Table 1: Benefits of 2016 RGGI Investments

Category	Annual Benefits of 2016 Investments	Lifetime Benefits of 2016 Investments
 Participating Households	182,135 (Programs)* 806,605 (Bill Assistance)	N/A
 Participating Businesses	2,680 (Programs)* 109,220 (Bill Assistance)	N/A
 Workers Trained	370	N/A
 Short Tons CO <sub>2</sub> Avoided	382,266	6.4 million
 Equiv. Cars Off Road	74,258	1.2 million
 Megawatt-Hours Saved	409,630	7.0 million
 MMBtu Saved	1.6 million	30.4 million
 Energy Bill Savings	\$150.5 million	\$1.7 billion

\*Participants in all programs other than direct bill assistance.



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# RGGI Impacts (Independent Estimates)

## 1. RGGI has reduced emissions.

Murray, Brian C. and Peter T. Maniloff. “Why Have Greenhouse Emissions in RGGI States Declined? An Econometric Attribution to Economic, Energy Market, and Policy Factors.” *Energy Economics*. August 2015. <http://www.sciencedirect.com/science/article/pii/S0140988315002273>

## 2. RGGI has boosted economic growth & employment.

“The Economic Impacts of the Regional Greenhouse Gas Initiative on Nine Northeastern and Mid-Atlantic States.” Analysis Group. April 2018.  
[https://www.analysisgroup.com/globalassets/uploadedfiles/content/insights/publishing/analysis\\_group\\_rggi\\_report\\_april\\_2018.pdf](https://www.analysisgroup.com/globalassets/uploadedfiles/content/insights/publishing/analysis_group_rggi_report_april_2018.pdf)

## 3. RGGI has improved public health.

“Analysis of the Public Health Impacts of the Regional Greenhouse Gas Initiative.” Abt Associates, 2017. <http://abtassociates.com/reports/2017/rggi.aspx>

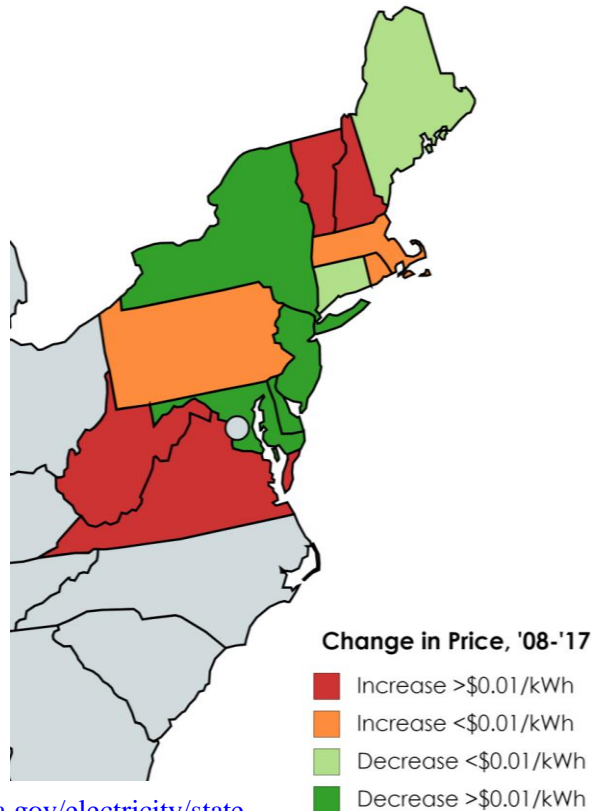


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# Does RGGI Increase Electricity Costs?

## Rough Analysis:

Most RGGI states' average retail rates have gone down since RGGI began, while non-participating neighbors' have gone up.



## Sophisticated Analysis:

### Analysis Group Retrospective:

“Since RGGI’s commencement in 2009, energy and dollar savings resulting from all states’ investments in EE and RE has more than offset the wholesale market price increases associated with the inclusion of allowance costs in market bids...consumers of electricity saved \$99 million [from 2015-2017 alone]”



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# RGGI Regulations

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- The participating states work together to write a Model Rule
  - <http://www.rggi.org/design>
- Each state's RGGI regulation is consistent with the Model Rule
  - <http://www.rggi.org/design/regulations>
- The cap is the sum of participating state allowance budgets

