PHILADELPHIA GAS WORKS (PGW)

Low Carbon Pathways Study

COMMUNITY ENGAGEMENT MEETING NO. 2

AUGUST 12, 2026

Sustainability is our business

Context and Study Overview

The objective of PGW's Low Carbon Pathways study is to assess a variety of long-term decarbonization pathways balancing safety, affordability, reliability, and sustainability for PGW customers.

What is a Pathways Study?

Four steps of a low carbon pathways study:

1. **Where are we today?**
   Understand current GHG emissions sources and how energy is used
2. **Where are we headed?**
   Evaluate the impact of existing programs and demand trends on future emissions
3. **What can we do?**
   Identify solutions to meet long-term goals/analyze emissions reduction impacts
4. **What's next?**
   Evaluate the results to help plan a clean, safe, affordable, and reliable energy future

Low Carbon Pathway Scenarios

Reference
Baseline scenario of existing gas network and emission-reduction programs.

Full Electrification
Greater deployment of electric space heating, cooking, drying, and water heating. Shifts energy demand from natural gas to electric. Low-carbon fuels play lesser role.

Hybrid
Explores primarily hybrid space heating and cooling (electric and gas) and gas heat pumps. Leverages the gas and electric systems. Low-carbon fuels support.

*The goal of this study is not to identify a preferred pathway, but rather to **explore a range of viable options** as representative examples for comparison, and **to establish a foundation for future decision making.***

Takeaways and Follow-ups from June 3rd Stakeholder Meeting

The June 3rd stakeholder meeting provided a comprehensive overview of PGW's approach to the low carbon pathways modelling process, key energy innovation technologies, and an open listening session to hear public feedback.

Approach

PGW's study will analyze several long-term emission reduction pathways to reduce Philadelphia GHG emissions, and will include:

- A range of leading decarbonization opportunities
- Emissions reductions
- Total system costs and cost-effectiveness
- PGW customer impacts including rates and adoption potentials

Emissions

- The pathways will be structured around supporting the City's 2050 carbon neutrality goal
- The study quantifies upstream and downstream emissions throughout full energy value chains
- The study will rely on credible, 3rd-party analyses, including EPA GHG protocols and US Energy Information Administration (EIA) modeling

Affordability

- The study will show total costs for each pathways, and will demonstrate customer rate impacts
- Understanding and ensuring customer affordability was one of the major themes raised by community attendees at the June 3rd meeting and subsequent written comments

Technologies

- The study includes a wide range of technologies: energy efficiency, electrification, lower carbon fuels, carbon capture and storage, and thermal energy networks, among others
- Weatherization and energy efficiency were raised as priorities by several community members, and are in all scenarios as primary solutions

Engagement

- PGW accepted public comments for two weeks following the June 3rd Stakeholder Meeting. Written comments are posted on PGW's website.
- PGW also posted a Questions & Answers document.
- PGW will accept and post written comments after the August 12th meeting, and will continue to share project materials on the pgworks website going forward

Pathway Drivers and Key Assumptions

PGW's Low Carbon Pathways Study evaluates the emissions and costs associated with the adoption of various energy transition technologies. The model included the following drivers and key assumptions:

Energy Demand

*The Low Carbon Pathways Study projects **natural gas usage**, **electricity consumption**, and **alternative fuel consumption** across all scenarios.*

The study also accounts for energy demand reductions from weatherization and energy efficiency.

Technology Efficiency

Conventional gas technology efficiency increases over time from 80% to 95%.

Electrified heating technology ranges from 310% for residential air source heat pumps to 360% for ground source.

Electric non-heat efficiency is assumed to be 210%.

Transition Costs

The model includes costs for:

- *Technology conversions*
- *Equipment maintenance*
- *Energy commodity and delivery*
- *Weatherization*
- *Gas system revenue requirement*
- *Electric system transmission, distribution (T&D), and generation.*

Emissions & Reductions

The study evaluates emissions from:

- *Downstream gas consumption*
- *Upstream gas system*
- *Electricity use*
- *Low carbon fuel blending.*

Emissions reductions are calculated for efficiency upgrades and weatherization.

Peak Electric Demand

The costs to the electricity grid from electrification are comprised of:

- *Transmission & Distribution costs for all incremental peak demand.*
- *Capacity costs for all incremental peak demand exceeding system surplus.*

PGW Data – Energy Demand

All modelled scenarios are underpinned by a baseline projection of PGW customers and their energy demand through 2050.

