EARTHJUSTICE
BECAUSE THE EARTH NEEDS A GOOD LAWYER

May 31, 2023

VIA E-MAIL

The Honorable Eranda Vero
The Honorable Arlene Ashton
Office of Administrative Law Judge
Pennsylvania Public Utility Commission
801 Market Street, Suite 4063
Philadelphia, PA 19107

Re: *Pa. PUC v. Philadelphia Gas Works*, Docket No. R-2023-3037933

Dear Judge Vero and Judge Ashton:

Please find enclosed POWER Interfaith Statement No. 2, Direct Testimony of Dorie Seavey, Ph.D. The parties have been served per the attached Certificate of Service. Should you have any questions, please do not hesitate to contact me. Thank you.

Sincerely,

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cc:
PA PUC Secretary's Bureau (Cover Letter and Certificate of Service only)
Parties of Record

BEFORE THE
PENNSYLVANIA PUBLIC UTILITY COMMISSION

Pennsylvania Public Utility Commission, et al. v. Philadelphia Gas Works	Docket No. R-2023-3037933

DIRECT TESTIMONY OF DORIE SEAVEY, PH.D.

ON BEHALF OF

POWER INTERFAITH

May 31, 2023

POWER Interfaith Statement No. 2

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Exh. DKS-1, Dorie Seavey, Ph.D. Curriculum Vitae.

Exh. DKS-2, Dorie Seavey, *Philadelphia's Gas Pipe Replacement Plan* (Mar. 2023).

Exh. DKS-3, PGW, Methane Reduction Report (June 2021)

Exh. DKS-4, PGW, Annual Asset Optimization Plans, FY 2016, FY 2017, FY 2018, FY 2019, FY 2020, FY 2021, FY 2022.

Exh. DKS-5, PGW, FY 2023 Capital Budget Filing.

Exh. DKS-6, PGW, Compliance Capital Budget Reports, FY 2019-2022.

Exh. DKS-7, PGW, Compliance Capital Budget, FY 2023.

Exh. DKS-8, PGW, Philadelphia Gas Works Revised Annual Asset Optimization Plan FY 2022 and FY 2023 (Projected), PA P.U.C. Docket No. M-2022-3036434 (Mar. 28, 2023).

Exh. DKS-9, I&E Statement No. 3, Direct Test. of Scott Orr, PA P.U.C. Docket No. R-2020-3017206 (Sept. 1, 2020).

Exh. DKS-10, RTK Responses.

Exh. DKS-11, PGW Interrogatory Responses.

Exh. DKS-12, PGW, Petition of Philadelphia Gas Works for Approval of Its Third Long-Term Infrastructure Improvement Plan, PA P.U.C. Docket No. P-2022-3032303 (May 3, 2022).

Exh. DKS-13, PA P.U.C., Bureau of Consumer Services, Universal Service Program & Collections Performance – 2021 Report (Dec. 2022).

Exh. DKS-14, PA P.U.C., Order, PA P.U.C. Docket No. M-2021-3029323 (Jan. 12, 2023).

Exh. DKS-15, PGW, Universal Service and Energy Conservation Plan, PA P.U.C. Docket No. M-2021-3029323 (Nov. 1, 2021).

* Exhibits are available for download here.

I. Witness Identification and Qualifications

Q. Please state your name, occupation, and business address.

A. My name is Dorie Seavey. I am an independent research economist, with a business address at 73 Mount Vernon Street, Suite 3, Boston, MA 02108. I appear here in my capacity as an expert witness on behalf of POWER Interfaith.

Q. What is your educational and professional background?

A. I am an applied research economist and consultant. I received a Ph.D. in Economics from Yale University. I also hold a Master of Science in Economics from the London School of Economics and a Bachelor's Degree from Stanford University. My current work focuses on complex energy systems change with an emphasis on the future of natural gas. I am the author of two studies on gas distribution systems and a co-author of a study on solutions to the energy transition for low-income households. A copy of my curriculum vitae is attached.[1]

Q. Have you testified previously before the Pennsylvania Public Utility Commission?

A. No.

II. Purpose of Testimony

Q. What is the purpose of your testimony in this proceeding?

A. The purpose of my testimony is to present information and recommendations relating to the need for transparent and comprehensive reporting on Philadelphia Gas Work's ("PGW") pipeline replacement spending as it relates to PGW's 2023 Base Rate Case filing. I will also address the need to increase the Low-Income Usage Reduction Program ("LIURP") budget proportionally to any increase in PGW's rates.

[1] Exh. DKS-1, Dorie Seavey, Ph.D. Curriculum Vitae.

III. The Need for Integrated Pipeline Replacement Reporting

Q. Have you reviewed PGW's 2023 Base Rate Case filing?[2]

A. Yes.

Q. Have you reviewed the Commission's regulations concerning ratemaking procedures and considerations for determining just and reasonable rates for PGW?[3]

A. Yes.

Q. Do you have any concerns about PGW's 2023 Base Rate Case filing?

A. Yes. As the Direct Testimony of PGW witness Mr. Robert K. Smith indicates, one of the major effects of the rate increase will be to enable an acceleration of PGW's pipeline replacement program.[4] I am concerned about the significant expense of this program.

Q. Please say more about your concerns.

A. I recently prepared a report for the nonprofit Home Energy Efficiency Team ("HEET") examining the total cost of PGW's pipeline replacement program.[5] I would like to highlight two key findings. First, I found that the projected total cost, as I estimated it, was extremely high - at $6 to $8 billion by 2058.[6] Second, I found that it was very difficult to obtain accurate and up to date spending and cost information about the company's replacement programs, which I found troubling given the magnitude of this spending on the City's distribution infrastructure.[7]

[2] PGW, 2023 Base Rate Case Filing (Feb. 27, 2023).
[3] 52 Pa. Code §§ 69.2702–2703.
[4] PGW Statement No. 7, Direct Test. of Robert K. Smith, at 2:17–3:5 (Feb. 27, 2023).
[5] Exh. DKS-2, Dorie Seavey, *Philadelphia's Gas Pipe Replacement Plan*, (Mar. 2023).
[6] Exh. DKS-2, Dorie Seavey, *Philadelphia's Gas Pipe Replacement Plan*, at 25 (Mar. 2023).
[7] Exh. DKS-2, Dorie Seavey, *Philadelphia's Gas Pipe Replacement Plan*, at 9 (Mar. 2023) (discussing the difficulty associated with locating public data regarding PGW's pipeline replacement activities).

Q. Have you reviewed statements about pipeline replacement and the Long Term Infrastructure Improvement Plan ("LTIIP") in Mr. Smith's Direct Testimony?

A. Yes. Mr. Smith addressed PGW's efforts to improve the safety and reliability of the PGW gas distribution system and stated that the proposed rate relief would allow PGW to accelerate its replacement rate for cast iron mains, shortening the remaining removal period from 37.8 to 33.1 years.[8] He reported that over the past ten fiscal years, PGW removed approximately 310 miles of cast iron pipe replacing it with modern materials.[9] With regard to the LTIIP, Mr. Smith's testimony showed that PGW's first and second LTIIPs (2013 - 2017 and 2018 - 2022) were successfully completed, removing 145 miles and 165 miles, respectively.[10] Mr. Smith explained that PGW's third LTIIP (FY 2023 - 2027) will eliminate approximately 65 miles of cast iron pipe with PGW's baseline main replacement program continuing to remove 18 miles of cast iron per year, for a total projected amount of 155 miles.[11] It should be understood that the purview of the LTIIP is only the accelerated portion of PGW's pipeline replacement which is funded by the Distribution System Improvement Charge ("DSIC").[12] In addition, PGW replaces other cast iron mains, non-cast iron mains, and services with internally-generated funds.

Q. Does the Direct Testimony of Mr. Smith provide information about the cost of pipeline replacement, including information about trends in average cost per mile to replace main?

[8] PGW Statement No. 7, Direct Test. of Robert K. Smith, at 2:17–3:5 (Feb. 27, 2023).
[9] PGW Statement No. 7, Direct Test. of Robert K. Smith at 3:17–18 (Feb. 27, 2023).
[10] PGW Statement No. 7, Direct Test. of Robert K. Smith, at 5, Figure 2 – LTIIP Cast Iron Main Removal Cumulative Results Fiscal Years 2013 – 2022.
[11] PGW Statement No. 7, Direct Test. of Robert K. Smith, at 5:5–10.
[12] *See* 66 Pa. C.S.A. § 1353 (authorizing the Commission to approve DSIC surcharges for utilities "to provide for the timely recovery of the reasonable and prudent costs incurred to repair, improve or replace eligible property in order to ensure and maintain adequate, efficient, safe, reliable and reasonable service); 52 Pa. Code § 121.3 (requiring utilities seeking approval of a DSIC surcharge to file an LTIIP and setting forth the required elements of an LTIIP).

A. No. Mr. Smith's testimony does not provide any information about the annual costs of PGW's main and services replacement activity, such as its expected current year costs, historic cumulative totals, and projected future costs.