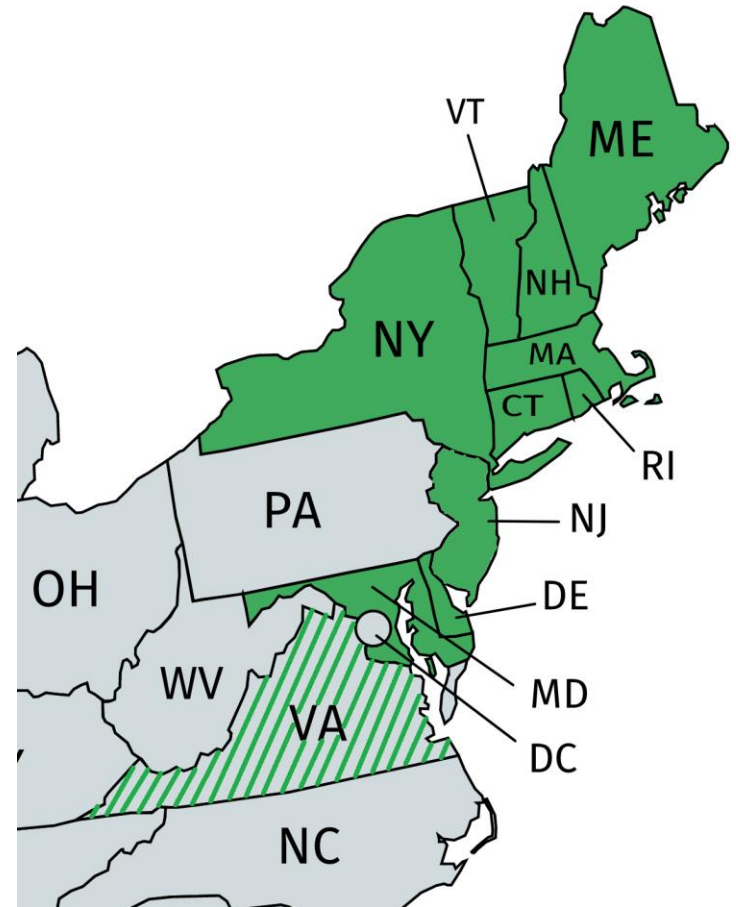


# New State Participation

- RGGI states are always available to discuss participation.

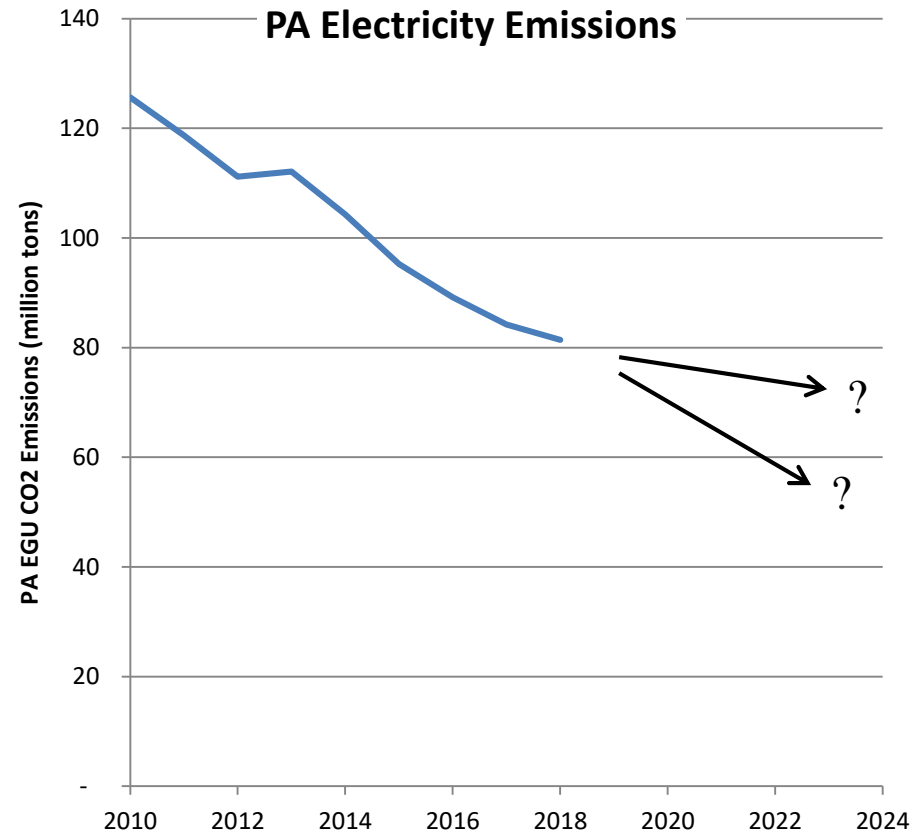
## Important Considerations:

