CY2022 SCOPE 3 GREENHOUSE GAS EMISSIONS INVENTORY REPORT

Philadelphia Gas Works

Prepared By:

TRINITY CONSULTANTS
211 Welsh Pool Road
Suite 238
Exton, PA 19342
610-280-3902

October 2023

Project 236001.0002

1. INTRODUCTION

Philadelphia Gas Works (PGW) is the largest municipally-owned gas utility in the U.S. PGW manages and maintains a system of over 6,000 miles of gas mains and service pipes that deliver an annual 78 billion cubic feet of safe, reliable natural gas to 500,000 customers each year.

In 2023, PGW initiated a project to develop a comprehensive Scope 3 emissions inventory based on CY 2022 activity data. The inventory was developed in conformance with the WRI/WBCSD Corporate Value Chain Protocol[1] (Scope 3 Protocol). This inventory report provides a description of PGW's assessment of relevant Scope 3 emissions categories, documentation of data collection activities and calculation methodologies for relevant Scope 3 categories, and a summary of PGW's CY2022 Scope 3 GHG inventory (see Table 1 below). More details and the actual calculations are provided in "PGW GHG Scope 3 Calculations" Microsoft Excel™ spreadsheet calculation tool developed by Trinity Consultants (Appendix A).

Table 1-1. CY2022 PGW Scope 3 GHG Emissions Summary

Emission Source Type	Total CO_2e (Metric Tons)	Percent Total CO_2e Emissions
Scope 3 Emissions Category		
Category 1 – Purchased Goods and Services	1,132,837	21.98%
Category 2 – Capital Goods	10,384	0.20%
Category 3 – Fuel & Energy Related Activities	3,516	0.07%
Category 5 – Waste Generated in Operations	1,026	0.02%
Category 7 – Employee Commuting	2,079	0.04%
Category 11 – Use of Sold Products	4,003,490	77.69%
Total Scope 3 GHG Emissions	**5,153,333**	**100%**

[1] https://ghgprotocol.org/sites/default/files/standards/Corporate-Value-Chain-Accounting-Reporing-Standard_041613_2.pdf

2. SCOPE 3 MATERIALITY ASSESSMENT

The Scope 3 Protocol lists 15 categories of potential interest, eight upstream and seven downstream. The Scope 3 Protocol provides the following criteria for determining the relevance of Scope 3 categories:

- **Size** – contributes significantly to the company's total anticipated Scope 3 emissions profile
- **Influence** – potential emission reductions for this category could be undertaken or influenced
- **Risk** – contributes to the company's risk profile
- **Stakeholders** – deemed critical by stakeholders (e.g., customers, suppliers, investors, or civil society)
- **Outsourcing** – activities that were previously performed in-house or are by other similar companies in the sector
- **Sector guidance** – identified as significant by sector-specific guidance
- **Other** – meet additional criteria for determining relevance developed by the company or sector

Peer benchmarking was conducted to provide insight regarding which Scope 3 categories are considered relevant by other companies in the natural gas distribution sector and/or by their stakeholders.

2.1 Peer Benchmarking Materiality Findings

Public disclosures by PGW's peers, People's Natural Gas/Essential Utilities, Public Service Enterprise Group (PSEG) and Duke Energy, were reviewed to assess the relevance of Scope 3 categories for PGW. Each of these peers have quantified and disclosed Scope 3 emissions. Table 2 below qualitatively summarizes the reported Scope 3 GHG emission categories reported by each peer company and indicates the three most significant categories for those reported. The unreported categories as noted in Table 1 were considered not relevant and immaterial by the respective company.

Based on the qualitative data summarized in Table 1, Categories 1, 3, 5, 7, and 11 are considered material for all three benchmarked peers. Categories 2, 4, 6, 10 are considered material for at least one of the benchmarked peers. Categories 8, 9, 12, 13, 14, and 15 are not considered material for any of the benchmarked peers. It should be noted that the scope of operations of each of these peers extends beyond the natural gas utility operations of PGW. For instance, Essential Utilities comprehensively reports GHG emissions related to both their water and wastewater operations and natural gas operations, and PSEG and Duke Energy comprehensively report GHG emissions related to both their electric and natural gas service operations. Therefore, it is likely that in some instances a Scope 3 emission source category may be more significant due to operations outside the scope of PGW's natural gas operations.

