

**pennsylvania**

DEPARTMENT OF ENVIRONMENTAL PROTECTION



# **Draft Final-Form Rulemaking**

## **Chapter 145. Interstate Pollution Transport Reduction**

### **Subchapter E. CO<sub>2</sub> Budget Trading Program**

**Air Quality Technical Advisory Committee**  
**May 17, 2021**

Tom Wolf, Governor

Patrick McDonnell, Secretary

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# Power Sector Modeling- 2021 Update

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# 2021 Power Sector Modeling

**The Department completed updated power sector modeling to ensure use of the most recent laws, policy changes, inputs & assumptions.**

- **Power Sector Modeling**

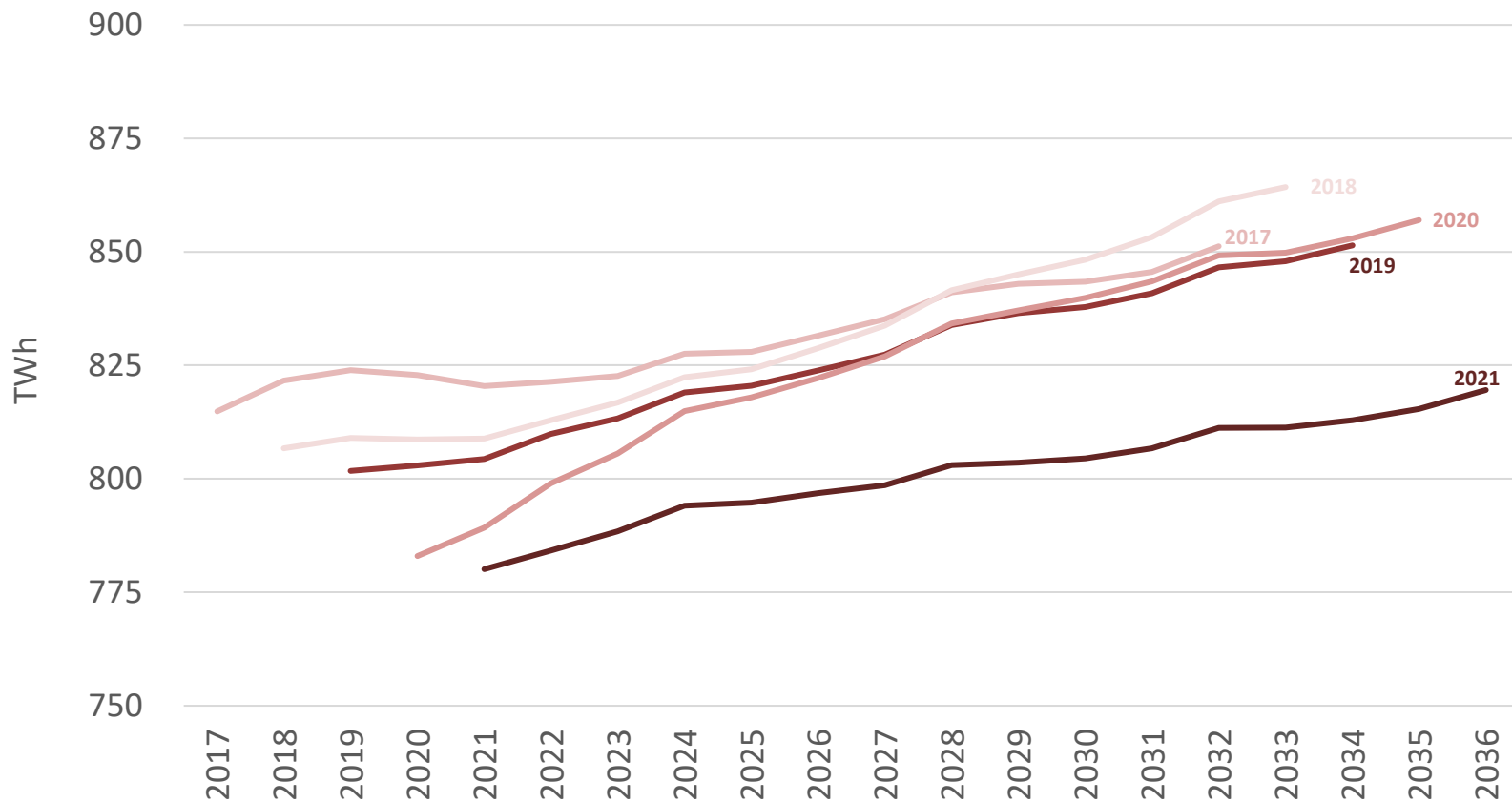
- Used same, advanced modeling software, Integrated Planning Model (IPM<sup>®</sup>), as original effort.
- Included updated data, assumptions, and inputs that reflect recent changes in power sector.
- Power sector modeling only, did not include economic modeling.
- Results include a reference case (without regulation) and a policy case (with regulation) going out to 2030.
- Results are publicly available on DEP RGGI webpage.

