

**Testimony on RGGI Modeling Assumptions**  
**Joint Hearing of the Senate Environmental Resources and Energy Committee and**  
**Community, Economic and Recreational Development Committee**

March 29, 2022

Matthew Knittel, Director, Independent Fiscal Office

Good morning Chairs and members of the committees. For my brief remarks, I will provide comments on the most recent assumptions used by the consultant to model the potential impact on Pennsylvania from joining the Regional Greenhouse Gas Initiative or RGGI. I will limit my comments to model assumptions, as I am not able to comment on the relative accuracy of projections or the reliability of the models used.

Regarding the assumptions, the first key issue is the **recent surge in auction prices** for RGGI allowances.

- The last two auction prices were **\$13.00** and **\$13.50**. (See page 2.)
- The most recent RGGI model had assumed a nominal price of **\$3.57** for 2022. At that price and an effective budget of 57.9 million allowances, annual gross proceeds would total **\$207 million**.
- At the current price of \$13.50, annual gross proceeds would be **\$781 million**. That figure is 3.8x higher.
- Conventional modeling assumes those costs would be pushed forward to final consumers. Based on the latest EIA data, one-third of that amount could be exported if generation did not change. The RGGI model had assumed that one-quarter was exported.
- If passed forward to consumers, the much higher auction price could impact demand and generation compared to what was assumed by the latest model.
- A May 2021 presentation by DEP computed higher monthly residential electricity bills of \$1.17 (no electric heat) to \$1.65 (electric heat) for 2022. Assuming the same methodology, the higher auction proceeds should raise bills by the same multiple noted (3.8x).
- In the Balanced Approach scenario, the model assumed that each new dollar of RGGI investment would leverage \$2.52 of private investment for energy efficiency (31% of proceeds) and renewables investment (32%). It is not known if that leverage ratio would hold if investments were 3 to 4 times higher.
- It should be noted that beginning in 2021, nearly all RGGI states are able to withhold up to 10% of allowances if prices fall below the Emission Containment Reserve (ECR) trigger price of \$6.42 in 2022. The trigger price increases by 7% per annum. Withheld allowances are not reoffered for sale.
- High inflation will also impact nominal auction prices, and it may have different implications for compliance entities versus investors. The inflation rate assumed by the model was not published but appears modest (~2% per annum) given other price data.
- Finally, the current high auction prices also impact the General Fund. If one-third of generation is exported, then gross receipts and sales and use taxes could increase by roughly **\$40 million** per annum.

Second, **generation** is higher and the mix is different than assumed by the model. (See page 3.)