Table 2-1. Peer Benchmarking Reported Scope 3 Categories

Scope 3 Category Number	Scope 3 Category	People's Natural Gas/Essential Utilities	Public Service Enterprise Group	Duke Energy
1	Purchased goods and services	✓ (#3)	✓	✓ (#3)
2	Capital goods	✓ (#2)	✓ (#3)	NR
3	Fuel- and energy-related activities (not included in Scope 1 or Scope 2)	✓	✓ (#2)	✓ (#1)
4	Upstream transportation and distribution[a]	NR	✓	NR
5	Waste generated in operations	✓	✓	✓
6	Business travel	NR	✓	✓
7	Employee commuting	✓	✓	✓
8	Upstream leased assets	NR	NE	NR
9	Downstream transportation and distribution	NR	NR	NR
10	Processing of sold products	NR	NR	✓
11	Use of sold products	✓ (#1)	✓ (#1)	✓ (#2)
12	End-of-life treatment of sold products	NR	NR	NR
13	Downstream leased assets	NR	NE	NR
14	Franchises	NR	NR	NR
15	Investments	NR	NR	NR

✓ = Reported, NR = Not Relevant, NE= Not Evaluated

[a] PSEG CDP report indicates, "Emissions from upstream transportation and distribution are less than the 1% threshold of total Scope 3 emissions, and are therefore not considered relevant. ", however they were noted as "not relevant, calculated" and a spend-based approach was used to calculate them.

2.2 Sector Guidance

In addition to peer benchmarking, the IPIECA/API Scope 3 Guidance provides the following insight with respect to Scope 3 materiality for the oil and gas industry sector:[2]

- **Category 1**: Purchased Goods and Services emissions are generally more material for companies with downstream operations, such as retailers, that do not produce their own oil and gas products, therefore at least a screening evaluation of Category 1 emissions is recommended in order to confirm materiality by size at a company-specific level.
- **Category 2**: Capital Goods emissions are only likely to be material in any given year for oil and gas companies if significant capital equipment purchases occurred in the reporting year.
- **Category 3:** Fuel & Energy-Related Activities emissions may be more significant for companies that are energy-intensive and purchase their energy rather than consuming energy that is predominantly produced themselves. Accordingly, at least a screening evaluation of Category 3 emission is recommended to confirm materiality by size at a company-specific level.
- **Category 4:** Upstream Transportation & Distribution emissions are often small when transportation and distribution emissions are captured in Scope 1 reporting. However, pipeline transport for operations such as natural gas distribution may be particularly relevant to this category's emissions. At least a screening

[2] https://www.ipieca.org/resources/good-practice/estimating-petroleum-industry-value-chain-scope-3-greenhouse-gas-emissions-overview-of-methodologies/

evaluation of Category 4 emission is recommended to confirm materiality by size at a company-specific level.

- **Category 5:** Waste Generated in Operations emissions are relatively minimal, however, due to stakeholder input and interest, many companies consider waste emissions to be material.
- **Category 6:** Business Travel emissions are often a minimal Scope 3 emissions source for the natural gas distribution sector.
- **Category 7:** Employee Commuting emissions are often a minimal Scope 3 emissions source for the natural gas distribution sector.
- **Category 8:** Upstream Leased Assets emissions are not commonly reported nor considered material.
- **Category 9:** Downstream Transportation & Distribution emissions are not material for the natural gas distribution sector when they are accounted for under Scope 1.
- **Category 10:** Processing of Sold Products emissions can be material for Scope 3 depending on a company's location in the value chain, however materiality due to the processing of sold products is more applicable to upstream companies.
- **Category 11:** Use of Sold Products emissions for oil and gas companies are considered material and are likely larger than Scope 1 and Scope 2 emissions combined, and therefore at least a screening evaluation of Category 11 emission is recommended to confirm materiality.
- **Category 12:** End-of-life Treatment of Sold Products emissions are more material for companies that produce significant quantities of products that are disposed of through incineration, non-fuel products, and products that require reuse or recycling of packaging containers or motor oil.
- **Category 13:** Downstream Leased Assets emissions are more material for companies with a large number of leased assets or third-party service stations owned by the company and leased to other entities.
- **Category 14:** Franchises emissions are not considered material for the oil and gas sector.
- **Category 15:** Investments emissions may be material for companies with significant investments and joint ventures not accounted for in Scope 1 and Scope 2 inventory.