# Modeling: Revised Assumptions & Inputs

- Reference Case (Business-as-Usual)
  - Updated PJM Demand Forecast
  - 2021 AEO Natural Gas Prices
  - Updated capacity additions and retirements
  - Revisions to state laws & policies
  - Updated NREL technology costs
  - New in-state generation requirement- AEPS Tier II
- Policy Case (RGGI)- includes all updates above AND
  - Adjusted Waste Coal Set-Aside Amount
  - New CHP Set-Aside Amount

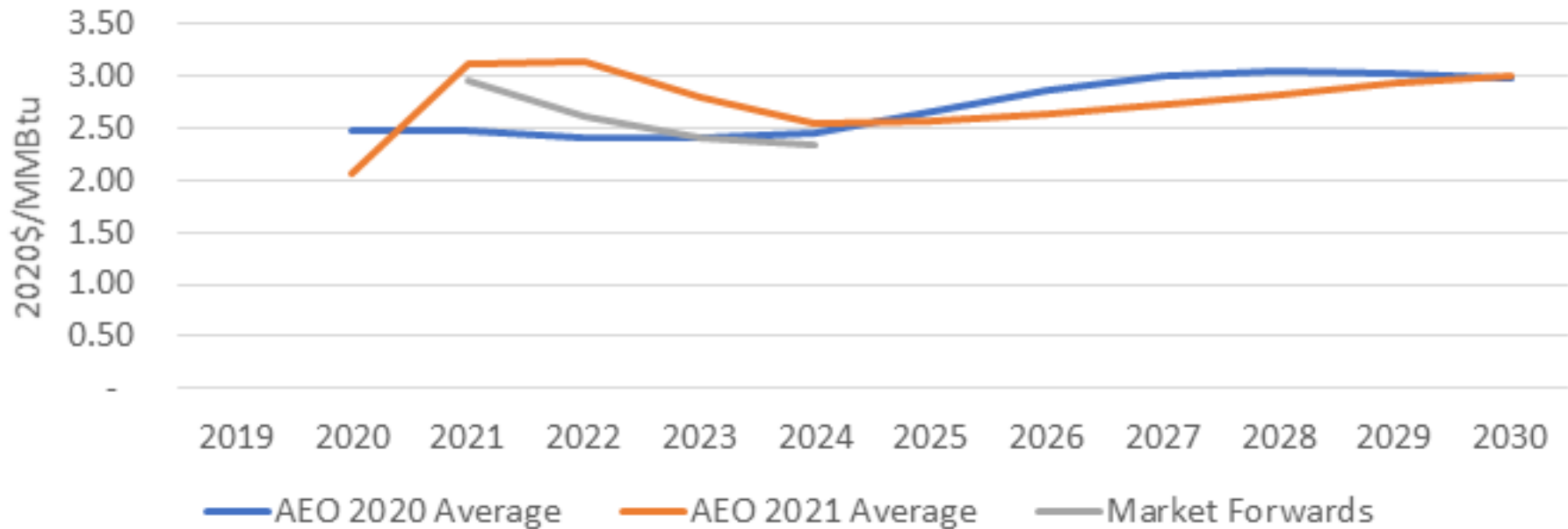
# Assumptions: Demand Forecast

Variability in PJM Demand Forecasts



# Assumptions: Natural Gas Prices

EIA AEO and Futures Henry Hub Gas Prices



# Assumptions: Firm Capacity Additions

Project Name	Capacity (MW)	Fuel Type
Shell Chemical	250	Natural Gas
Towanda	163	Natural Gas
Renovo Energy Center	1,240	Natural Gas
Hill Top Energy Center	620	Natural Gas
Robinson Power (Beech Hollow)	1,000	Natural Gas
Firm Natural Gas Capacity Additions --- 3,273 MW (+142 MW)		
Firm Solar Capacity Additions --- 719 MW (+468 MW)		
Firm Wind Capacity Additions --- 200 MW (+200MW)		
Firm Hydropower Capacity Additions --- 25 MW (+25MW)		
<b>Total Firm Capacity Additions 2021 --- 4,217 MW</b>		
<b>Total Firm Capacity Additions 2020 --- 3,382 MW</b>		

# 2021 Modeling Results Key Takeaways

- 1. Confirmed Starting Allowance Budget:** Original allowance budget confirmed at 78 million tons of CO<sub>2</sub>.
- 2. Significant Avoided Emissions through RGGI participation:** All modeling shows that PA would experience significant CO<sub>2</sub> reductions as a RGGI participating state.
- 3. Sharp Decline in Coal Generation by 2025:** Overall PA coal generation decreases significantly with or without RGGI participation.
- 4. Limited Impact on Natural Gas Generation:** Minor overall impact on natural gas generation with RGGI participation.
- 5. PA Remains a Leading Energy Exporter:** Updated modeling showing a smaller impact on exports due to RGGI participation.
- 6. Similar Minimal Impact on Electricity Prices Compared to Past Modeling:** PA's wholesale power prices are projected to be slightly higher in the policy case, as seen with the 2020 modeling. This does not account for future program investments, which can reduce prices.



# Key Takeaways: Allowance Budget

Original modeling, updated modeling scenarios, and actual PA 2020 emissions confirmed the validity of the proposed 78 million ton starting allowance budget.