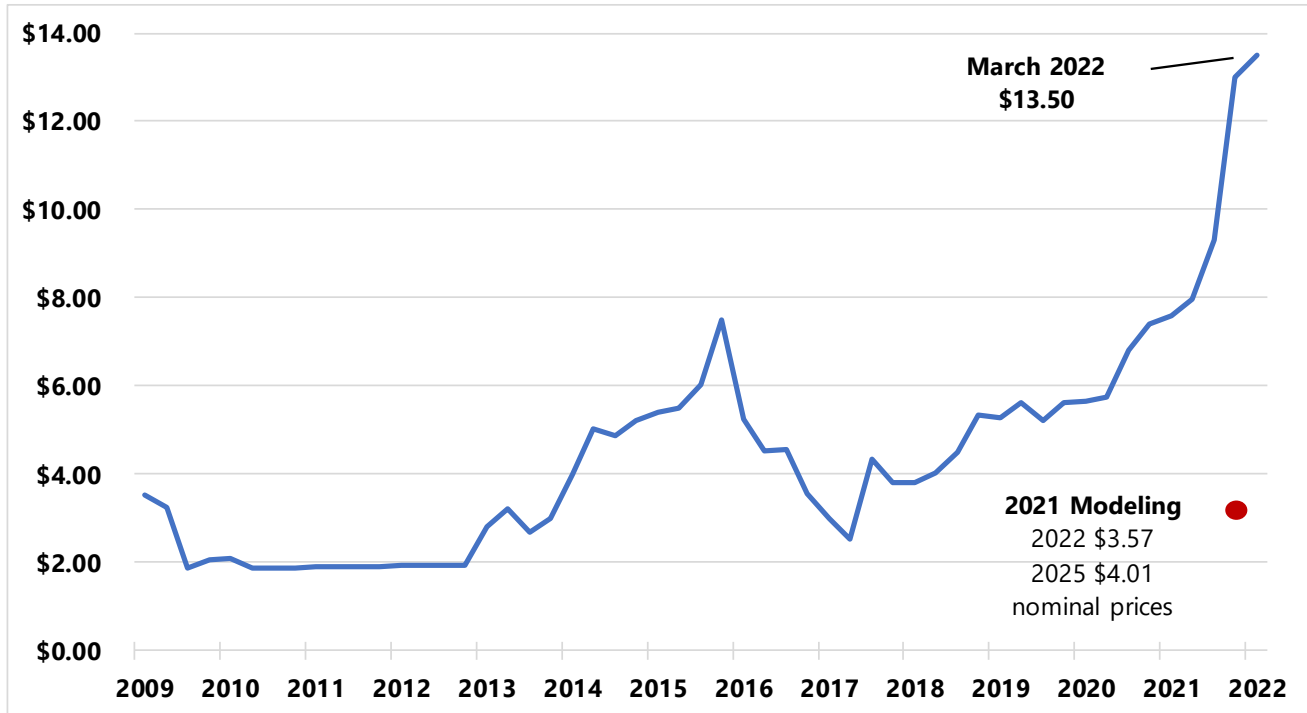
- The latest EIA data for 2021 show an increase in total generation, especially for natural gas and coal. The model reference case assumed flat total generation for 2022 with a material reduction for natural gas.
- For 2022, the difference between assumed and actual generation from natural gas could be ~16%.

Third, **natural gas prices** have diverged from model assumptions. (See page 3.)

- The model reference case assumed a Henry Hub price of \$3.27 per MMBtu for 2022.
- The latest price data for 2022 Q1 is \$4.78 (+46%).
- NYMEX futures are currently at \$5.00 for the rest of 2022 (+53%).

The final page of this submission displays historical data for net generation and CO2 emissions for the 10 original RGGI states (excludes Virginia which joined in 2021) and 4 adjacent non-RGGI states from 2008 to 2020. CO2 emissions fell dramatically across all states while net generation increased only for Pennsylvania and Virginia.

## RGGI Auction Market Clearing Prices



### RGGI auction prices much higher than assumed in the most recent February 2021 modeling.

- Market clearing prices were \$13.00 (Dec 2021) and \$13.50 (Mar 2022).
- The prices assumed for the model are \$3.57 (nominal price, price in 2017 dollars is \$3.24) for 2022, \$4.01 in 2025 and \$4.53 in 2028. (Source: 2021 Modeling Reference Case spreadsheet at DEP website).
- After set asides, the model assumes 57.9 million allowances would generate \$207 million. At latest auction price of \$13.50, same volume of allowances generates \$781 million (3.8x higher).

### The higher auction proceeds could have significant implications for other aspects of model.

- Costs are pushed forward. Higher prices could impact overall demand and in-state generation.
- Under the Balanced Approach scenario: 31% of net proceeds are invested in energy efficiency and 32% in renewable energy. Model assumes that every dollar of RGGI revenue invested would leverage \$2.52 of private investment. (Source: Pennsylvania RGGI Modeling Report, September 2020.) Model also assumes a 3.57 kwh savings per dollar of revenue spending on energy efficiency.
- Potential material impact on gross receipts tax (~\$33 million) and sales and use tax (~\$10 million, both assume one-third of generation exported).