Methodology

Data Inputs from PGW

PGW historical data and near-term forecast of customer counts and natural gas consumption by customer class.

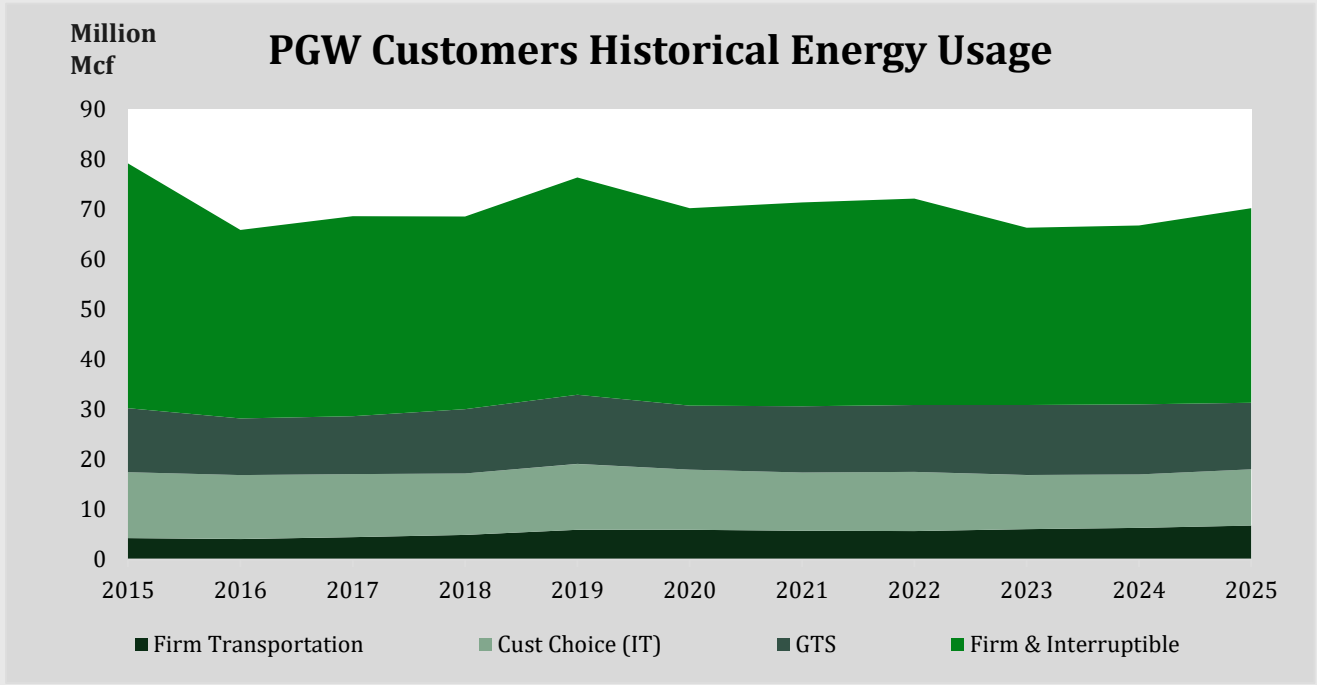
Analyze & Future Projections

A long-term forecast of customer counts and natural gas consumption is generated by extending PGW's near-term forecast.

Input into Pathways

The baseline forecast determines the costs and emissions of the Reference Case and the total equipment stock underpinning all scenarios.

Graphic Example



Annual Energy Outlook – Energy Sources & Emissions

The Annual Energy Outlook (AEO) is a comprehensive projection of the U.S. energy system generated by the U.S. Energy Information Administration (EIA) that considers various policy and regulatory scenarios.