<b>Modeling Scenario/Source</b>	<b>Short Tons CO<sub>2</sub></b>
Actual 2020 PA RGGI Covered Emissions	77,400,000
2022 Reference Case Emissions (2020)	78,000,000
2022 Reference Case Emissions (2021)	81,100,000
2022 Reference Case Emissions (2021 Gas Futures)	77,400,000

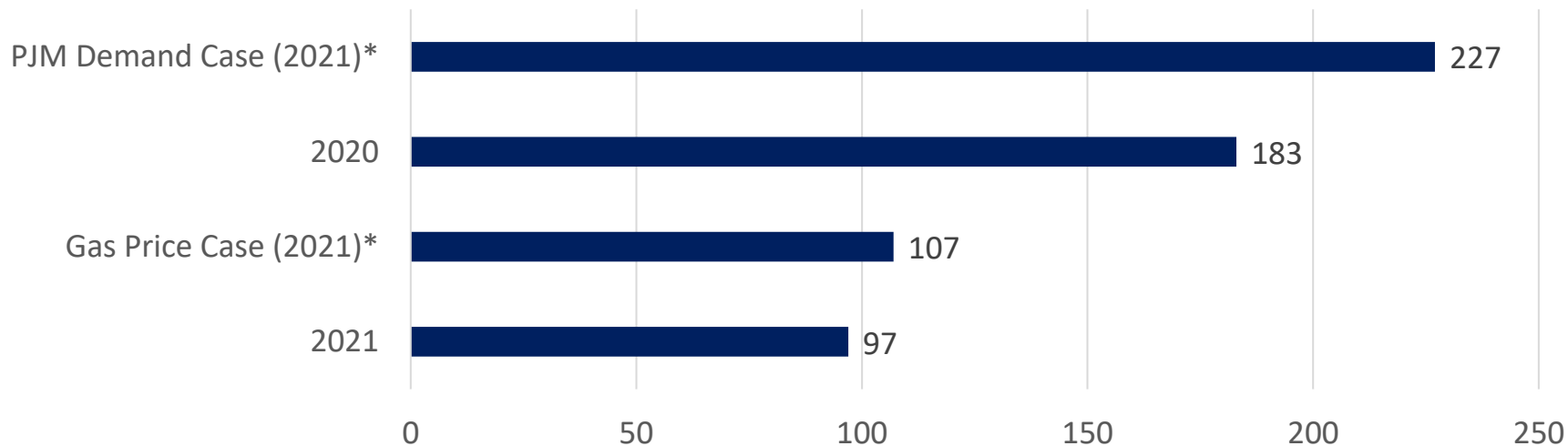
# Calculating CO<sub>2</sub> Allowance Budget

Year	Budget	Decline (Tonnage)	Annual Decline (Percentage)
2020			
2021			
2022	78,000,000		
2023	75,510,630	2,489,370	-3.19%
2024	73,021,260	2,489,370	-3.30%
2025	70,531,890	2,489,370	-3.41%
2026	68,042,520	2,489,370	-3.53%
2027	65,553,150	2,489,370	-3.66%
2028	63,063,780	2,489,370	-3.80%
2029	60,574,410	2,489,370	-3.95%
2030	58,085,040	2,489,370	-4.11%
<b>2022-2030 Total Reduction:</b>		<b>19,914,960</b>	<b>-25.532%</b>
<b>25.532% reduction from 2022:</b>	<b>58,085,040</b>		
<b>Total tonnage reduction:</b>	<b>19,914,960</b>		
<b>Annual tonnage reduction:</b>	<b>2,489,370</b>		

# Key Takeaways: PA Avoided Emissions

- All modeling confirms significant avoided CO<sub>2</sub> emissions for Pennsylvania resulting from RGGI participation— ranging from nearly 100 million to 225 millions tons reduced between now and 2030.
- Updated modeling results heavily impacted by Alternative Energy Portfolio Standards Act legislation relating to Tier II requirements, decreased regional electricity demand, and fluctuating natural gas prices.

Cumulative Avoided Emissions (million tons CO<sub>2</sub>) 2021-2030



*\*These avoided emissions results were based on the difference between a reference case and a policy case that were the same as the 2021 case, except with a different electricity demand or natural gas price assumption.*

# Benefits of CO<sub>2</sub> Reductions

**When power plants pollute less....**



- **CO<sub>2</sub> emissions decrease**
- **SO<sub>2</sub> emissions decrease**
- **NO<sub>x</sub> emissions decrease**