Q. Independent of this rate case, have you studied PGW's pipeline replacement activity and costs?

A. Yes. Pipeline replacement activity and costs were the main subject of my report on PGW's pipeline replacement activity, which I mentioned above.[13]

Q. What did your study entail and what was its purpose?

A. The main purpose of my study was to investigate the financial cost of PGW's pipeline replacement activity. I also investigated whether PGW's replacement plans are on track to achieve their stated goals.

Q. Why did you study that?

A. Philadelphia is known for having a high proportion of pre-1940 pipe and also for being home to the largest municipally-owned gas utility in the country. The City is also recognized for having one of the highest poverty rates in the United States. Given this context, I wanted to see how PGW and the City approach the gas system's safety, reliability and affordability at a time of energy transition. What I found is that PGW's pipeline replacement project is a massive capital investment project that carries significant implications for rates and energy affordability over at least the next three decades.

Q. Was it straightforward to find the information you needed on quantities and cost of pipeline replaced? If not, why not?

[13] Exh. DKS-2, Dorie Seavey, *Philadelphia's Gas Pipe Replacement Plan*, (Mar. 2023).

A. No. It was difficult and time consuming because of the lack of consistent, unified reporting across categories of pipeline replacement that official filings and reports otherwise treat as siloed into different programs and cost categories. Specifically, there is no one location in which PGW reports consistently measured, year-over-year replacement quantities and spending for cast iron mains, non-cast iron mains, and service lines.

Q. What are the different pipeline replacement programs or categories of replacement?

A. In PGW's gas distribution infrastructure, I see four categories of pipeline replacement inclusive of both mains and services:

1. Baseline cast iron main replacement
2. Accelerated cast iron main replacement
3. Non-cast iron main replacement
4. Service line replacement

PGW replaces its cast iron mains under two programs: Baseline and Accelerated.[14] Cast iron mains constitute approximately two-thirds of PGW's vintage mains, according to U.S. Department of Transportation, Pipeline and Hazardous Materials Safety Administration ("PHMSA").[15] Non-cast-iron mains—which make up the remaining third—are replaced at a rate of about 6 miles per year.[16] As far as I can discern, leak-prone non-cast iron mains are not part of a specific replacement program. The fourth category of replacement is PGW's aging service lines. PGW states that service lines are

[14] Exh. DKS-3, PGW, Methane Reduction Report, at 4 (June 2021); Exh. MDK-4, PGW, FY 2024 Capital Budget Filing, at 7 (Jan. 3, 2023).
[15] Exh. DKS-2, Dorie Seavey, *Philadelphia's Gas Pipe Replacement Plan*, at 8, Figure 1 (Mar. 2023).
[16] The quantities of non-cast iron miles abandoned can be deduced from detailed information on abandoned mains provided in the Asset Inventory Information schedule of the Fiscal Capital Budgets. For example, looking at page 549 in the Fiscal 2024 Capital Budget, it is possible to calculate non-cast iron mains abandoned as the remainder of "Grand Total" minus "Cast Iron – Total" for each of the fiscal years 2018 to 2022. For FY 2018 to 2022, an average of 5.9 miles of non-cast iron mains were abandoned annually.

replaced as mains are replaced,[17] but it also has set a goal of eliminating all of its leak-prone service lines by 2038, while main replacement is due to continue into the 2050s.[18] The specific plan for service line replacement is unclear given this muddy context, but spending on service line replacements is non-trivial at roughly $20 million per year.[19]

Q. How did you carry out your investigation to find the needed data on pipeline replacement?

A. I thoroughly investigated all publicly available official sources of information regarding the quantity and cost of replacement activity.

Q. Did you review PGW's FY 2023 Capital Budget as approved by the Philadelphia Gas Commission and the Philadelphia City Council?

A. Yes. I have also reviewed PGW's most recent Proposed FY 2024 Capital Budget.

Q. What figures are listed in PGW's Fiscal Year Capital Budgets regarding PGW's main replacements?

A. PGW's Capital Budgets provide Asset Inventory Information schedules that detail five to six years of annual data on the actual quantity of mains (broken out by pipeline material) across three categories: abandonment, replacement, and addition.[20] Each of these categories is reported as a separate schedule. The years reported begin two years prior to the year of the fiscal budget (*i.e.*, the FY 2024 Budget, as proposed, reports actual

[17] PGW Statement No. 7, Direct Test. of Robert K. Smith at 7:3–4.
[18] Exh. DKS-3, PGW, Methane Reduction Report, at 4–5 (June 2021); Note: PGW's use of the term "unprotected bare steel services" in its Methane Reduction Report conflates two distinct categories of services: those that are bare steel and those that are coated but not cathodically or otherwise protected. PGW should confirm that it intends to replace both types of services by 2038. According to PHMSA, as of 2021, there were 68,187 bare steel services and 18,842 unprotected coated steel services. *See* U.S. Dept. of Transportation, PHMSA, Gas Distribution Annual Data – 2010 to present (ZIP extracted for 2020), https://www.phmsa.dot.gov/ data-and-statistics/pipeline/gas-distribution-gas-gathering-gas-transmission-hazardous-liquids.
[19] Exh. MDK-4, PGW, FY 2024 Capital Budget Filing, at 17, 36 (Jan. 3, 2023).
[20] *See* Exh. MDK-4, PGW, FY 2024 Capital Budget Filing, at 549–551 (Jan. 3, 2023).

quantities of mains for the years 2018-2022). Cast iron mains removed under the Baseline and Accelerated Programs would in theory be accounted for in the "abandonment" category, pipeline installed to replace those abandoned mains would be accounted for in the "replacement" category, and new mains added due to load growth would be accounted for in the "addition" category.

Q. Do you have any concerns regarding the way main replacement data is reported in the Capital Budget filings?

A. Yes. It would be helpful if the asset schedules provided notes that explained large deltas between main abandonment and main replacement. For example, in FY 2022, it appears that miles reported as abandoned exceed miles reported as replaced by 4.34 miles. To illustrate this issue, I prepared Table 1, using data from the three relevant schedules in the Asset Inventory Information provided in the Proposed FY 2024 Capital Budget:[21]

Table 1: Categories of pipeline main asset activity in FY 2022 from Proposed FY 2024 Capital Budget

	Abandonment (in miles)	Replacement (in miles)	Addition (in miles)
Cast iron	33.96		
Non-cast iron	5.36	34.98	2.57
Total	39.32	34.98	2.57

Source: Exh. MDK-3, PGW FY 2024 Capital Budget Filing, at 549-551.

Furthermore, to avoid confusion, reporting on pipeline replacement needs to follow consistent definitional protocols, particularly when tying abandonment and replacement activity to spending amounts. Otherwise uncertainty is created for a reader

[21] Exh. MDK-4, PGW, FY 2024 Capital Budget Filing, at 549–551 (Jan. 3, 2023).

or analyst when determining whether certain miles of pipe were simply retired versus installed for replacement.

Q. Are there any other categories of data in the Capital Budgets related to pipeline replacement relevant to your analysis?

A. Yes. The Capital Budgets also provide five-year forecasts of "replacement" activity. Table 2 shows PGW's most recent forecast for replacement activity for the period FY 2023 to 2029 (by year), totaling $761.2 million.[22]

Table 2: Projected distribution replacement spending, FY 2024 – FY 2029

Capital Budget, FY 2024 - Philadelphia Gas Works — January 3, 2023

PHILADELPHIA GAS WORKS
FISCAL YEAR 2024 AND FORECAST 2025 THROUGH 2029

DEPARTMENT	2024 CAPITAL BUDGET	FORECAST 2025	2026	2027	2028	2029	TOTAL 6 YEARS
GAS PROCESSING							
ADDITIONS	81,000	83,000	85,000	87,000	89,000	91,000	516,000
REPLACEMENTS	22,375,000	39,747,000	6,999,000	179,687,000	7,580,000	10,352,000	266,740,000
TOTAL GAS PROCESSING	22,456,000	39,830,000	7,084,000	179,774,000	7,669,000	10,443,000	267,256,000
ACQUIRE ASSETS LEASE	22,456,000	39,830,000	7,084,000	179,774,000	7,669,000	10,443,000	267,256,000
DISTRIBUTION							
ADDITIONS	17,567,000	17,467,000	17,869,000	18,298,000	18,734,000	19,179,000	109,114,000
REPLACEMENTS	129,314,000	128,588,000	129,983,000	131,472,000	132,995,000	108,806,000	761,158,000
GROSS TOTAL DISTRIBUTION	146,881,000	146,055,000	147,852,000	149,770,000	151,729,000	127,985,000	870,272,000
LESS: SALVAGE							
LESS: CONTRIBUTIONS*							
LESS: REIMBURSEMENT**	(6,693,000)	(6,110,000)	(6,238,000)	(6,370,000)	(6,505,000)	(6,643,000)	(38,559,000)
NET TOTAL DISTRIBUTION	140,188,000	139,945,000	141,614,000	143,400,000	145,224,000	121,342,000	831,713,000
ACQUIRE ASSETS LEASE	140,188,000	139,945,000	141,614,000	143,400,000	145,224,000	121,342,000	831,713,000

Source: Exh. MDK-4, PGW, FY 2024 Capital Budget Filing, at 65 (Jan. 3, 2023)

The assumptions behind the forecasts are not indicated on the forecast schedule, such as number of miles and services installed, unit costs, and the assumed escalation rate.