- 1- Comparable Stringency
- 2- Consistent Program Elements
- 3- Governance



# Comparable Stringency

- New states bring in more allowances (i.e. higher cap), and more emissions
  - How does that affect the overall balance between the cap and emissions?
- Indicators of stringency:
  - Allowance price
    - Modeling is useful here: will future allowance price decrease because of the new state?
  - New state's budget vs current emissions



# Consistent Program Elements

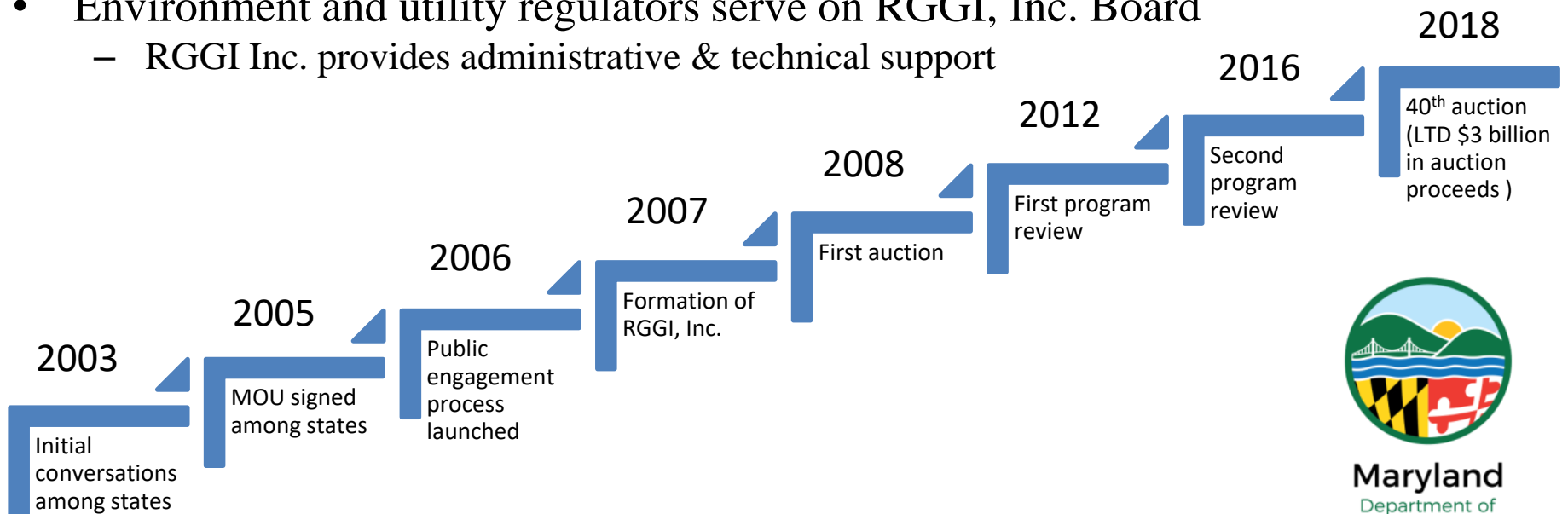
- How will new state allocate allowances?
- How will new state implement important elements?
  - Price Floor
  - Cost Containment Reserve
  - Emissions Containment Reserve
  - Bank Adjustment
- All state programs are independent, but consistent enough for generators to participate in one market



# Governance

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- RGGI emerged and continues through bipartisan collaboration & public engagement
- Participating states convene periodic Program Review to improve program
  - Third Program Review will start by 2021
- Environment and utility regulators serve on RGGI, Inc. Board
  - RGGI Inc. provides administrative & technical support