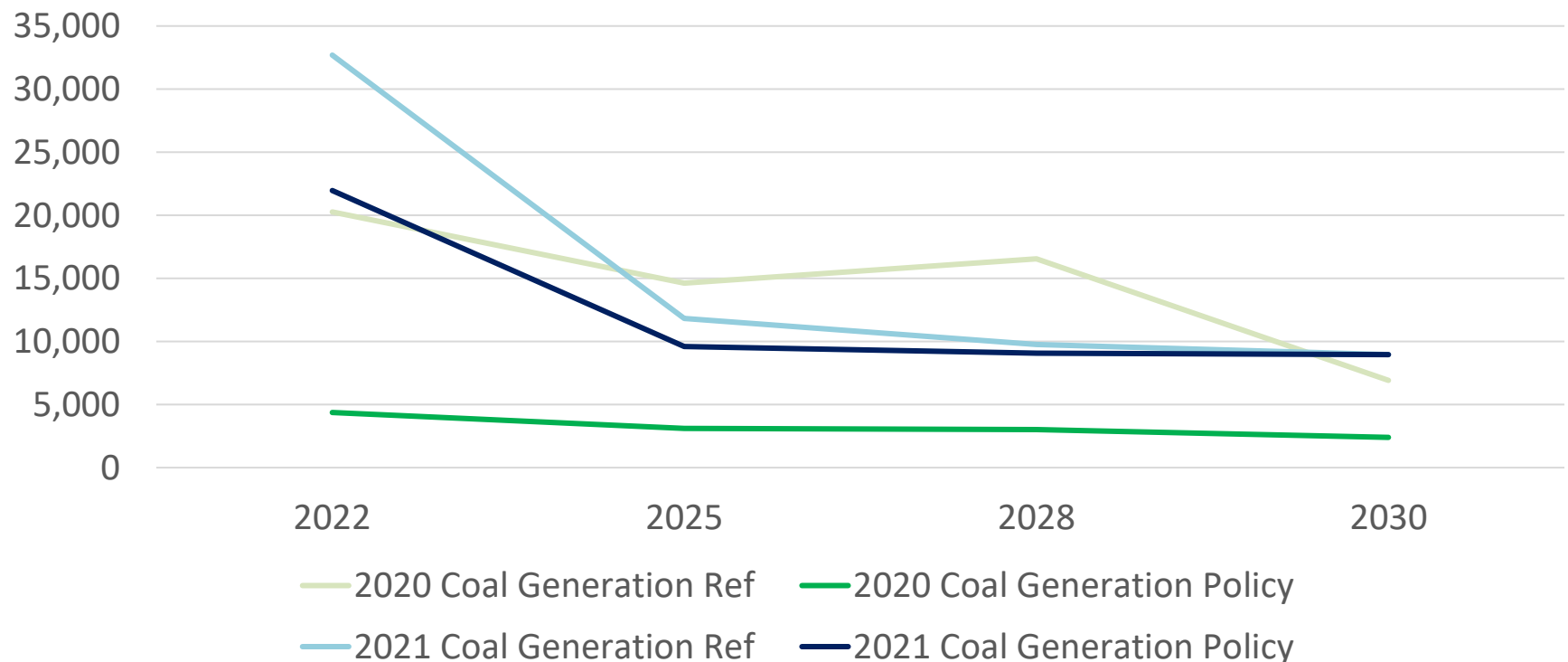
**Air and Water are Cleaner. People are Healthier.**

- **Reduced childhood asthma and respiratory disease**
- **More avoided hospital visits & premature deaths**
- **Less lost workdays**
- **Hundreds of millions in annual health savings for Pennsylvanians**

# Key Takeaways: Coal Generation

Without RGGI participation, PA coal generation declines rapidly – with limited facilities operating beyond 2025. Intervening AEPS legislation results in sustained coal generation even with RGGI participation leading to less realized emissions reductions.

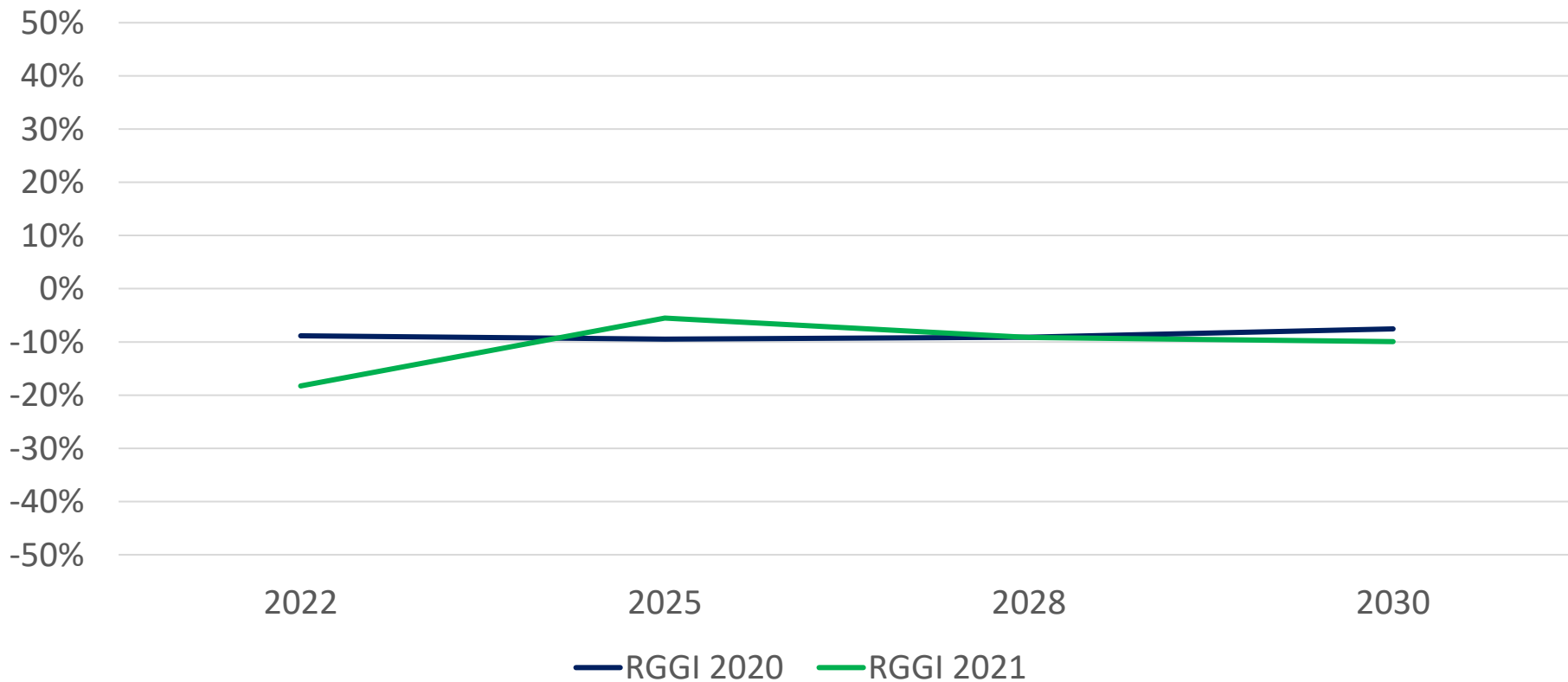
Coal Generation Comparison (MWh)