[22] Exh. MDK-4, PGW, FY 2024 Capital Budget Filing, at 65 (Jan. 3, 2023).

Q. Do the Capital Budgets include information regarding past actual costs for pipeline replacements?

A. No. The Capital Budgets do not provide information about actual costs incurred for prior-year pipeline replacement activity.

Q. Did you review PGW's most recent Annual Asset Optimization Plan ("AAOP") and can you explain its relevance?

A. Yes, I reviewed the AAOP filings. The AAOP is filed annually with the Commission as part of PGW's LTIIP. The required scope of the LTIIP is confined to accelerated main replacement paid for by the DSIC, a supplemental recovery mechanism for costs related to incremental/accelerated distribution system repair, improvement, and replacement.[23] I found that the AAOP reports specify actual cast iron miles replaced in the prior fiscal year for both the Basic and Accelerated Programs, but they only provide actual costs for the Accelerated Program.

Q. Are the figures from the Proposed FY 2024 Capital Budget filing regarding main replacements the same as those reported in the most recent AAOP?

A. With regard to cast iron mains, they are generally close, but not identical. To compare the figures, I created the following table:

Table 3: Comparing cast iron main replacement/abandonment activity reported in the most recent AAOP and Capital Budget, FY 2016 to FY 2022

[23] *See* 66 Pa. C.S.A. § 1353; 52 Pa. Code § 121.3.

	FY 2016	FY 2017	FY 2018	FY 2019	FY 2020	FY 2021	FY 2022
From AAOP FY 2016 - FY 2022							
Baseline Program cast iron miles replaced	18.06	18.06	18.51	18.10	18.05	18.05	19.69
Accelerated Program cast iron miles replaced	13.55	16.86	15.36	16.50	9.28	19.43	13.70
Total	**31.61**	**34.92**	**33.87**	**34.60**	**27.33**	**37.48**	**33.39**
From PGW Capital Budgets FY 2023 and FY 2024							
Cast iron abandonment in miles	**31.54**	**33.66**	**33.00**	**32.56**	**27.65**	**37.57**	**33.96**
Delta (AAOP reporting minus Capital Budget reporting)	*0.07*	*1.26*	*0.87*	*2.04*	*-0.32*	*-0.09*	*-0.57*

Sources: Exh. DKS-4, Annual Asset Optimization Plans, FY 2016, FY 2017, FY 2018, FY 2019, FY 2020, FY 2021, FY 2022; Exh. DKS-5, PGW, FY 2023 Capital Budget Filing; Exh. MDK-4, PGW, FY 2024 Capital Budget Filing.

The mileage differences between the two sources range from 0.7 to 2.04 miles per year. Further, I find that the lack of consistent definitions creates confusing terminology. For example, the AAOP uses the term "replaced" for the same miles that the Capital Budget refers to as "abandoned."

Q. Do the sources you've mentioned so far provide data on service line replacements?

A. No. I was unable to locate a PGW report or filing stating the number of services actually replaced over the past few years. The closest source I found was the annual PGW Compliance Capital Budget reports, which provide the lineal feet of services *expected* to be replaced each year.[24] Adding up figures for lineal feet of services expected to be replaced from individual reports for fiscal years 2019 through 2022 suggests that approximately 9,200 lineal feet of services were budgeted to be replaced each year.[25] According to the most recent report, in FY 2023, 9,060 lineal feet of services are to be

[24] These reports are available at the PGW website. Visit https://www.pgworks.com/about-us/pgw-financials and scroll down to "Capital Budget Reports."
[25] Exh. DKS-6, PGW, Compliance Capital Budget Reports, FY 2019-2022.

replaced at a cost of $19,472,000.[26] As noted above, PGW's Methane Reduction Program report does state a goal of replacing all leak-prone services by 2038.[27]

Q. Do any of these sources provide data on actual replacement costs?

A. The only regular reporting on *actual* replacement costs is partial and covers the Accelerated Program's portion of the cast iron main replacement program, as reported in the AAOPs, for the prior year only.

Q. What does the most recent AAOP state regarding actual replacement costs for the Accelerated Program?

A. The latest AAOP available covers FY 2022 and FY 2023.[28] This new report shows that PGW spent $50.3 million in FY 2022 to replace 13.7 miles under the state's accelerated replacement program, which suggests an average per-mile replacement cost of $3.7 million.[29]

Q. Do you have any concerns about that data?

A. Yes. The total cost figure of $50.3 million seems questionable to me, since PGW's Annual Comprehensive Financial Report for FY 2022 says that the company billed customers $36.8 million for the DSIC surcharge.[30] Furthermore, the suggested per-mile replacement cost of $3.7 million seems out of line with prior year average costs. On a more minor note, the totals for the last two last columns of the table presented on pages

[26] Exh. DKS-7, PGW, Compliance Capital Budget, FY 2023, at 16–17. The 9,060 lineal feet can be calculated by adding the 8,950 feet attributed to "renewal of 1-1/4" and smaller services for prudent reasons, as a result of leak surveys, customer complaints or city and state work" to the 110 feet attributed to "renewal of 2" and larger services" reported on PDF p. 16. The $19,472,000 cost figure appears on PDF p. 17.
[27] Exh. DKS-3, PGW, Methane Reduction Report, at 5 (June 2021).
[28] Exh. DKS-8, PGW, Philadelphia Gas Works Revised Annual Asset Optimization Plan FY 2022 and FY 2023 (Projected), PA P.U.C. Docket No. M-2022-3036434, at 1 (Mar. 28, 2023).
[29] Exh. DKS-8, PGW, Philadelphia Gas Works Revised Annual Asset Optimization Plan FY 2022 and FY 2023 (Projected), PA P.U.C. Docket No. M-2022-3036434, at 5 (Mar. 28, 2023).
[30] Exh. MDK-11, PGW, 2022 Annual Comprehensive Financial Report, at 31 (Feb. 24, 2023). In FY 2022 and FY 2021, the Company billed customers $36.8 million and $34.6 million for the DSIC surcharge, respectively."),

4-5 of the most recent AAOP do not agree with the sum of the items in the columns (*i.e.*, the column for total footage sums to 69,886, not 72,334, and the column for total cost sums to $49,437,744, not $50,337,894).[31]

Q. Did you review PGW's last Base Rate Case for data regarding pipeline replacements?

A. Yes.

Q. What data did you find in the 2020 Base Rate Case?

A. The Direct Testimony of Scott Orr on behalf of the Bureau of Investigation & Enforcement ("I&E") concerning pipeline replacement costs introduced a detailed schedule obtained via a discovery request showing the total cost of pipeline replacement on a per mile basis broken down into cost categories for each of the five prior years (2015 – 2019).[32] Regarding the schedule, Mr. Orr concluded that: "PGW's capital replacement costs are increasing. In 2015, the cost was $1,204,801 per mile as compared to $1,611,987 in 2019. This is approximately a 33.8% increase in cost per mile over five years, or an average increase in the cost of 6.9% per year."[33]

Q. What conclusions did you draw from your research exercise?

A. I concluded that:

1. Comprehensive, consistent reporting by PGW detailing the actual quantity of mains and services replaced along with the cost of their replacement is not available from publicly accessible sources.

[31] Exh. DKS-8, PGW, Philadelphia Gas Works Revised Annual Asset Optimization Plan FY 2022 and FY 2023 (Projected), PA P.U.C. Docket No. M-2022-3036434, at 4-5 (Mar. 28, 2023).
[32] Exh. DKS-9, I&E Statement No. 3, Direct Test. of Scott Orr, Ex. No. 3, Sch. No. 5, at 2, PA P.U.C. Docket No. R-2020-3017206 (Sept. 1, 2020).
[33] Exh. DKS-9, I&E Statement No. 3, Direct Test. of Scott Orr, at 12:16–20, PA P.U.C. Docket No. R-2020-3017206 (Sept. 1, 2020).

2. The information that is available must be pieced together from multiple sources.
3. Even when pieced together, there are inconsistencies and discrepancies plus missing cost data.
4. In sum, existing reporting and data on PGW pipeline replacement lacks transparency and is inadequate.

Q. Were the sources you consulted for your research readily accessible to the public?

A. No. While the sources I consulted are public information, it took considerable effort to retrieve them. Basic, consistent reporting and metrics that would allow an analyst, regulatory staff, or policymaker to assess the outcomes and cost of these programs over time are not available or do not appear to exist.

Q. What next step did you take in your research project?

A. Since I was unable to locate consistent, reliable, year-over-year reporting, I decided to pursue a Right-To-Know ("RTK") request.

Q. Did you make a RTK request?

A. Yes.

Q. What data did you receive from PGW pursuant to the RTK Request?

A. I requested and received a) year-by-year replacement figures for mains and service lines for FY 2015 to 2021, and b) year-by-year costs for main and service replacements, broken down by labor, materials, contractors, and "other."[34] As an example, here is a table from my report, which consists of the data I received regarding pipeline mains and a final column in which I calculated the average total cost of per-mile main replacement:[35]

[34] Exh. DKS-10, RTK Responses.
[35] Exh. DKS-2, Dorie Seavey, *Philadelphia's Gas Pipe Replacement Plan*, at 11, Table 3: PGW data on main replacement costs, FY 2015-2021 (Mar. 2023); Exh. DKS-10, RTK Responses, at "Main and Service Replacement Costs Incl Units."