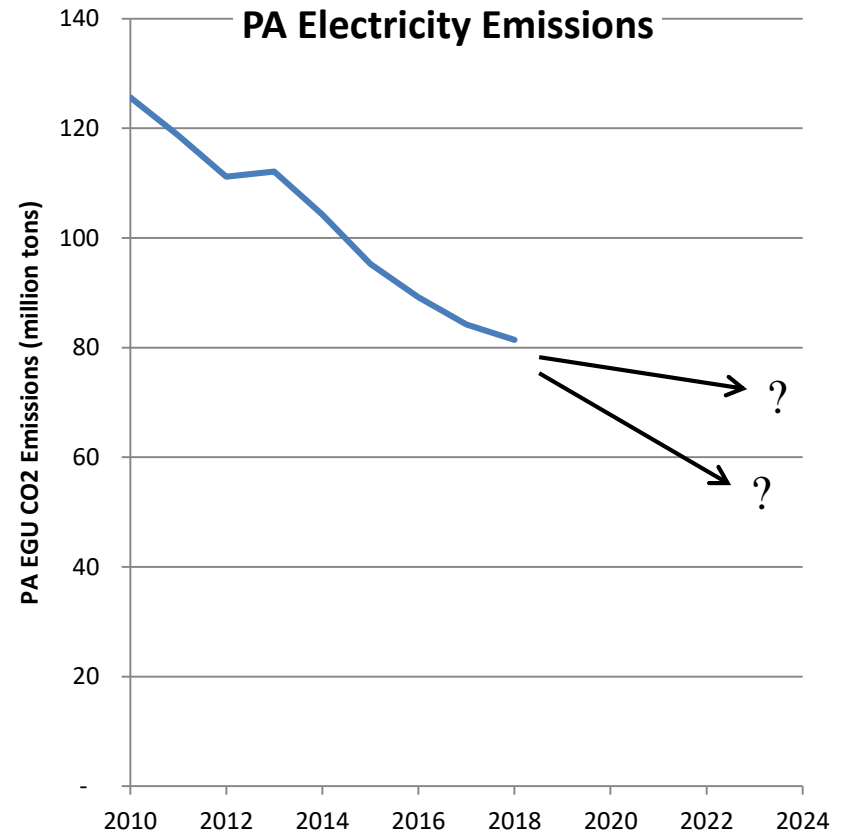


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# Process to Participate

1. Begin formal discussions w/ RGGI states
2. RGGI States will assist with modeling, analysis, regulation interpretation, stakeholder engagement to design consistent program
3. Follow rulemaking process



# My Info

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# Extra Slides

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# Flexibility Mechanisms

The Cost Containment Reserve is...

A reserve from which allowances are released

If prices are high

The Emissions Containment Reserve is...