# Key Takeaways: Gas Generation

Previous modeling showed the impact of Pennsylvania joining RGGI had relatively minor effect on gas generation. That trend is confirmed in the updated modeling, with only a single digit projected decrease in total natural gas generation in most years.

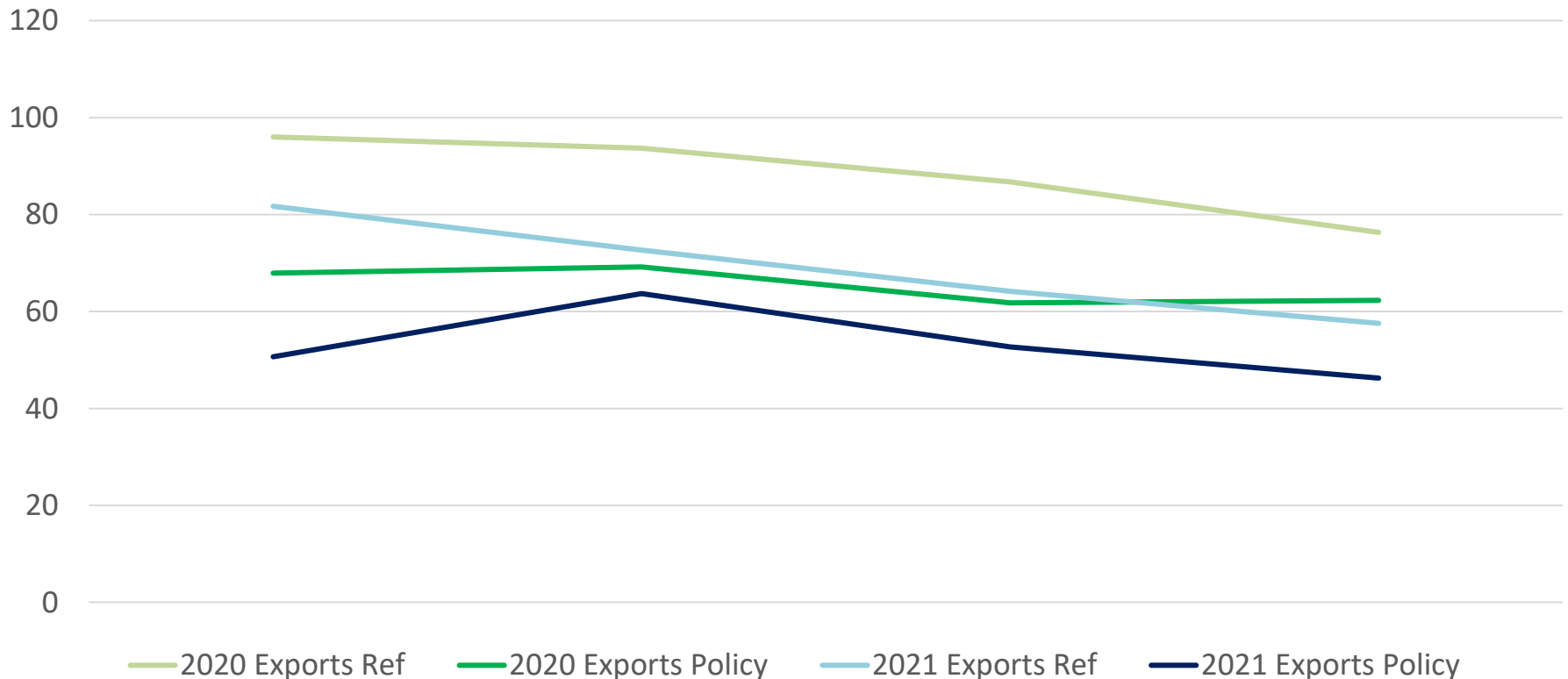
Impact of PA RGGI Participation on Gas Generation



# Key Takeaways: Electricity Exports

Pennsylvania continues to be a leading electricity exporter in all modeled cases. The updated assumptions in the 2021 modeling leads to overall less exports in both the reference and policy cases, with minimal impact on exports from PA participating in RGGI.