2.3 Materiality Assessment for the 2022 Inventory

Findings from both the peer benchmarking and sector guidance review demonstrate significant correlation and indicate that Categories 1, 3, 5, and 11 are likely material for PGW. Similarly, both sector guidance and peer benchmarking suggest that Categories 8, 9, 10, 12, 13, 14, and 15 are likely not relevant.

Of the remaining categories, PGW made the following determinations:

- Based on peer benchmarking, Category 2 may be material for PGW and therefore a screening level assessment has been conducted.
- For Category 4 emissions, PGW is accounting for the upstream transportation and distribution emissions associated with the natural gas purchased under Category 1 instead of under Category 4. This is because the emission factor used to calculate Category 1 emissions includes upstream transportation and distribution of the natural gas to the city gate. Peer benchmarking shows that all three peer companies considered Category 4 emissions as not relevant. Based on this insight, PGW concluded that the upstream transportation and distribution emissions associated for purchased goods other than natural gas are likely not relevant.
- According to sector guidance, business travel emissions are likely minimal. Based on the more limited region of service for PGW, Category 6 is considered likely not relevant.
- Similarly, sector guidance indicates that employee commuting emissions are likely minimal. However, a screening evaluation of Category 7 emissions has been performed since each of the benchmarked peers reported employee commuting emissions.

- Regarding Category 10 emissions, for a natural gas distribution company like PGW, they would likely only be relevant if PGW sells natural gas to downstream refiners for processing rather than use (e.g., methane reforming to product hydrogen). At this time, PGW does not know of any application of the natural gas it sells being further processed rather than combusted. Therefore, Category 10 is likely not relevant.
- PGW does not own any downstream leased assets, therefore Category 13 is not relevant.

In summary, PGW determined that the following Scope 3 GHG emissions categories may be relevant and included them in the 2022 Scope 3 inventory: Categories 1, 2, 3, 5, 7, and 11.

3. SCOPE 3 EMISSIONS CATEGORIES

Table 3-1 provides a summary of the Scope 3 categories that were quantified and the activity data sources and estimation approach used for each category. Additional details are available in "PGW GHG Scope 3 Calculations" Microsoft Excel™ spreadsheet calculation tool developed by Trinity Consultants (Appendix A).

Table 3-1. PGW Scope 3 GHG Emissions Sources

Category	GHGs	Data Source	Scope 3 Estimation Approach[3]
1 – Purchased Goods and Services	CO_2 CH_4 N_2O	(1) Purchasing records	Average data method based on quantity of natural gas purchased; Screening using spend-based method for all other goods and services purchased
2 – Capital Goods	CO_2 CH_4 N_2O	(1) Purchasing records	Screening using average spend-based method
3 – Fuel & Energy-Related Activities	CO_2e	(1) Electricity, diesel, and gasoline purchasing records (2) Transportation distance and mode	Average data method based on quantities of fuel and energy purchased
5 – Waste Generated in Operations	CO_2e	(1) Waste disposal records (2) Wastewater bills, permits, and reports (3) Waste manifest records	Waste type-specific method based on quantities of types of waste generated and disposal method
7 – Employee Commuting	CO_2 CH_4 N_2O	(1) Number of employee vehicles, number of vehicle miles traveled, type of vehicle	Distance-based method based on distance traveled and mode used
11 – Use of Sold Products	CO_2 CH_4 N_2O	(1) Sales records (meter readings) (2) EIA and A-1 reports	Direct use-phase emissions based on quantity of natural gas sold

The following sections provide an overview of the most relevant Scope 3 sources:

3.1 Category 1 – Purchased Goods and Services

The Scope 3 Protocol describes Category 1 as all of the upstream emissions from the products and services purchased by a reporting company. This specifically focuses on the production of such products and services, both tangible and intangible.