Table 3: PGW data on main replacement costs, FY 2015-2021
(Received via Right-To-Know Law Request, August 2022)

Fiscal year	Labor	Materials	Contractors	Other	Grand Total	Units (miles)*	Cost per mile**
2015	$5,443,656	$4,618,823	$26,470,959	$2,225,291	$38,758,729	29.42	$1,317,428
2016	$6,664,445	$6,586,625	$37,235,814	$2,964,285	$53,451,169	38.56	$1,386,182
2017	$6,149,012	$6,869,398	$41,586,160	$3,104,808	$57,709,378	34.42	$1,676,623
2018	$5,755,912	$8,010,869	$67,299,558	$3,119,446	$84,185,785	46.50	$1,810,447
2019	$5,379,833	$7,010,612	$46,217,261	$2,485,047	$61,092,754	33.96	$1,798,962
2020	$5,892,647	$6,953,349	$38,280,205	$3,506,265	$54,632,466	37.74	$1,447,601
2021	$6,773,339	$8,896,834	$51,957,631	$3,795,784	$71,423,588	34.01	$2,100,076

* Mileage of main installed for replacement projects.
**Calculation by author as Grand Total divided by Units.
Source: PGW response to author's Right-To-Know Law Request in August 2022.

Q. How did the data compare between the patchwork of sources you initially consulted and the information you obtained through your RTK request?

A. The strength of the provided RTK information is that the figures come from one source that comprehensively addresses both the quantity of mains and services replaced and their costs.

Comparing the pre-2020 information in Table 3 of my report with the PGW figures previously provided in Mr. Orr's testimony, while the cost figures are generally similar, the RTK request returned figures for the mileage of mains installed that are generally smaller. For example, Mr. Orr reported that 37.9 miles in FY 2019 were installed at a cost of $61.1 million, but the RTK information shows 33.96 miles replaced for $61.1 million.[36]

Q. Did PGW's response to Discovery Request POWER-01-21 (the "Discovery Response") help clarify your understanding of how PGW accounts for pipeline

[36] Exh. DKS-9, I&E Statement No. 3, Direct Test. of Scott Orr, Ex. No. 3, Sch. No. 6, at 2, PA P.U.C. Docket No. R-2020-3017206 (Sept. 1, 2020); Exh. DKS-10, RTK Response, at "Main and Service Replacement Costs Incl Units."

replacement activity over time and/or was it consistent with the information provided by PGW in response to your RTK request ("RTK Response)?

A. The Discovery Response[37] did not clarify my understanding and the information provided lacked consistency with the RTK Response. The Discovery Response actually leads to more questions for two reasons. First, the Discovery Response seems to indicate that it is not possible to provide the "units" that accompany the "spending." However, in the RTK Response, "units" *were* provided, and they were also provided in PGW's response to Mr. Orr's discovery request during the 2020 rate case. Second, while some of the spending figures by category provided in the Discovery Response are identical to those provided in the RTK Response for the overlapping time period—suggesting that the numbers were pulled from a common source—there are concerning differences. For example, a) for FY 2018, in response to my RTK Request, PGW indicated total spending on main replacement of $84.2 million,[38] whereas the Discovery Response indicates that spending for the same was $72.2 million,[39] and b) for FY 2021, total spending according to the RTK response was $71.4 million versus $69.7 million reported in the Discovery Response.[40] Table 4 below provides a comparison of the cost figures from the two responses.

Table 4: Comparison of RTK and Discovery Responses for Main Replacement, FY 2018 – FY 2021

[37] Exh. DKS-11, PGW Interrogatory Responses, Response to POWER-01-21.
[38] Exh. DKS-10, RTK Response, at PDF p. 4.
[39] Exh. DKS-11, PGW Interrogatory Responses, Response to POWER-01-21.
[40] Exh. DKS-10, RTK Response, at PDF p. 4; Exh. DKS-11, PGW Interrogatory Responses, Response to POWER-01-21.

Costs & Units	FY 2018		FY 2019		FY 2020		FY 2021	
	RTK Response	Discovery Response	RTK Response	Discovery Response	RTK Response	Discovery Response	RTK Response	Discovery Response
Labor	$5,755,912	$5,201,977	$5,379,833	$5,379,833	$5,892,647	$5,892,647	$6,773,339	$6,773,339
Materials	$8,010,869	$7,371,857	$7,010,612	$7,010,612	$6,953,349	$6,953,349	$8,896,834	$8,896,834
Contractors	$67,299,558	$56,984,955	$46,217,261	$47,066,194	$38,280,205	$38,280,205	$51,957,631	$50,252,236
Other	$3,119,446	$2,629,763	$2,485,047	$2,373,577	$3,506,265	$3,460,973	$3,795,784	$3,797,587
Grand total	$84,185,785	$72,188,552	$61,092,754	$61,830,216	$54,632,466	$54,587,174	$71,423,588	$69,719,996
Units (miles)	46.5	?	33.96	?	37.74	?	34.01	?
Average cost per unit	$1,810,447	?	$1,798,962	?	$1,447,601	?	$2,100,076	?

Sources: Exh. DKS-9, RTK Response, at "Main and Service Replacement Costs Incl Units" and Exh. DKS-10, PGW Interrogatory Responses, Response to POWER-01-21.

Q. Does the inconsistency between the RTK Response and the Response to POWER-01-21 concern you?

A. Yes.

Q. Why?

A. Inconsistency in PGW's reported cost data (in response to information requests regarding prior year-to-year spending on pipeline replacement by cost category) renders these numbers a "moving target" which in turn undermines sound, rigorous analysis and impedes transparency about the actual historical costs of PGW's pipeline replacement spending. Furthermore, the Discovery Response's position that it is not possible to provide the units associated with the provided cost figures is a significant step backwards for any effort to shed light on cost trends in PGW's pipeline replacement work. Both Mr. Orr and I received information on the units of miles associated with the spending figures and used these units to calculate the average cost per unit of main replacement. Average cost per main mile replaced is a generally accepted, basic metric in regulatory proceedings for gas utility proceedings I have studied across the country. It is essential for gas utility regulators to require consistent reporting that allows for these cost-per-mile figures to be calculated accurately.

I would also note that, looking across PGW's discovery responses regarding pipeline replacement, there are confusing inconsistencies in PGW's position on providing units and unit costs. In POWER-01-20, PGW does provide a per-mile unit cost figure for main replacement of $1,994,747 for FY 2023.[41] And in POWER-01-29, PGW provides main replacement footage in miles for each of the years 2018 to 2022.[42] This latter set of units appears to be the unit information requested, but not provided, in POWER-01-21. Table 5 replicates Table 4 below but adds in red the mileage unit information provided in POWER-01-29 and the resulting average cost per unit.

Table 5: Comparison of RTK and Discovery Responses for Main Replacement including POWER-01-21, and POWER-01-29, FY 2018 – FY 2021

Costs & Units	FY 2018		FY 2019		FY 2020		FY 2021	
	RTK Response	Discovery Response	RTK Response	Discovery Response	RTK Response	Discovery Response	RTK Response	Discovery Response
Labor	$5,755,912	$5,201,977	$5,379,833	$5,379,833	$5,892,647	$5,892,647	$6,773,339	$6,773,339
Materials	$8,010,869	$7,371,857	$7,010,612	$7,010,612	$6,953,349	$6,953,349	$8,896,834	$8,896,834
Contractors	$67,299,558	$56,984,955	$46,217,261	$47,066,194	$38,280,205	$38,280,205	$51,957,631	$50,252,236
Other	$3,119,446	$2,629,763	$2,485,047	$2,373,577	$3,506,265	$3,460,973	$3,795,784	$3,797,587
Grand total	$84,185,785	$72,188,552	$61,092,754	$61,830,216	$54,632,466	$54,587,174	$71,423,588	$69,719,996
Units (miles)	46.5	45.547	33.96	31.2034	37.74	37.7439	34.01	33.8687
Average cost per unit	$1,810,447	$1,584,924	$1,798,962	$1,981,522	$1,447,601	$1,446,252	$2,100,076	$2,058,538

Sources: Exh. DKS-10, RTK Responses, at "Main and Service Replacement Costs Incl Units" and Exh. DKS-11, PGW Interrogatory Responses, Response to POWER-01-21 and Response to POWER-01-29.

Q. Using the RTK data, were you able to conduct a projection of the cumulative cost over time of PGW's pipeline replacement programs?

A. Yes.

Q. What was your cost estimate of PGW's planned cumulative pipeline replacement?

A. I used two different approaches to model the costs and arrived at a total cost estimate for replacing mains and services from 2022 to 2058 that ranged from $6.2 billion to $7.6

[41] Exh. DKS-11, PGW Interrogatory Responses, Response to POWER-01-20.
[42] Exh. DKS-11, PGW Interrogatory Responses, Response to POWER-01-29.

billion in nominal dollars ($4.9 billion to $6.1 billion in real dollars).[43] The higher-end projection builds on starting-year unit costs for main replacement and assumes:

- Replacement of 39.25 miles per year consisting of 32.85 miles of cast iron and 6.4 miles of non-cast iron;[44]
- "Starting" average cost per-mile replacement cost of $2.1 million, as provided by PGW in response to my RTK request;[45]
- Annual escalation rate of 3.5%, as assumed by PGW for its projected capital budgets as of its FY 2023 Capital Budget filing;[46]
- Debt servicing costs attributable to pipeline replacement of approximately $20.7 million per year;[47] and
- Replacement cost for services of $19.5 million per year trended forward at the escalation rate until 2038. This assumption was made given that annual data on units and average costs of services were not available.