PA Electricity Exports Comparison Between Modeling Cases



# Key Takeaways: Electricity Price Changes

- **Wholesale power prices** (\$/MWh) are slightly higher with RGGI participation- though smaller than 2020 modeled price impacts.

	2022	2025	2028	2030
Reference Case	\$33.0	\$34.8	\$37.9	\$40.3
Policy Case (RGGI)	\$33.8	\$36.0	\$39.4	\$41.0
\$ Difference	+\$0.80 (2.42%)	+\$1.20 (3.45%)	+\$1.30 (3.96%)	+\$0.70 (1.73%)

- **Residential electricity bills** are slightly higher with RGGI participation- with bill impacts declining to just \$.84- \$1.19 per month by 2030.

RGGI Price Changes	2022	2025	2028	2030
Customer A: Heats w/ other fuel	+\$1.17	+\$1.67	+\$1.92	+0.84
Customer B: Heats w/ electric	+\$1.65	+\$2.36	+\$2.70	+\$1.19

\*Does not include anticipated electricity price decreases resulting from energy sector investments.



# Regulatory Changes from Proposed to Final

# Summary of Regulatory Changes

- Added Quarterly CO<sub>2</sub> Allowance Budgets for 2022 (§ 145.341)
- Made a slight modification to the Limited Exemption (§ 145.305)
- Expanded Cogeneration (now Combined Heat and Power) Set-Aside with Qualifiers (§ 145.342)
- Adjusted the amount of Waste Coal Set-Aside Allowances (§ 145.342)
- Refined and Clarified Strategic Use Set-Aside (§ 145.342)
- Added DEP Commitment to Annual Air Quality Impact Assessment (§ 145.306)
- Incorporated Equity Principles (preamble)

# NEW Quarterly CO<sub>2</sub> Allowance Budget § 145.341

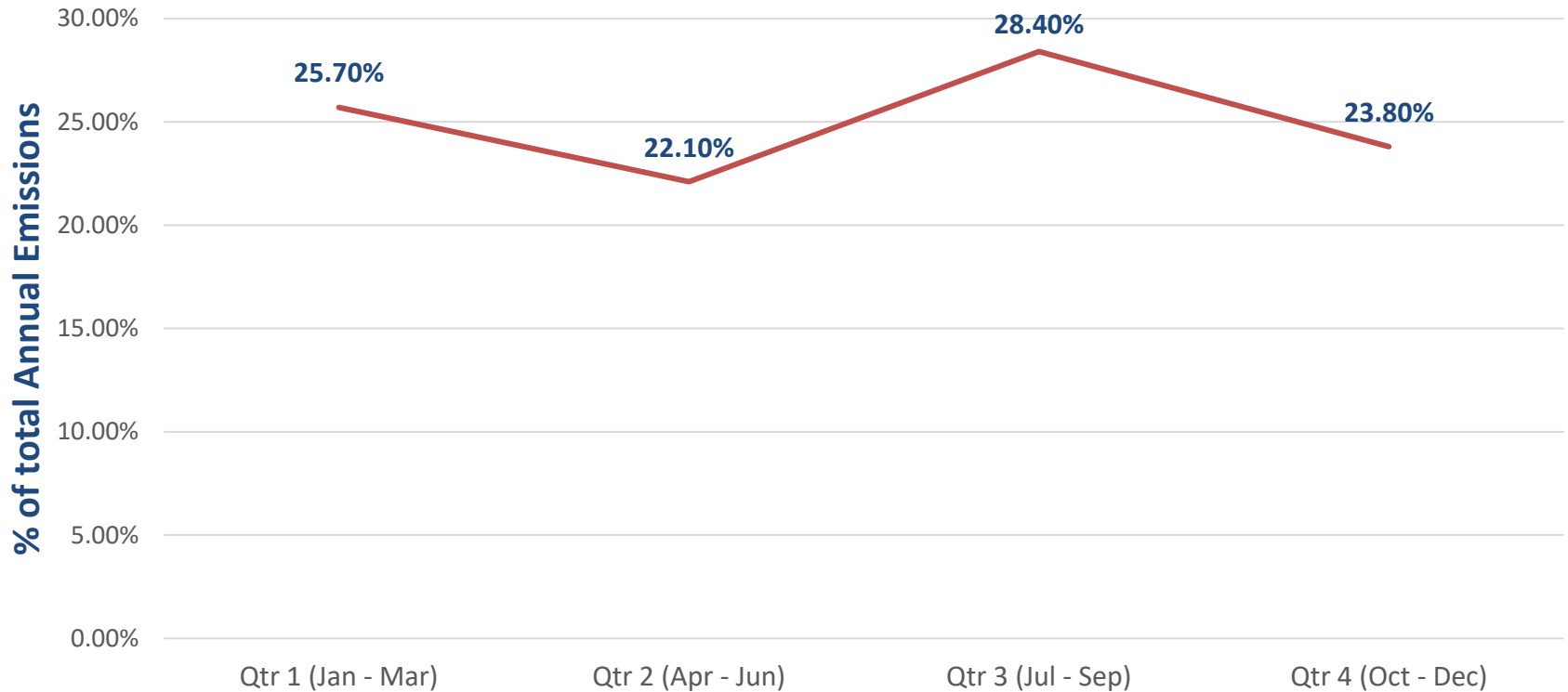
If Pennsylvania is a participating state on January 1, 2022, for 2022, the CO<sub>2</sub> Budget Trading Program base budget is 78,000,000 tons. If Pennsylvania is a participating state after January 1, 2022, then the CO<sub>2</sub> Budget Trading Program Base Budget for 2022 will be one of the following.