For PGW, the Category 1 emissions account for all of the consumable goods purchased by the company that do not account for large infrastructural expansions (i.e., permanent equipment, buildings, etc.). Also included in Category 1 emissions are services such as administrative support, broadcasting and telecommunications, and all other services that are purchased to facilitate PGW's operations. In total, 51 goods and services categories are applicable to PGW in CY2022.

[3] Based on GHG Protocol Technical Guidance for Calculationg Scope 3 Emissions (Version 1.0), https://ghgprotocol.org/sites/default/files/standards/Scope3_Calculation_Guidance_0.pdf

Most of PGW's Category 1 emissions are calculated using the spend-based method, wherein dollar amounts for each type of product or service purchased are coupled with emission factors from specific industries. Emission factors for each product and service type are from EPA's Supply Chain Greenhouse Gas Emission Factors for US Industries and Commodities, v1.1.1, 2016 Summary Industry[4] and the US Environmentally-Extended Input-Output (USEEIO) v2.0.1-411[5]. Price indexes used are from Chain-Type Price Indexes for Gross Output by Industry[6], published by the Bureau of Economic Analyses (BEA). Emissions for each good and service are broken into CO_2, CH_4, and N_2O totals.

Since PGW does not produce the gas that is sold to customers, the amount of gas purchased from upstream providers is categorized as a purchased good, and emissions for this purchased gas are calculated by the Average-Data method. Emissions are calculated using the total gas volume purchased by PGW and an emission factor provided by the Department of Energy's NETL CO2U openLCA LCI Database, Version 2.1[7], which accounts for average life-cycle emissions for natural gas extraction, processing, and transportation through the transmission sector in the United States. Due to the sheer quantity of the amount of natural gas that PGW purchases to deliver to their customers, the upstream emissions from purchased natural gas are nearly 5 times larger than all other purchased goods and services combined. Of the remaining Category 1 goods and services evaluated using a spend-based screening calculation, purchased utilities make up the largest contribution of GHGs. While PGW spent more money on other goods and services, the CO_2 emission factor associated with purchased utilities is orders of magnitude larger than those of many other categories in the spend-based method.

3.2 Category 2 – Capital Goods

While similar to Purchased Goods and Services, Category 2 accounts for the upstream emissions of purchased goods and services that are intended to have extended life and/or are treated as fixed assets for the reporting company. This includes stationary equipment or significant upgrades to the company's infrastructure, such as new buildings or pipelines. Goods and services that are already accounted for in Category 1 are not included in Category 2.

PGW's Category 2 emissions are calculated very similarly to Category 1 via the spend-based method. For CY2022, PGW provided the number of dollars spent across 22 unique categories, and emissions of CO_2, CH_4, and N_2O were calculated using EPA's Supply Chain Greenhouse Gas Emission Factors for US Industries and Commodities, v1.1.1, 2016 Summary Industry[4], the US Environmentally-Extended Input-Output (USEEIO) v2.0.1-411[5], and BEA's Chain-Type Price Indexes for Gross Output by Industry[6] as in Category 1.

The largest contributor to PGW's Category 2 CO_2e emissions is Construction, followed by Specialty Grade Contractors and Miscellaneous Professional, Scientific, and Technical Services.

[4] Supply Chain GHG Emission Factors for US Commodities and Industries v1.1.1 - Catalog (data.gov)

[5] https://www.epa.gov/land-research/us-environmentally-extended-input-output-useeio-models

[6] BEA Interactive Data Application: Chain-Type Price Indexes for Gross Output by Industry

[7] Energy Analysis: NETL CO2U openLCA LCI Database Version 2.1 | netl.doe.gov

3.3 Category 3 – Fuel and Energy-Related Activities

Category 3 emissions cover the fuel and energy purchased by the reporting company. In PGW's case, the direct emissions from both fuel burning and electrical generation are calculated and reported in Scopes 1 and 2, respectively. Category 3 emissions account for the upstream emissions associated with the production, transportation, and distribution of these energy sources.