The lower-end projection projects forward until 2058 the current total budgeted costs for pipeline replacement (disregarding unit costs and numbers of miles to be replaced annually), adding on the cost of services and debt financing, and building in PGW's assumed 3.5% acceleration rate.

[43] Exh. DKS-2, Dorie Seavey, *Philadelphia's Gas Pipe Replacement Plan*, at 17 (Mar. 2023).
[44] This was the average number of miles replaced in the prior five years.
[45] Exh. DKS-2, Dorie Seavey, *Philadelphia's Gas Pipe Replacement Plan*, at 11, Table 3: PGW data on main replacement costs, FY 2015-2021 (Mar. 2023).
[46] Exh. DKS-5, PGW, FY 2023 Capital Budget, at 10 (Jan. 3, 2022).
[47] While no long-term debt is issued to fund the accelerated cast iron replacement program, part of PGW's bond interest expense should be attributed to PGW's other pipeline replacement capital spending. *See* Exh. DKS-2, Dorie Seavey, *Philadelphia's Gas Pipe Replacement Plan*, at 14–15, for treatment of this issue.

Q. How do your projections of the total cost of pipeline replacement compare to those available from PGW in its FY Capital Budgets and LTIIPs?

A. The main difference between my projections and the ones found in the FY 2024 Capital Budget and LTIIP are that I projected costs not for just the next five years, but for the more than three-decade remaining replacement period over which PGW intends to replace roughly half of its distribution mains. Other differences are that I systematically include the cost of replacing services and the cost of debt servicing attributable to capital spending on pipeline replacement. I am also clear about the average per mile cost of main replacement I have assumed and the escalation rate.

In its FY Capital Budgets, PGW does make available a five-year forecast of its distribution system-related capital spending.[48] The latest available projections concern the period FY 2024 and then the forecast for FY 2025 – FY 2029. The totals for spending on main replacement and services are not directly presented, however, and must be extracted and summed up across the appropriate capital spending categories.[49] For projected replacement spending on services, two categories must be summed.[50] For main replacement, eleven asset categories must be aggregated.[51] Furthermore, the "Five Year Forecast" does not present information on units of mains or services. The escalation rate for FY 2025 – FY 2029 would appear to be 2.3% to 2.4%.[52]

[48] Exh. MDK-4, PGW, FY 2024 Capital Budget Filing, at 62, 70–72 (Jan. 3, 2023).
[49] The appropriate capital categories are itemized in PGW in Exh. DKS-9, RTK Responses, at "Main and Service Replacement Costs Incl Units." See the upper right-hand corners of each of the two pages, one for mains and the other for services.
[50] Exh. MDK-4, PGW, FY 2024 Capital Budget Filing, at 72 (Jan. 3, 2023). For total proposed spending on replacement services, add categories 52-24-2-01 and 52-24-2-02.
[51] Exh. MDK-4, PGW, FY 2024 Capital Budget Filing, at 70–71 (Jan. 3, 2023). For total proposed spending on replacement mains, add categories 52-20-2-01 through -04, 52-21-2-01 through -04, 52-22-2-01 through -02, and 52-22-2-04.
[52] Exh. MDK-4, PGW, FY 2024 Capital Budget Filing, at 10 (Jan. 3, 2023).

As for the LTIIP, these plans are submitted every five years and include a five-year forecast of expenditures and units replaced for cast iron main replacements only. Services are not included in this forecast. The latest LTIIP covers the period FY 2023 to FY 2027.[53]

Q. What is your assessment of the information provided by PGW in its response to POWER-01-18, POWER-01-22 and POWER-01-23, which also concern projections?

A. POWER-01-18 asked for projections of total spending on main replacement and services for FY 2025 – FY 2027, accompanied by units and unit costs.[54] PGW limited its response to providing information on cast iron main replacement only and it declined to provide information on unit costs and services.[55] The table provided in the response essentially replicates certain columns from Figures 10 and 11 in the most recent LTIIP report.[56]

POWER-01-22 and 23 asked for information about how PGW develops its projections regarding replacing all cast iron mains in 37.8 and 33.1 years, respectively, without and with the proposed rate increase.[57] The projections provided in responses pertain only to cast iron mains and do not include services or the cost of debt servicing.[58] They also do not provide a per mile cost for main replacement, although it is clear that one is implicit since a schedule of the cost per foot/mile by pipe diameter is provided (given this schedule, the average per-mile cost would likely be calculated as a weighted

[53] Exh. DKS-12, PGW, Petition of Philadelphia Gas Works for Approval of Its Third Long-Term Infrastructure Improvement Plan, PA P.U.C. Docket No. P-2022-3032303, at 15 (May 3, 2022), https://www.puc.pa.gov/pcdocs/1742862.pdf.
[54] Exh. DKS-11, PGW Interrogatory Responses, Response to POWER-01-18.
[55] Exh. DKS-11, PGW Interrogatory Responses, Response to POWER-01-18.
[56] Exh. DKS-12, PGW, Petition of Philadelphia Gas Works for Approval of Its Third Long-Term Infrastructure Improvement Plan, PA P.U.C. Docket No. P-2022-3032303, at Attachment A, 13–15 (May 3, 2022).
[57] Exh. DKS-11, PGW Interrogatory Responses, Response to POWER-01-22, POWER-01-23.
[58] Exh. DKS-11, PGW Interrogatory Responses, Response to POWER-01-22, POWER-01-23.

average of the unit costs by pipe diameter classifications). An assumed annual "inflation factor of cost per foot expenses" of 1.5% is specified.[59]

PGW's model projects a total long-run cost of replacing its cast iron mains of $3.0 billion without the rate increase and $2.8 billion with the rate increase.[60] In my opinion, this model should be adjusted to include: a) average annual spending of $20 million on services replacement, b) average annual spending of $27.4 million on debt servicing attributable to pipeline replacement activities, and c) the cost of replacing on average 6.4 miles non-cast iron mains per year. In addition, the model should explore more than one inflation factor. The assumption of a 1.5% inflation factor does not receive support from the actual cost escalation observed in PGW's main replacement costs to date: as explained below, that cost escalation has been 8.5% per year on average from FY 2015 to FY 2021.[61]

Q. Going back to your RTK request, did PGW's response to the RTK request allow you to make conclusions regarding trends in pipe replacement average costs? Specifically, are pipeline replacement costs increasing?

A. Yes, I was able to make conclusions regarding trends using the RTK request data, and yes, the evidence I reviewed indicates that pipeline replacement costs are increasing at a rate several orders of magnitude greater than PGW's assumed escalation rate. I found that PGW's average cost for pipeline replacement increased 8.5% per year from 2015 to 2021.[62] This compares to a 6.9% rate of increase for the earlier time period of 2015 to

[59] Exh. DKS-11, PGW Interrogatory Responses, Response to POWER-01-22, POWER-01-23.
[60] Exh. DKS-11, PGW Interrogatory Responses, Response to POWER-01-22 (c), at 2, and Response to POWER-01-23 (c), at 2.
[61] Exh. DKS-2, Dorie Seavey, *Philadelphia's Gas Pipe Replacement Plan*, at 18 (Mar. 2023).
[62] Exh. DKS-2, Dorie Seavey, *Philadelphia's Gas Pipe Replacement Plan*, at 18 (Mar. 2023).

2019 according to the data reported by Mr. Orr in the 2020 rate case.[63] Based on the information in my RTK request and Mr. Orr's earlier request, I conclude that the average cost of pipeline replacement by PGW has continued to accelerate since the 2020 Rate Case.

Q. What did you conclude in your study regarding how much of PGW's leak-prone mains it would be possible to replace by 2058?

A. I concluded that by 2058, PGW will be able to eliminate its cast iron mains, but a backlog of approximately 387 miles of leak-prone largely steel pipe will remain unaddressed. PGW's current replacements plans (slated to end in 2058 without the requested rate increase) are not adequate to eliminate all of the City's current inventory of leak-prone pipe by 2058 (or five years earlier with the proposed rate increase). Additionally, even if PGW were able to eliminate its entire current inventory of leak-prone pipe by 2058, by that time an additional 379 miles of mains installed in the 1970s and 1980s are likely to need replacement.[64]

Q. What concerns do you have about the current Base Rate Case filing as it relates to capital spending on pipeline replacement?