If PA is a participating state after:

- January 1, 2022, but before or on April 1, 2022, then the CO<sub>2</sub> Budget Trading Program Base Budget is 57,954,000 tons.
- April 1, 2022, but before or on July 1, 2022, then the CO<sub>2</sub> Budget Trading Program Base Budget is 40,716,000 tons.
- July 1, 2022, but before or on October 1, 2022, then the CO<sub>2</sub> Budget Trading Program Base Budget is 18,564,000 tons.

# 2022 Quarterly Emissions Calculation

## Average Annual Emissions by Quarter (2016- 2020)



## NEW Changes to the Limited Exemption § 145.305

- An otherwise applicable EGU (25 MW+) that supplies  $\leq 10\%$  of its annual gross generation to the electric grid.
- An otherwise applicable combined heat and power EGU (25 MW+) that supplies  $\leq 15\%$  of its annual total useful energy to any entity- not including energy sent to an interconnected **manufacturing industrial, institutional or commercial** facility.
- Required to have a permit issued by the Department containing a condition restricting the supply of the CO<sub>2</sub> budget unit's annual electrical output to the electric grid in order to qualify for the limited exemption.

# Combined Heat and Power Set-Aside Account

*A general account established by the Department for the allocation of CO<sub>2</sub> allowances in an amount sufficient to retire CO<sub>2</sub> allowances equal to the CO<sub>2</sub> emissions from Combined Heat and Power units under § 145.342(k).*

## **Set-Aside Eligibility Criteria for Applicable Facilities**

1. Units must be located in PA and be subject to the CO<sub>2</sub> Budget Trading Program.
2. Must meet definition of Combined Heat and Power (CHP) unit per § 145.302.
  - An electric-generating unit that simultaneously produces both electricity and useful thermal energy.
3. CHP unit may request retirement of CO<sub>2</sub> allowances equal to one of the following:
  - Total amount of CO<sub>2</sub> emitted as a result of providing useful thermal energy or electricity, or both, during the allocation year, OR
  - Partial amount of CO<sub>2</sub> emitted as a result of supplying useful thermal energy or electricity, or both, to an interconnected industrial, institutional or commercial facility during the allocation year.
4. Department will retire allowances for applicable CHP units.

# Waste Coal Set-Aside Account

*A general account established by the Department for the allocation of CO<sub>2</sub> allowances in an amount sufficient to provide CO<sub>2</sub> allowances equal to the legacy emissions from all waste coal-fired units under § 145.342(i).*

## Defining Legacy Emissions

1. The amount of CO<sub>2</sub> emissions in tons equal to the highest year of CO<sub>2</sub> emissions from a waste coal-fired unit during the 5-year period beginning January 1, 2015 through December 31, 2019 as determined by the Department. § 145.302
2. **Legacy emissions increased from 9,300,000 tons to 10,400,000 tons of CO<sub>2</sub> emissions. § 145.342**
  - a) **Colver waste coal facility has withdrawn its deactivation notice to PJM**
  - b) **Legacy emissions for Colver are 1.1 M tons CO<sub>2</sub>**
  - c) **9.3 Million (original value) + 1.1 Million = 10.4 M tons CO<sub>2</sub>**
3. Any undistributed allowances are transferred to the Strategic Use set-aside account each year.

# Strategic Use Set-Aside Account

*A general account established by the Department for the distribution of CO<sub>2</sub> allowances to **reduce greenhouse gas emissions through energy efficiency measures, renewable or noncarbon-emitting energy technologies, and greenhouse gas emissions abatement.** § 145.342(j)*

## Allocation to Eligible Projects

1. Department will allocate undistributed CO<sub>2</sub> allowances to the strategic use set-aside account for each allocation year from the waste coal set-aside account.
2. Distributions may be made from the set-aside account to eligible projects located in Pennsylvania that result in a **Greenhouse Gas emission reduction** benefit including:
  - a) **Implementation** of energy efficiency measures.
  - b) **Implementation of** renewable and non-carbon emitting energy technologies.
  - c) **Development** of innovative **greenhouse gas emission abatement technologies with significant greenhouse gas reduction potential.**
3. Established set-aside application process and requirements.
4. CO<sub>2</sub> allowances distributed upon completion of the eligible project which cannot be legally required.