Emissions for fuel and energy procurement are calculated using PGW's records of CY2022 purchased electricity, gasoline, and diesel. For all energy sources, the amount purchased is multiplied by an emission factor to provide the total CO_2e emissions. Emission factors for electricity procurement is provided by the World Resources Institute's Sustainability Dashboard Methodology[8]. Diesel and gasoline procurement emission factors are provided by the Department of Energy's NETL CO2U openLCA LCI Database, Version 2.1[7].

Upstream emission associated with purchased electricity is also calculated using the CY2022 purchased energy totals. Since electricity is transported to PGW via transmission power lines, a single emission factor from the World Resources Institute's Sustainability Dashboard Methodology[8] is used to calculate greenhouse gas emissions totals.

Diesel and gasoline are delivered to PGW by trucks, therefore the emissions from transportation and distribution is dependent upon the distance between the fuel sources and the stations to where it gets delivered. PGW provided both the total amounts of fuel purchased and the distances from each fuel provider to each of the delivery points. Using an emission factor from the NETL CO2U openLCA LCI Database, Version 2.1[7], each PGW station that had diesel and gasoline delivered is assigned a CO_2e emission total for CY2022.

3.4 Category 5 – Waste Generated in Operations

Category 5 waste is broken into 5 types of non-water waste: hazardous, residual, municipal, recyclable, and compostable. For this analysis, PGW provided the amount of waste material type, by weight, for each of the company's facilities. In cases where PGW's waste records did not perfectly match one of the provided waste material types, Trinity used best engineering judgement to characterize the waste type as closely as possible.

Each facility's waste types are then broken down further to divide the waste by its disposal/treatment methods. These include whether the waste was sent to a landfill, was incinerated, recycled, or any other modes of waste processing. Emission factors for all waste material types are provided by the EPA's Emission Factors Hub for Scope 3 Category 5: Waste Generated in Operations and Category 12: End-of-Life Treatment of Sold Products[9]. Each of these emission factors assign a CO_2e emission value for each of the waste disposal/treatment methods.

Wastewater downstream emissions are calculated using PGW's total reported wastewater sent to treatment facility and an emission factor derived from US EPA Region 3 Wastewater Treatment Factors.

[8] https://www.wri.org/sustainability-wri/dashboard/methodology

[9] GHG Emission Factors Hub | US EPA

As expected, PGW's Category 5 emissions account for an extremely small portion of the company's Scope 3 emissions (<0.1%).

3.5 Category 7 – Employee Commuting

PGW performed a survey to understand commuting trends for employees at a series of company facilities. The survey investigated which mode of transportation employees used to get to work each day, the total round-trip distance for each commute, and the number of days per week each employee commuted to their workplace. The resulting analysis provided the total number of employees at each facility, a predominant transportation mode, and an average commute distance.

To estimate CO_2e emissions, Trinity assumed that every employee commuted by car and that each car was classified as "Passenger Car" under the EPA's Inventory of U.S. Greenhouse Gas Emissions and Sinks. Emissions were calculated for CO_2, CH_4, and N_2O using EPA emission factors and total miles driven per year.

3.6 Category 11 – Use of Sold Products

As PGW's main business function is to distribute and sell fossil-based natural gas, the downstream emissions from the eventual combustion and use of the natural gas are inherently the predominant contributor to the company's Scope 3 emissions. Total gas volumes sold to all types of PGW's downstream customers (residential, commercial, industrial, electricity-generating facilities, vehicle fuel, and LNG) were obtained from PGW and referenced EIA Form 176 and A-1 Reports. Total gas volumes reported do not include gas that is transported, but not sold, by PGW as it does not meet the Category 11 criteria for products sold to downstream users or consumers. Emissions were calculated by assuming a standard gas HHV and using EPA's Part 98 Subpart C emission factors for CO_2, CH_4, and N_2O.

APPENDIX A. EMISSION CALCULATIONS

Refer to "PGW GHG Scope 3 Calculations Final 2023-1027" spreadsheet workbook.