A. The Commission is in the position of approving rates that support (indeed are "driven by"[65]) a multi-decade, long-term infrastructure investment project that has become one of the largest—if not the largest—expenditures ever undertaken by the City and is on a course to replace roughly half of the City's gas distribution system. My main concern is that the Commission lacks the high-quality, year-over-year, comprehensive reporting on

[63] Exh. DKS-9, I&E Statement No. 3, Direct Test. of Scott Orr, Ex. No. 3, Sch. No. 5, at 2, PA P.U.C. Docket No. R-2020-3017206 (Sept. 1, 2020).
[64] Exh. DKS-2, Dorie Seavey, *Philadelphia's Gas Pipe Replacement Plan*, at 4 (Mar. 2023).
[65] PGW Statement No. 2, Direct Test. of Joseph F. Golden, Jr., at 4:25–5:1 (Feb. 27, 2023).

pipeline replacement activity and its full costs that would best inform an understanding and evaluation of this spending. Such reporting would allow for the analysis of important trends and issues that can inform rate setting. The vast majority of information presented to the Commission regarding this massive infrastructure project is weighted toward short- to near-term performance with at most a five-year look out. The reported metrics do not include any analysis of the cost effectiveness of the spending including cost-per-unit analyses. The fact that PGW's pipeline replacement costs appear to show significant cost escalation on a per-mile basis has been brought to the Commission's attention only as a result of discovery requests in the 2020 rate case and my outside report.

Q. Why isn't the LTIIP and its accompanying docket a satisfactory location for your concern?

A. The LTIIP and its docket are important, but by statute, their formal scope is limited to the accelerated portion of cast iron main replacement. Approximately two-thirds of PGW's main replacement activity falls outside of the LTIIP. In FY 2022, for example, of the mains replaced, approximately thirty-five percent fell under the Accelerated Program, fifty-one percent under the Baseline Program, and fourteen percent pertained to non-cast iron mains.[66] In addition, outside of the LTIIP, service lines were replaced at a cost of approximately $19.5 million.[67]

[66] The FY 2022 totals for the Accelerated and Baseline Programs can be found in Exh. DKS-8, PGW, Philadelphia Gas Works Revised Annual Asset Optimization Plan FY 2022 and FY 2023 (Projected), PA P.U.C. Docket No. M-2022-3036434, at 3 (Mar. 28, 2023). The FY 2022 total for non-cast iron mains is calculated from Exh. MDK-4, PGW, FY 2024 Capital Budget Filing, at 549. Note: the sum of the Accelerated and Baseline cast iron mains appearing in the AAOP is 33.39 miles while the Capital Budget indicates 33.96 for the same. This difference does not affect the calculation of the percentages.

[67] Exh. MDK-4, PGW, FY 2024 Capital Budget Filing, at 17, 36 (Jan. 3, 2023). The Capital Budget does not provide an actual figure for spending on services replacement. $19.5 million is indicated as FY 2023 compliance budget amount and $21 million as the FY 2024 budget figure.

Q. Why is it important to have accurate, publicly accessible, comprehensive data regarding PGW's pipeline replacements and their costs?

A. Comprehensive, integrated reporting on pipeline replacement is essential for determining whether the creation of these long-lived distribution pipeline assets is appropriate, economically and technically efficient, recoverable, and in the public interest. That determination is then fundamental to specifying the capital-spending-related margins required to meet bond coverage and internally generated funds. These margins, in turn, go to the heart of the Commission's determination of whether delivery rate levels are just, reasonable and prudent.[68]

More broadly, it is essential to have accurate, publicly accessible comprehensive data on pipeline replacement activity for the following reasons:

1. Transparency

Ratepayer-owners of a municipal utility like PGW have a direct and considerable stake in transparent distribution system planning and prudent spending, especially for projects on the scale of PGW's pipeline replacement programs. Regular information should be available on whether the programs are achieving their goals cost-effectively, their projected capital expenditures, and implications for rates and the neighborhoods the projects will impact.

2. Basic business management

The maxim "you can't manage what you don't measure" is fundamental to all business management, including regulated utilities. Data- and performance-driven overview and management of PGW's otherwise siloed replacement activities is essential and would

[68] *See* 52 Pa. Code § 69.2702.

appear particularly prudent given evidence of steep trend increases in replacement costs presented both in this testimony and the prior 2020 rate case.[69]

3. Capital efficiency

Without accurate accounting of the full costs of pipeline replacement, it is not possible to determine whether the replacement investment is cost-effective relative to other available remedies or solutions. For example, in some situations it may be more cost-effective to retire a segment of pipeline or utilize advanced leak repair technologies such as cured in-place liners to renew the pipe or extend its life.

4. Protecting ratepayers

Additions to the PGW rate base are to be largely supported by a residential customer base that is nearly forty percent estimated low-income (*i.e.*, under 150% of federal income poverty guidelines).[70] Moreover, in 2021, sixty-one percent of PGW's confirmed low-income customers received federal bill payment grants (LIHEAP) totaling $40.5 million.[71] The challenging demographics of PGW's customer base underscore the need to ensure maximally efficient and prudent spending of its funds. This need is particularly salient with regard to proposed pipeline replacement activity in light of longer-term scenarios where gas throughput may decline significantly due to warmer temperatures or shrinking customer base. In such scenarios, which are projected for many gas utilities

[69] Exh. DKS-9, I&E Statement No. 3, Direct Test. of Scott Orr, Ex. No. 3, Sch. No. 5, at 2, PA P.U.C. Docket No. R-2020-3017206 (Sept. 1, 2020).
[70] Exh. DKS-13, PA P.U.C., Bureau of Consumer Services, Universal Service Program & Collections Performance – 2021 Report, at 9, Table: Estimated Low-Income Natural Gas Customers - 2021 (Dec. 2022).
[71] Exh. DKS-13, PA P.U.C., Bureau of Consumer Services, Universal Service Program & Collections Performance – 2021 Report, at 7, 75 Table: Estimated Low-Income Natural Gas Customers - 2021 (Dec. 2022). This percentage was calculated using the number of confirmed low-income natural gas customers served by PGW in 2021 and the number of low-income households receiving LIHEAP in PGW's service territory.

across the country, customers left on the gas system run the risk of being stranded with exceptionally high system costs spread over fewer and fewer ratepayers.[72]

5. Informing long-term gas system planning

Utility regulators around the country are embarking on proactive planning for the impact of technological change and energy policy on gas utilities in light of the transformative effects that anticipated decreases in gas consumption are likely to have on the companies they regulate.[73] Access to comprehensive information about existing infrastructure investment programs is essential for making sure that any such long-term planning is fully and accurately informed.

Q. What is your recommendation regarding pipeline replacement reporting?

A. I recommend that PGW be required to submit Comprehensive Annual Pipeline Replacement Reports.

Q. What elements should be required in a comprehensive annual report on pipeline replacement?

A. I recommend that the annual reporting contain the following seven elements:

1. Pipeline quantity: Year-over-year replacement figures for mains and service lines.
2. Pipeline composition: Data on current composition of current inventory of distribution pipeline mains by material (*i.e.*, cast iron, unprotected steel, etc.) and age (*i.e.*, decade of installation).

[72] *See* Exh. MDK-2, PGW, Business Diversification Study, at 34–35 (providing an example scenario in which gas bills significantly increase for PGW customers after the customer base shrinks "because the fixed costs of PGW's system are spread among a smaller customer base, increasing the average cost of service for those who remain connected to the gas system.").

[73] Such proceedings are currently taking place in California, Colorado, District of Columbia, Massachusetts, Minnesota, New Jersey, New York, and Rhode Island. For a recent listing of the proceedings, see Pub. Serv. Comm'n of Maryland, *Petition of the Office of People's Counsel for Near-Term, Priority Actions and Comprehensive, Long-Term Planning for Maryland's Gas Companies*, at Appx. C – Comprehensive Planning Proceedings in Other States, (Feb. 9, 2023), https://perma.cc/9YUC-XCY6.

3. Pipeline spending cost breakdown: Year-over-year current and historic costs for main and service replacements, broken down by labor, materials, contractors, and "other." This breakdown should be sufficient to enable unit cost analysis.
4. Projection of cumulative pipeline replacement costs including services through program termination based on unit cost analysis and assumed escalation factor. Consideration should be given to including the debt servicing costs associated with non-DSIC funded replacement.
5. Throughput analysis: Trend data on gas throughput by rate class and projected for next five years.
6. Customer base composition: Historic and current data on size of PGW's customer base, percent low-income, percent low-income payment-troubled customers, percent eligible for LIHEAP and the Customer Responsibility Program ("CRP"), and receipt of LIHEAP and CRP.
7. Undepreciated pipeline assets: Historic, current, and projected value of undepreciated distribution pipeline assets (by asset category with totals) through expected program termination date.

IV. The Need to Mitigate the Effects of the Rate Increase on Low-Income Customers with Increased LIURP Budget

Q. Do you have any other concerns with PGW's 2023 Base Rate Case filing?

A. Yes. I am concerned about the impact of the proposed rate increase on low-income customers.

Q. Do you have any recommendations for how that effect could be mitigated?

A. Yes. The Low-Income Usage Reduction Program ("LIURP") is an important mechanism for helping people reduce their energy burden by supporting the deployment of energy efficiency measures that reduce energy consumption.[74] PGW's LIURP was the subject of a recent proceeding of this Commission, but I am concerned that the LIURP program as it stands is based on PGW's current rates, and it will become outdated if a rate increase is approved in this proceeding. As I will discuss in further detail below, PGW should take steps to increase its LIURP budget at least proportional to any approved rates increase in this proceeding.