# NEW Annual Air Quality Impact Assessment

*The Department of Environmental Protection is making an annual commitment to assess changes in emissions and air quality in Pennsylvania as it relates to implementation of this regulation. § 145.306*

- The Department will use the emissions measurements recorded and reported under Article III to determine whether areas of this Commonwealth have been disproportionately impacted by increased air pollution as a result of implementation of this subchapter.
- The Department will publish notice of the availability of a report of the emissions measurements and the determination in the *Pennsylvania Bulletin* on an annual basis to include at a minimum:
  - Baseline air emissions data from each CO<sub>2</sub> budget unit for the calendar year prior to the year Pennsylvania becomes a participating state.
  - Annual emissions measurements recorded and reported to the Department from each CO<sub>2</sub> budget unit.

# New RGGI Equity Principles

**Environmental justice** ensures fair treatment and meaningful involvement of all people in development of environmental laws, regulations and policies and embodies the principle that populations should not be disproportionately exposed to environmental impacts.

DEP has developed and prioritized for implementation, a set of **RGGI Equity Principles** whereby the Department in development of this rulemaking and associated investment framework commits to :

- Inclusively gathering and considering input from the public related to decisions made under RGGI.
- Protecting public health and welfare, mitigating any adverse impacts on human health, especially in EJ communities.
- Working equitably and with intentional consideration to distribute environmental and economic benefits of the proceeds of allowance auctions.



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# Compliance & Implementation

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# Compliance Requirements

1. Title V Permit Modifications
2. Establish CO<sub>2</sub> Allowance Tracking System (COATS) Account
3. Emissions Monitoring (EPA's Clean Air Market Division)
4. Recordkeeping & Reporting
5. Application for Allowances from Qualifying Set-Asides (optional)
6. Transfer of Required Allowances to Compliance Account
  - a) 50% during interim control periods
  - b) 100% at the close of the control period

**CO<sub>2</sub> Allowance Transfer Deadline:** *Midnight of March 1<sup>st</sup> is the deadline by which CO<sub>2</sub> allowances must be submitted for recordation in a CO<sub>2</sub> budget source's compliance account for the source to meet the CO<sub>2</sub> requirements of § 145.306(c).*

# Pennsylvania Compliance Timeline

## – 2022 – CO<sub>2</sub> Allowance Requirements Begin

January 1, 2022 or the 1st day of the next calendar quarter following publication of the final-form rulemaking, the CO<sub>2</sub> requirements start. Regulated facilities must obtain one CO<sub>2</sub> allowance for each ton of CO<sub>2</sub> emitted from this day onward.

## – 2023 – Interim Compliance

Midnight of March 1, 2023/CO<sub>2</sub> allowance transfer deadline. Eligible facilities must hold allowances equal to at least 50% of interim control period (2022) CO<sub>2</sub> emissions.

## – 2024 – Full Compliance

Midnight of March 1, 2024/CO<sub>2</sub> allowance transfer deadline. Eligible facilities must hold allowances equal to 100% of control period (2022 and 2023) CO<sub>2</sub> emissions.

# Regulatory Review

*If the Department determines that changes to the regulation are needed after implementation, the rulemaking would be amended through the regulatory process.*

## **Regional Greenhouse Gas Initiative Program Review**

- The RGGI participating states conduct periodic program reviews to consider program successes, impacts and design elements- two have been completed since 2009.
- Program review evaluates the RGGI Model Rule, the multistate auction process and emissions reduction targets, and other key policy considerations.
- The next program review is scheduled to commence later this year and will evaluate energy trends, emerging energy issues, and other program elements.
- The review includes extensive regional stakeholder engagement involving the regulated community, environmental groups, consumer and industry advocates, etc.
- Based on stakeholder input and feedback, RGGI states will develop program review objectives and embark upon policy deliberations and technical analyses in 2022.

# Anticipated Rulemaking Schedule

## Consultation with Department Advisory Committees

- Air Quality Technical Advisory Committee – May 17, 2021
- Citizens Advisory Council – May 19, 2021
- Small Business Compliance Advisory Committee – May 19, 2021
- Environmental Justice Advisory Board – May 20, 2021

## Environmental Quality Board Considers Final Rulemaking

- Anticipated Third Quarter 2021 (July- September)

## Final-Form Rulemaking Promulgated

- Anticipated Fourth Quarter 2021 (October – December)  
publication in the *Pennsylvania Bulletin*.

# Questions & Answers







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DEPARTMENT OF ENVIRONMENTAL PROTECTION



**Allen Landis, [alllandis@pa.gov](mailto:alllandis@pa.gov)**  
**Krishnan Ramamurthy, [kramamurth@pa.gov](mailto:kramamurth@pa.gov)**  
**Jennie Demjanick, [jdemjanick@pa.gov](mailto:jdemjanick@pa.gov)**

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Email staff with additional questions @  
[ra-epclimate@pa.gov](mailto:ra-epclimate@pa.gov)