Methodology

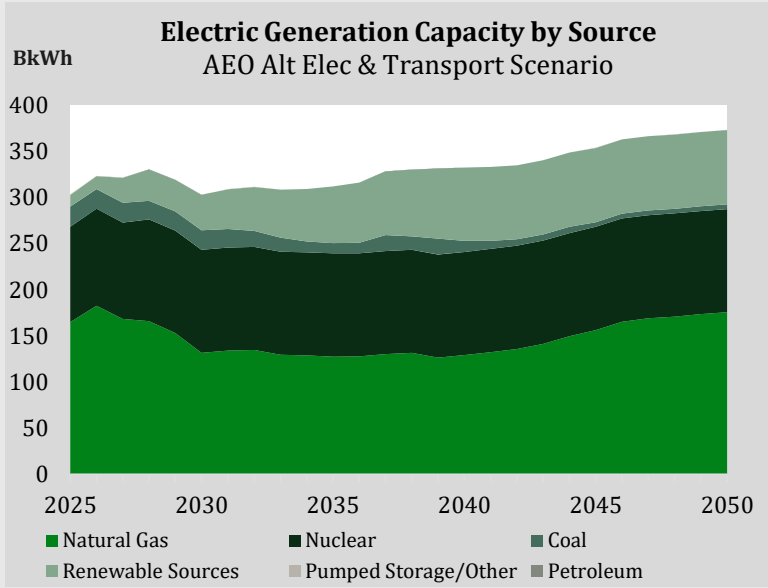
Obtained Data from AEO

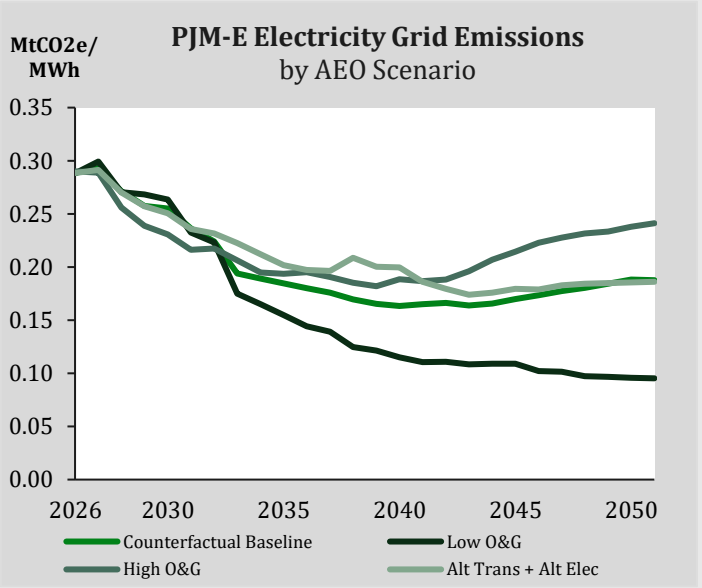
- *Electric generation sources forecasts*
- *Henry Hub Natural Gas Prices*
- *PJM-E Electricity Prices (Wholesale + Retail)*
- *PJM-E Electricity Emissions*
- *Hydrogen Spot Prices*

Input into Pathways

- *PJM-E electricity prices and emissions are used directly in the model.*
- *Hydrogen spot prices are used directly in the model.*
- *Henry Hub natural gas price trajectory is applied to PGW reported FY25 natural gas commodity price*

Graphic Example





Source: U.S EIA Annual Energy Outlook 2026

PJM and PA PUC – Electric System Impacts

Heating and non-heating electrification incur additional costs to the grid, modelled as transmission and distribution (T&D) infrastructure and capacity costs.

Methodology

Obtained Data

PJM-E Net CONE Updates, Aug 2025
PA PUC Avoided Costs of Transmissions and Distribution Study, 2024