A reserve into which allowances are diverted

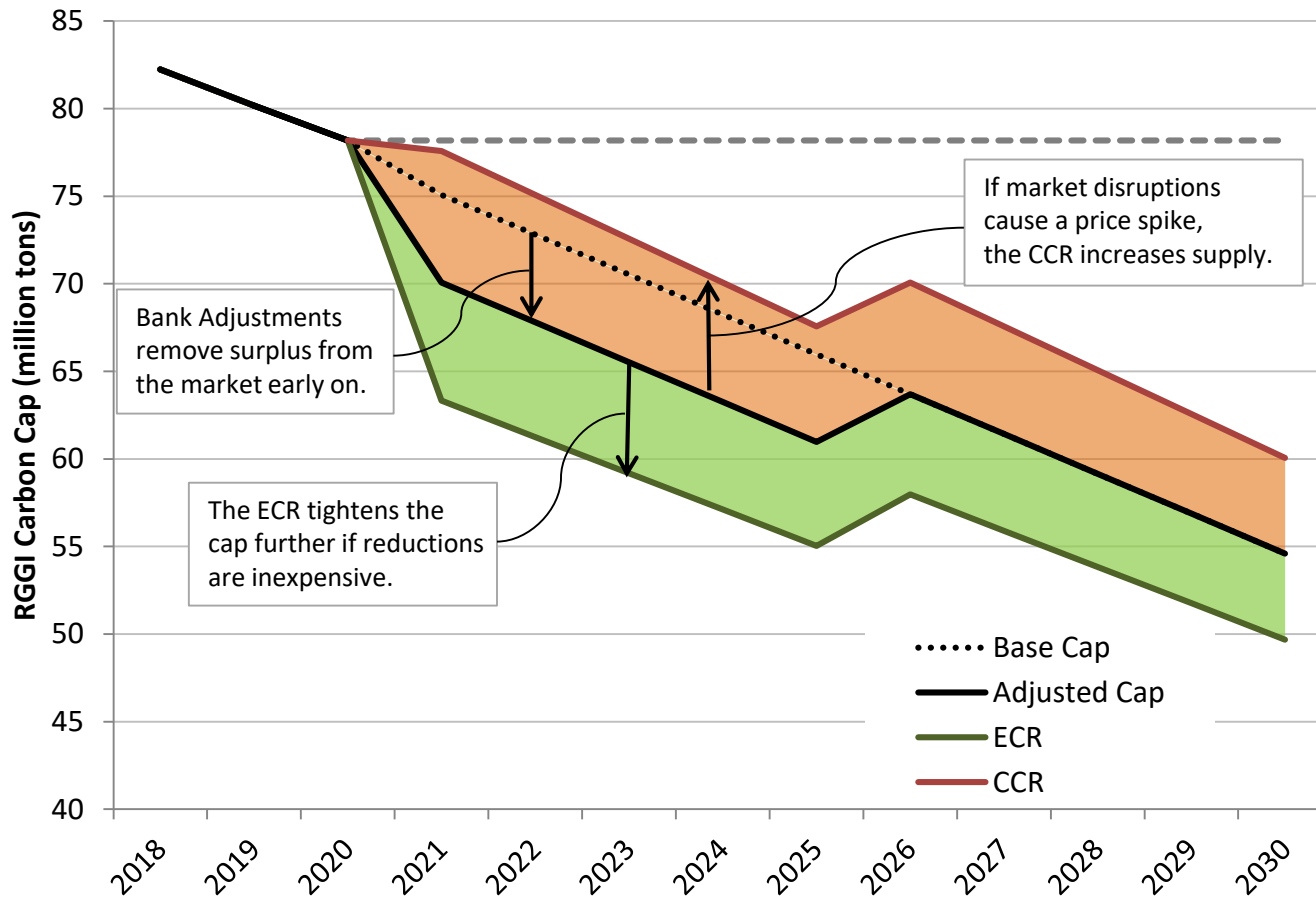
If prices are low

Both act during the auction

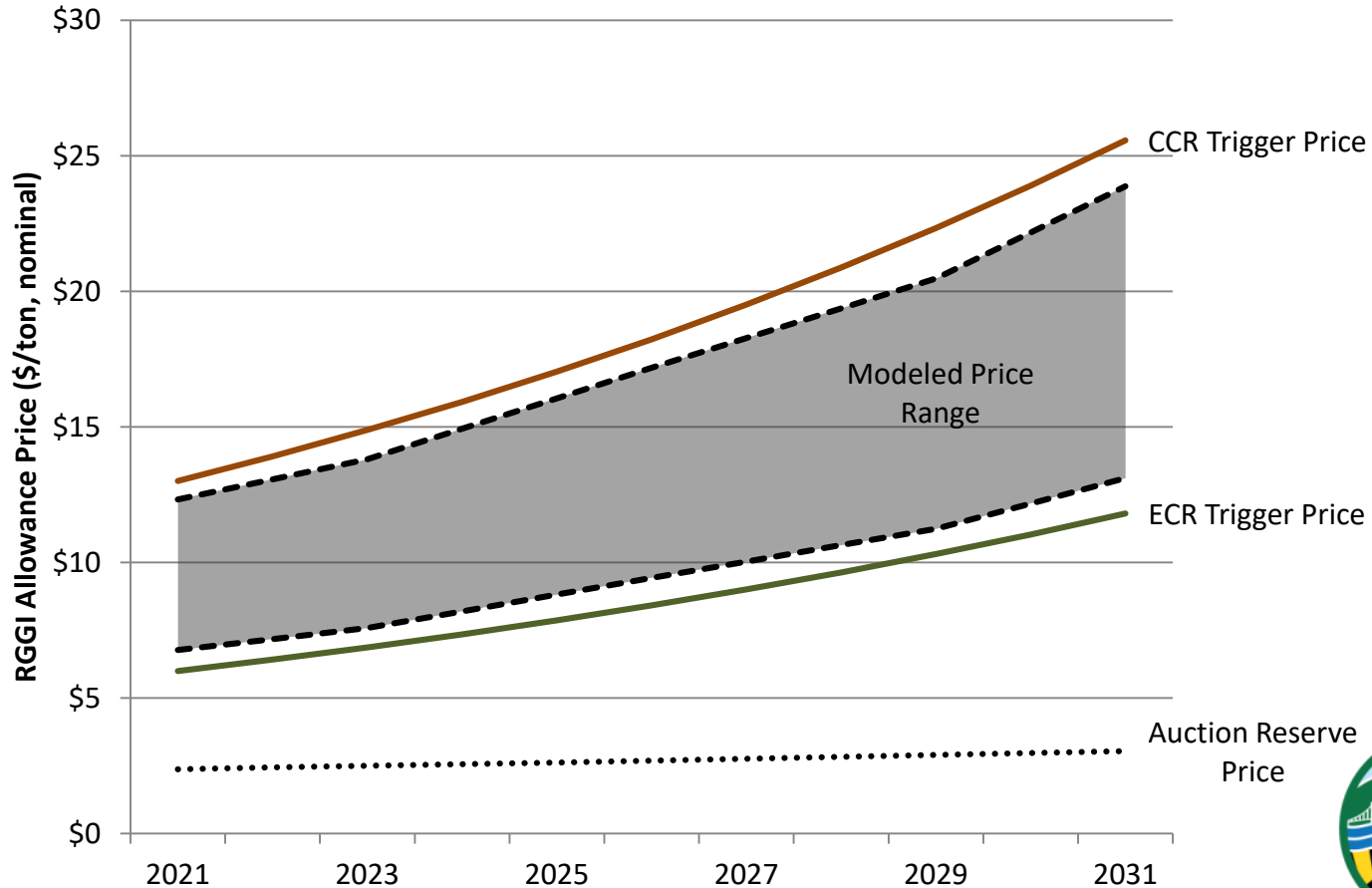


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# 2017 Agreement: An Adaptive Cap



# 2017 Agreement: CCR and ECR Price Triggers



# Leakage

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Leakage has been a concern since program design.

The states monitor for leakage through the annual electricity monitoring report.

Leakage cannot be directly measured.

Dispatch models will generally leak, even at low allowance prices (this may not always be realistic).



# Leakage

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Current state strategies to counteract leakage:

- 1- Invest in reductions in-region
- 2- Expand state participation

Potential state strategies to counteract leakage:

- 1- ISO/RTO market rules to reflect carbon pricing & address leakage
- 2- Updating Output-based Allowance Allocation