Q. Have you reviewed PGW's 2023-2027 Universal Service and Energy Conservation Plan docket (Docket No. M-2021-3029323)?

A. Yes.

Q. What is the amount set for the LIURP budget in that docket?

A. The Commission Order conditionally approving PGW's 2023-2027 Universal Service and Energy Conservation Plan ("USECP") lists a budget of $7,988,818 per year from 2023-2027 for the Home Comfort Program, which is PGW's LIURP.[75] Notably, that budget is unchanged from the LIURP budget set in PGW's 2017-2022 USECP.

Q. Since this issue was recently litigated, why is it relevant to discuss in this case?

A. PGW has proposed to increase its residential rates in this proceeding. Thus, the LIURP budget, which was calculated based on existing rates prior to PGW's 2023 Base Rate Case filing, will be out of date. As rates increase, the benefits of energy-conserving measures installed pursuant to LIURP also increase, meaning the number of households and individual measure installations that would be cost-effective under LIURP will

[74] 52 Pa. Code § 58.1.
[75] Exh. DKS-14, PA P.U.C., Order, PA P.U.C. Docket No. M-2021-3029323, at 89–91 (Jan. 12, 2023).

correspondingly increase.[76] To maintain at least the same rate of progress serving LIURP-eligible homes, the LIURP budget would need to increase to keep pace with residential rates. The details of PGW's rate increase could not have been anticipated at the time its 2023-2027 USECP was filed, so this proceeding presents the appropriate opportunity to adjust the LIURP budget to take into account any new rates that are adopted.

Q. What is your recommendation regarding LIURP spending as it pertains to PGW's proposed rate increase?

A. I recommend increasing the LIURP budget commensurate with the overall increase to residential rates. Whatever percentage increase PGW implements for its residential rates should also be applied to its LIURP budget.

Q. Why is your recommendation necessary?

A. Energy burdens are extremely high in PGW's service territory as the City has "a higher-than-average share of both low-income households and old, poorly insulated homes."[77] PGW's 2021 Business Diversification Study identified that "Philadelphian households on average spend around 6.7% of their income on energy, about double the national average, making Philadelphia one of the most energy-burdened cities in the United States."[78] Weatherization services provided through LIURP can provide important bill relief and arrearage reduction for participating customers through reduced energy usage as well as improve the health, safety and comfort levels of household members.[79] In addition, the LIURP budget funds pilot programs such as the Health and Safety Pilot and the Repair

[76] *See* 51 Pa. Code § 58.4 (setting forth the factors that the Commission must use to compute appropriate LIURP funding, including "the number of eligible customers that could be provided cost-effective usage reduction services.").
[77] Exh. MDK-2, PGW, Business Diversification Study, at 16.
[78] Exh. MDK-2, PGW, Business Diversification Study, at 8.
[79] Exh. DKS-13, PA P.U.C., Bureau of Consumer Services, Universal Service Program & Collections Performance – 2021 Report, at 54-55 (Dec. 2022).

and Renew Pilot.[80] These pilots maximize the reach and the effectiveness of LIURP benefits by targeting homes with conditions that could otherwise prohibit cost-effective weatherization and providing comprehensive services to address those issues while also weatherizing the home.[81] Ensuring sufficient budget for LIURP is a necessary step to realizing these benefits for the maximum number of eligible households.

V. Summary of Recommendations

Q. What are your recommendations for the Commission?

A. I recommend that the Commission condition approval of any rate increase for PGW on implementation of the following recommendations:

First, the Commission should find that PGW's current methods for reporting its pipeline replacement activity and spending are inadequate and lack transparency. As a result, the Commission should direct PGW to file annual accountings of its pipeline replacement activity. These documents should be filed at the Commission and be publicly accessible online. The Comprehensive Annual Pipeline Spending Reports should contain, at a minimum, the following seven elements:

[80] Exh. DKS-15, PGW, Universal Service and Energy Conservation Plan, at 21–23, PA P.U.C. Docket No. M-2021-3029323 (Nov. 1, 2021). *See also* Exh. DKS-14, PA P.U.C., Order, Docket No. M-2021-3029323, at 53, 57–58 (Jan. 12, 2023). (approving continuation of Health and Safety Pilot Program and approving Repair and Renew Pilot Program).

[81] *See* Exh. DKS-15, PGW, Universal Service and Energy Conservation Plan, at 21, PA P.U.C. Docket No. M-2021-3029323 (Nov. 1, 2021). (explaining that health and safety measures installed pursuant to the Health and Safety Pilot "enabled $428,521 in cost-effective spending on additional energy savings measures, which would not otherwise have been installed due to health and/or safety concerns in participating homes" and noting that average gas savings were "50% higher in pilot homes than in non-pilot homes."); *See also* Exh. DKS-15*,* PGW, Universal Service and Energy Conservation Plan, at 22, PA P.U.C. Docket No. M-2021-3029323 (Nov. 1, 2021) (describing the Repair and Renew program, which "will address heating system hazards and weatherize the homes of customers who are low income and are issues a recent hazard tag by PGW," and explaining that in a similar past program implemented outside of LIURP, "PGW treated 71 customers and achieved 1,979 first year MMBtu savings equal to 16.1% of pre-treatment usage.").

1. Pipeline quantity: Year-over-year replacement figures for mains and service lines.
2. Pipeline composition: Data on current composition of current inventory of distribution pipeline mains by material (*i.e.*, cast iron, unprotected steel, etc.) and age (*i.e.*, decade of installation).
3. Pipeline spending cost breakdown: Year-over-year current and historic costs for main and service replacements, broken down by labor, materials, contractors, and "other." This breakdown should be sufficient to enable unit cost analysis.
4. Projection of cumulative pipeline replacement costs including services through program termination based on unit cost analysis and assumed escalation factor. Consideration should be given to including the debt servicing costs associated with non-DSIC funded replacement.
5. Throughput analysis: Trend data on gas throughput by rate class and projected for next five years.
6. Customer base composition: Historic and current data on size of PGW's customer base, percent low-income, percent low-income payment-troubled customers, percent eligible for LIHEAP and the Customer Responsibility Program ("CRP"), and receipt of LIHEAP and CRP.
7. Undepreciated pipeline assets: Historic, current, and projected value of undepreciated distribution pipeline assets (by asset category with totals) through expected program termination date.

Second, I recommend that the Commission protect low-income ratepayers from the impacts of rising rates by requiring PGW to increase its LIURP budget in proportion to any approved overall increase in its residential rates.

VI. Conclusion

Q. Does this conclude your testimony?

A. Yes.

VERIFICATION

I hereby verify that the facts contained in the foregoing testimony are true and accurate to the best of my knowledge and that I am duly authorized to make this verification, and that I expect to be able to prove the same at any hearing held in this matter. I understand that the statements herein are made subject to penalties of 18 Pa. C.S. § 4904 (relating to unsworn falsification to authorities).

Dated: May 31, 2023

/s/ Dorie Seavey
Dorie Seavey

CERTIFICATE OF SERVICE

I hereby certify that I have this day served via email a true copy of this document upon the parties, in accordance with the requirements of 52 Pa. Code § 1.54 (relating to service by a party).

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Dated: May 31, 2023

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EARTHJUSTICE
BECAUSE THE EARTH NEEDS A GOOD LAWYER

May 31, 2023

VIA E-MAIL

The Honorable Eranda Vero
The Honorable Arlene Ashton
Office of Administrative Law Judge
Pennsylvania Public Utility Commission
801 Market Street, Suite 4063
Philadelphia, PA 19107

Re: *Pa. PUC v. Philadelphia Gas Works*, Docket No. R-2023-3037933

Dear Judge Vero and Judge Ashton:

Please find enclosed POWER Interfaith Statement No. 3, the Direct Testimony of Ben Havumaki. The parties have been served per the attached Certificate of Service. Should you have any questions, please do not hesitate to contact me. Thank you.

Sincerely,

/s/ Devin McDougall
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cc:
PA PUC Secretary's Bureau (Cover Letter and Certificate of Service only)
Parties of Record

BEFORE THE
PENNSYLVANIA PUBLIC UTILITY COMMISSION

Pennsylvania Public Utility Commission, et al. v. Philadelphia Gas Works	Docket No. R-2023-3037933

DIRECT TESTIMONY OF BEN HAVUMAKI

ON BEHALF OF

POWER INTERFAITH

May 31, 2023

POWER Interfaith Statement No. 3

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EXHIBIT LIST

Exh. BH-1, Ben Havumaki Curriculum Vitae.

Exh. BH-2, PGW Interrogatory Responses.

Exh. BH-3, Maryland Pub. Serv. Comm'n, Order No. 87884.

Exh. BH-4, Pa. Pub. Util. Comm'n, Opinion and Order, PA PUC Docket No. R-2018-3006818 (Oct. 3, 2019).

Exh. BH-5, Pa. Pub. Util. Comm'n, Opinion and Order, PA PUC Docket No. R-2020-3017206 (Nov. 19, 2020).

Exh. BH-6, Pa. Pub. Util. Comm'n, Opinion and Order, PA PUC Docket No. R-2020-3018835 (Feb. 18, 2021).