Input into Pathways

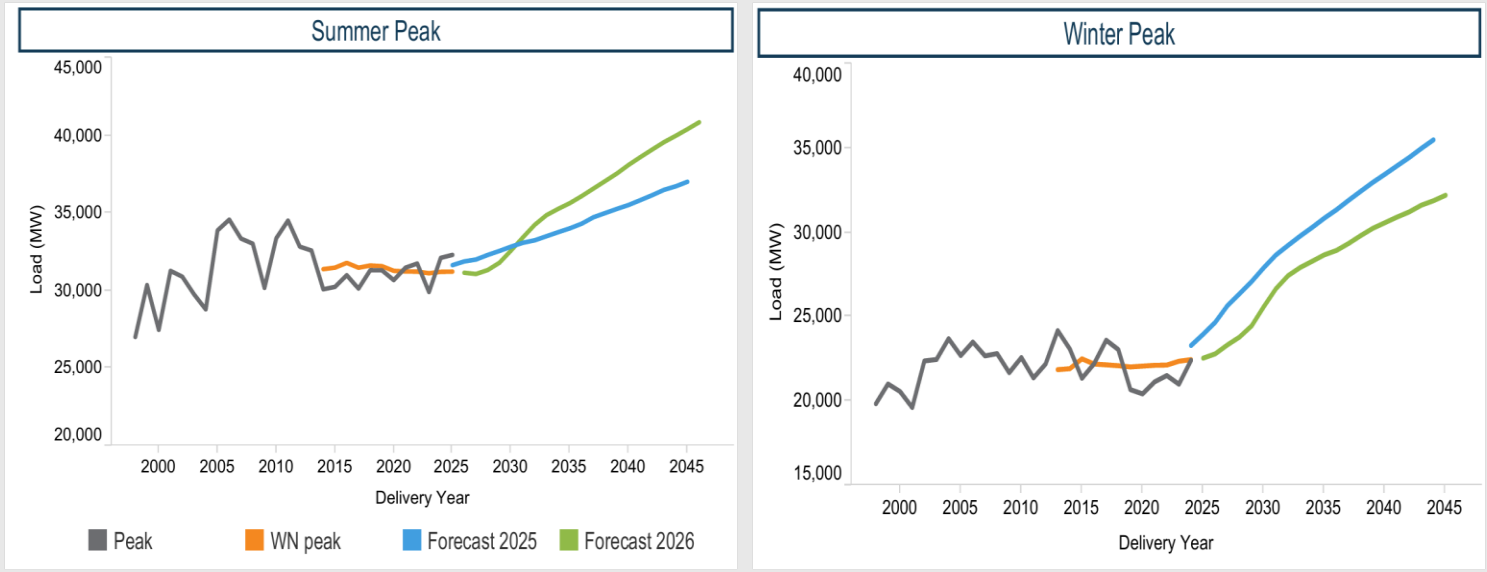
T&D costs

Additional Work

New-build capacity is assumed to be Gas Combustion Turbines (lowest cost). Future iterations could consider renewable generators.

Graphic Example

PJM East Summer and Winter Peak



Source: PJM Load Forecast Report 2026

US EIA – Costs

The Low Carbon Pathways Study evaluated annualized capital expenditures and maintenance costs for existing customer equipment replaced or retrofitted with low carbon technologies.

Inputs and Assumptions

Obtained Data

U.S EIA Buildings Sector Appliance and Equipment Costs and Efficiencies
PGW program data and peer utility project data

Analyze & Future Projections

Annualized capital and maintenance costs are modeled and adjusted over time based on existing data suggestions for each scenario.

Input into Pathways

Equipment conversion drives electric system and commodity costs, which are key cost profile differentiators for each scenario.

Graphic Example

Residential Air-Source Heat Pumps — **Final**

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DATA	2015	2020	2022				2023				2030		2040		2050	
	Installed Base	Installed Base	Current Standard	Typical	ENERGY STAR V. 5.0	High	New Standard	ENERGY STAR V. 6.1	ENERGY STAR Cold Climate Criteria	High[4]	Typical	High	Typical	High	Typical	High
Typical Capacity (kBtu/h)	36	36	36	36	36	36	36	36	36	36	36	36	36	36	36	36
SEER (Cooling)[1]	13.1	15.3	14.0	15.3	15.0	22.6	15.0	16.0	NA	22.6	16.0	22.6	16.5	22.6	17.0	22.6
SEER2[2]	12.4	14.5	NA	14.5	NA	21.5	14.3	15.2	15.2	21.5	15.2	21.5	15.7	21.5	16.2	21.5
HSPF (Heating)[1]	7.9	8.6	8.2	8.6	8.5	12.4	8.8	9.2	NA	12.4	9.2	12.4	9.3	12.4	9.3	12.4
HSPF2[2]	6.7	7.3	NA	7.3	NA	10.6	7.5	7.8	8.1	10.6	7.8	10.6	7.9	10.6	7.9	10.6
Average Life (y)	15.3	15.3	15.3	15.3	15.3	15.3	15.3	15.3	15.3	15.3	15.3	15.3	15.3	15.3	15.3	15.3
Retail Equipment Cost (2022$)[1]	3,290	4,270	3,970	4,270	4,110	6,740	4,110	4,380	4,380	6,740	4,380	6,740	5,000	6,740	5,100	6,740
Total Installed Cost (2022$)[1]	5,790	6,880	6,730	6,880	6,810	8,620	6,810	6,940	6,940	8,620	6,940	8,620	7,240	8,620	7,330	8,620
Annual Maintenance Cost (2022$)[3]	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20
	150	150	150	150	150	150	150	150	150	150	150	150	150	150	150	150