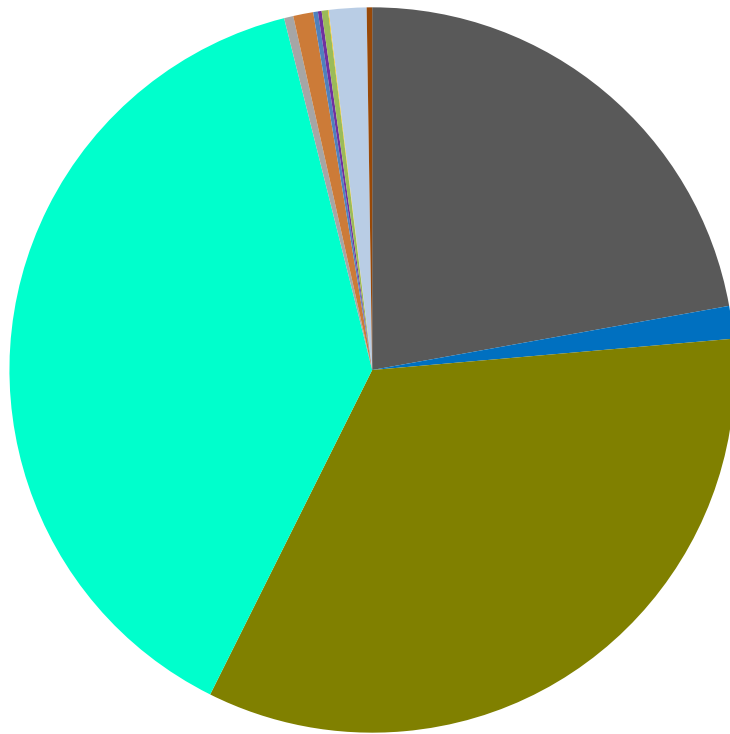




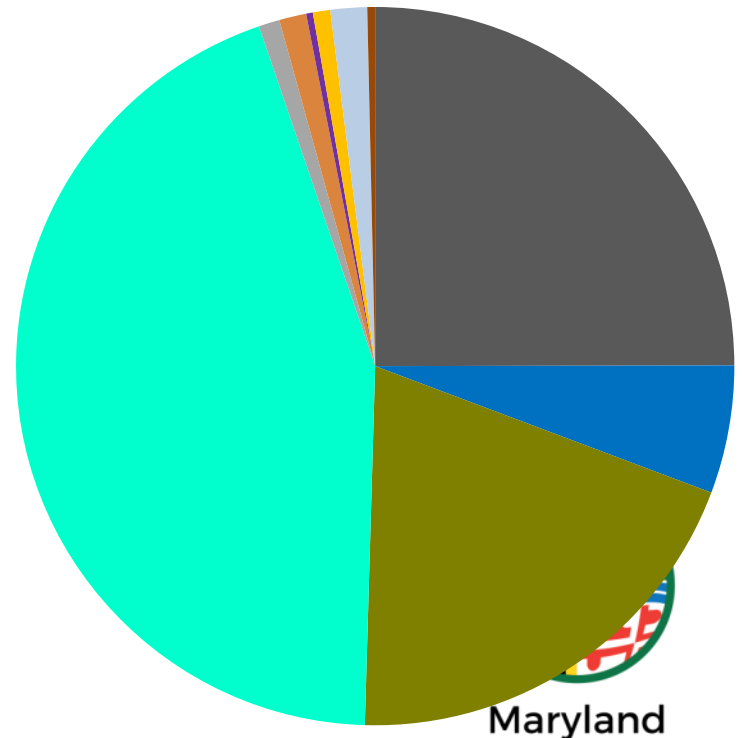
# MD & PA: 2017 Generation Mix

## Pennsylvania

## Maryland



- Coal
- Hydroelectric
- Natural gas
- Nuclear
- Other
- Other biomass
- Other gas
- Petroleum
- Solar
- Wind
- Wood

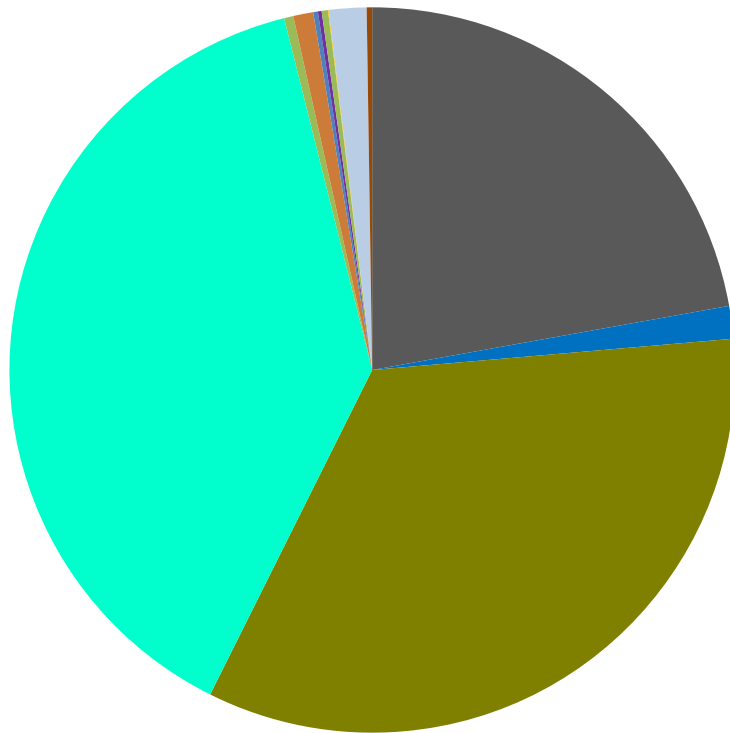


Not that different...

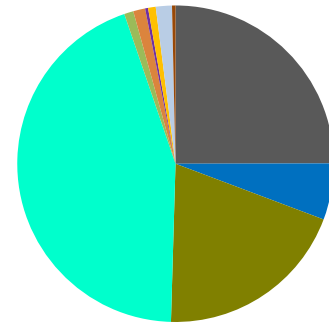
# MD & PA: 2017 Generation Mix

## Pennsylvania

## Maryland



213 TWh Total



34 TWh Total



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