## Net Generation Growth and Mix

|                             | Pennsylvania Net Generation (million MWh) |      |         |       |       | Consume | Net Exports |
|-----------------------------|---|------|---------|-------|-------|---------|-------------|
|                             | Nat. Gas                                  | Coal | Nuclear | Other | Total |         |             |
| <b>EIA Data</b>             |   |      |         |       |       |         |             |
| 2020                        | 120.8                                     | 23.4 | 76.5    | 9.4   | 230.1 | 151.8   | 78.3        |
| 2021                        | 127.3                                     | 29.3 | 75.9    | 9.1   | 241.6 | 156.2   | 85.5        |
| 2022                        | --  | --   | --      | --    | --    | --      | --          |
| <b>Model Reference Case</b> |   |      |         |       |       |         |             |
| 2020                        | 120.2                                     | 23.8 | 78.2    | 9.0   | 231.2 | 150.2   | 81.0        |
| 2021                        | --  | --   | --      | --    | --    | --      | --          |
| 2022                        | 111.3                                     | 32.7 | 78.2    | 10.0  | 232.2 | 150.2   | 82.0        |

Note: Consumption includes direct use consumption and line losses. Net Exports equal to Total less Consumption. In model reference case, nuclear includes miscellaneous other conventional.

Sources: U.S. Energy Information Administration and 2021 Modeling Reference Case spreadsheet from DEP website (see Generation page).

### Net Generation was higher in 2021 than assumed by RGGI modeling for 2022. The EIA projects that regional demand will grow by 0.4% in 2022.

- In near term, most of the increase in demand will likely be supplied by generators that use natural gas.
- Notable is the higher generation from natural gas in 2021 vs 2020. If natural gas generation grows by 1% in 2022, then the differential with model assumption will be ~16%.
- Modeling assumes that 25% of net generation exported. Latest data from EIA show export share is 35%.

## Natural Gas Prices

|                             | Natural Gas Prices (\$/MMBtu) |        |        |        |        |        |        |
|-----------------------------|-------------------------------|--------|--------|--------|--------|--------|--------|
|                             | 2020.3                        | 2020.4 | 2021.1 | 2021.2 | 2021.3 | 2021.4 | 2022.1 |
| <b>Henry Hub</b>            | \$1.95                        | \$2.47 | \$3.44 | \$2.88 | \$4.28 | \$4.74 | \$4.78 |
| % Change Prior Yr           | -16%                          | 6%     | 83%    | 75%    | 120%   | 92%    | 39%    |
| <b>Model Reference Case</b> |                               |        |        |        |        |        | \$3.27 |
| <b>Avg PA Hub (spot)</b>    | \$1.23                        | \$1.39 | \$2.53 | \$2.07 | \$3.54 | \$3.97 | \$3.89 |
| % Change Prior Yr           | -31%                          | -22%   | 64%    | 52%    | 187%   | 186%   | 54%    |

Source: Henry Hub and Avg. PA Hub prices are from Bentek Energy/Platts.

### The 2021 Model Reference Case assumed an average Henry Hub price of \$3.27 for 2022. For 2022 Q1, the average price was \$4.78 (+46% higher).

- NYMEX futures prices are at roughly \$5.00 for the remainder of the calendar year.
- Average PA hub spot price is average for Dominion South and Transco Leidy hubs.

## Generation and Emissions

|               | Net Generation (million MWh) |       |        | CO2 Emissions (million tons) |      |        |
|---------------|------------------------------|-------|--------|------------------------------|------|--------|
|               | 2008                         | 2020  | Change | 2008                         | 2020 | Change |
| 10-State RGGI | 386.0                        | 328.6 | -14.9% | 149.8                        | 79.6 | -46.9% |
| Pennsylvania  | 222.4                        | 230.1 | 3.5%   | 124.0                        | 72.3 | -41.7% |
| Ohio          | 153.4                        | 121.0 | -21.1% | 129.1                        | 67.2 | -47.9% |
| West Virginia | 91.1                         | 56.7  | -37.8% | 84.6                         | 49.5 | -41.5% |
| Virginia      | 72.7                         | 103.1 | 41.8%  | 41.4                         | 31.8 | -23.2% |

Note: 10-state RGGI includes New Jersey and excludes Virginia. Emissions in metric tons.

Source: U.S. Energy Information Administration.

**From 2008 to 2020, generation for the 10 original RGGI states declined 15% and CO2 emissions declined 47%.**

- For Pennsylvania, the respective figures are +3.5% and -42%. Emissions generally declined due to the transition from coal to natural gas generation.
- Other non-RGGI states recorded similar emission contractions. The exception is Virginia which recorded a substantial increase in generation and therefore a smaller reduction in emissions.