Source: U.S EIA Buildings Sector Appliance and Equipment Costs and Efficiencies: Appendix A – Technology Forecast Updates – Residential and Commercial Building Technologies – Reference Case

AGF and AEO - Alternative Fuel Mix and Costs

As cleaner fuel options become available, renewable natural gas and hydrogen may be incorporated into PGW's system, helping lower emissions while continuing to use existing pipeline infrastructure.

Inputs and Assumptions

Obtained Data

American Gas Foundation Renewable Natural Gas Supply Assessment 2025
2026 Annual Energy Outlook – Hydrogen Spot Prices

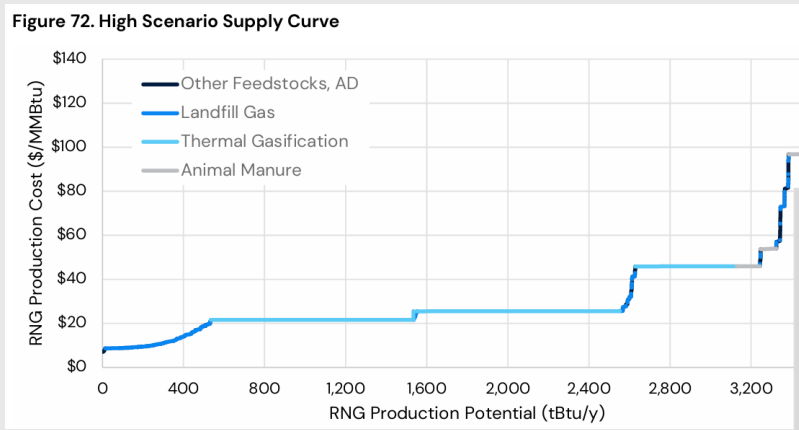
Analyze & Future Projections

Projected RNG and hydrogen pipeline blend rates increase overtime, and RNG costs depend on regional RNG demand and RNG stack

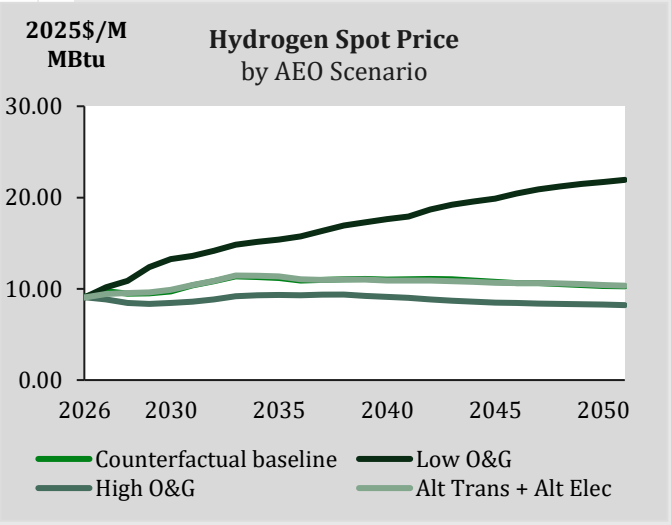
Input into Pathways

Low carbon fuel blending has a more significant emissions impact for the hybrid scenario, which retains some fuel demand for hybrid heating units.

Graphic Example



Source: AGF 2025 RNG Supply Assessment



Source: U.S EIA 2026 Annual Energy Outlook

Project Timeline

The Low Carbon Pathways Study is currently in the model development phase. The final report will be completed in Fall 2026 and shared with the public on PGW's website.

Baseline Assessment → **Design Pathways** → **Develop Low Carbon Pathways Model**

Winter 2025

Spring 2026

The project team will **continue to develop and refine the Low Carbon Pathways model** with stakeholder feedback.

Spring – Summer 2026

Final Report Published

Fall 2026

June 3rd — **Community Engagement Meeting #1**

August 12th — **Community Engagement Meeting #2**

August 26th — **Written comments due**