Exh. BH-7, Pa. Pub. Util. Comm'n, Recommended Decision, PA PUC Docket No. R-2021-3030218 (July 28, 2022).

Exh. BH-8, Pa. Pub. Util. Comm'n, Order, PA PUC Docket No. R-2021-3030218 (Sept. 15, 2022).

Exh. BH-9, Pa. Pub. Util. Comm'n, Recommended Decision, PA PUC Docket No. R-2022-3031113 (Oct. 11, 2022).

Exh, BH-10, Pa. Pub. Util. Comm'n, Order, PA PUC Docket No. R-2022-3031113 (Oct. 27, 2022).

Exh. BH-11, Pa. Pub. Util. Comm'n, Recommended Decision, PA PUC Docket No. R-2020-3018835 (Dec. 4, 2020).

Exh. BH-12, Pa. Pub. Util. Comm'n, Opinion and Order, PA PUC Docket No. R-2021-3023618, (Oct. 28, 2021).

* Exhibits are available for download here.

I. Witness Identification and Qualifications

Q. Please state your name, business name and address, and role in this proceeding.

A. My name is Ben Havumaki. I work for Synapse Energy Economics, Inc. ("Synapse"), with a business address at 485 Massachusetts Avenue in Cambridge, MA. I appear here in my capacity as an expert witness on behalf of POWER Interfaith.

Q. Please summarize your experience and expertise in the utility industry.

A. I have approximately five years of experience working in regulated utility proceedings as an analyst and expert witness. At Synapse, I focus on a range of related regulatory topics, including ratemaking and rate design, performance-based regulation, and grid modernization. I have sponsored testimony before the Minnesota Public Utilities Commission, the Public Utilities Commission of New Hampshire, the Georgia Public Service Commission, the Illinois Commerce Commission, the West Virginia Public Service Commission, the Rhode Island Public Utilities Commission, and the New Brunswick Energy and Utilities Board. A copy of my curriculum vitae is attached.[1]

Q. Have you ever testified before the Pennsylvania Public Utility Commission or other regulatory agencies in Pennsylvania?

A. No.

II. Purpose of Testimony

Q. What is the purpose of your testimony?

A. The purpose of my testimony is to respond to Philadelphia Gas Work's ("PGW") proposal to increase its residential customer charge. After considering PGW's arguments,

[1] Exh. BH-1, Ben Havumaki Curriculum Vitae.

I show that the large increase to the customer charge that has been proposed is not just and reasonable, because it is neither required nor consistent with past practices and regulatory precedents in Pennsylvania. I further demonstrate that the proposed increase, if permitted, would violate the principle of gradualism, unduly burden low-income customers, and blunt incentives for energy efficiency and conservation that help to reduce overall gas system costs.

III. Summary of PGW's Rate Design Proposal

Q. Please describe PGW's proposed change to its residential customer charge.

A. PGW proposes to increase the residential customer charge by over thirty percent, from $14.90 per month to $19.50 per month.[2]

Q. Why is PGW proposing to increase its residential customer charge?

A. PGW states that its proposed increase would help to better align rates with costs, resulting in a residential customer charge that would recover a greater share of total residential class fixed customer costs and improve revenue stability.[3] PGW asserts that its current rate design that recovers the majority of fixed costs through variable delivery is "inefficient and distorts the price signals to customers."[4] By implication, PGW suggests that its proposed fixed charge increase would improve efficiency and send what PGW views as the correct or proper price signals to customers.

Q. Why does PGW conclude that raising the residential fixed charge would better align rates and costs?

A. This conclusion is based upon the results of PGW's Class Cost of Service Study

[2] PGW Statement No. 1, Direct Test. of Denise Adamucci, at 13:5–6 (Feb. 27, 2023).
[3] PGW Statement No. 6, Direct Test. of Florian Teme, at 8:5–9:4 (Feb. 27, 2023).
[4] PGW Statement No. 6, Direct Test. of Florian Teme, at 9:1 (Feb. 27, 2023).

("CCOSS").[5]

Q. Is the proposed increase to the residential customer charge reasonable?

A. No, for multiple reasons:

1. The proposed fixed charge increase is inconsistent with past regulatory practices in Pennsylvania and would violate the principle of gradualism.
2. PGW has not justified the need to increase the residential customer charge for economic efficiency.
3. Increasing the residential customer charge would harm low-income customers.
4. Increasing the residential customer charge would blunt incentives for energy efficiency.

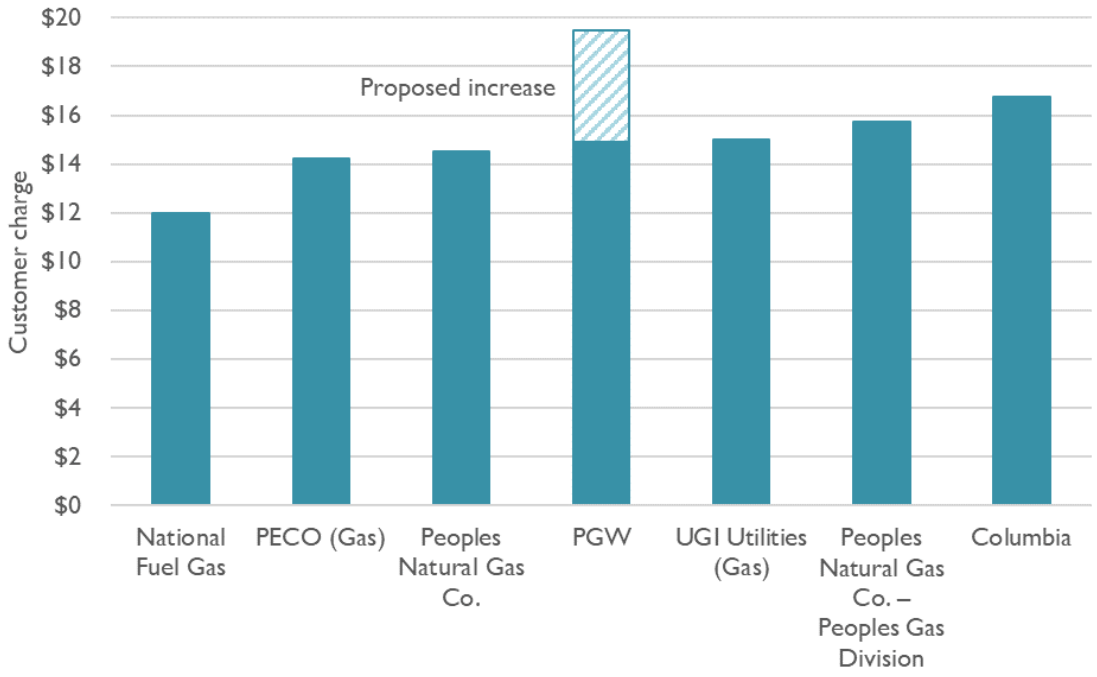
IV. The Proposed Increase to the Residential Customer Charge is Inconsistent with Past Pennsylvania Practices and Would Violate the Principle of Gradualism

Q. How do PGW's current and proposed residential customer charges compare to those of peer utilities?

A. PGW's current residential customer charge of $14.90 is in line with those of peer utilities, at the median of the customer charges provided for comparison by PGW witness Ms. Adamucci.[6] If PGW's proposed increase to its customer charge were granted, this would make PGW's residential customer charge notably higher than those of peer utilities (see **Figure *1***).

[5] PGW Statement No. 6, Direct Test. of Florian Teme, at 6:16–20. (Feb. 27, 2023).
[6] PGW Statement No. 1, Direct Test. of Denise Adamucci, at 14, Table: Residential Customer Charge Comparison (Feb. 27, 2023).

Figure 1. Monthly residential customer charge comparison



Q. Is PGW's proposed increase consistent with recent gas distribution utility rate cases in Pennsylvania?

A. The residential customer charge proposals and outcomes from several recent Pennsylvania gas distribution utility rate cases are listed below.

- Peoples Natural Gas Company (R-2018-3006818): requested increase from $13.95 to $20.00;[7] actual increase to $14.50.[8]
- PGW (R-2020-3017206): requested increase from $13.75 to $19.25; actual increase to $14.90.[9]
- Columbia Gas of Pennsylvania ("Columbia")(R-2020-3018835): requested

[7] Exh. BH-4, Pa. Pub. Util. Comm'n, Opinion and Order, PA PUC Docket No. R-2018-3006818, at 4 (Oct. 3, 2019).
[8] Exh. BH-4, Pa. Pub. Util. Comm'n, Opinion and Order, PA PUC Docket No. R-2018-3006818, at 25 (Oct. 3, 2019).
[9] Exh. BH-5, Pa. Pub. Util. Comm'n, Opinion and Order, PA PUC Docket No. R-2020-3017206, at 4 (Nov. 19, 2020).

increase from $16.75 to $23.00;[10] no actual increase.[11]

- Utilities Gas, Inc. ("UGI") (R-2021-3030218): requested increase from $14.60 to $19.95; actual increase to $15.00.[12,13]
- PECO (R-2022-3031113): requested increase from $13.63 to $18.50;[14] actual increase to $14.25.[15,16]

In each of these past cases, the utility requested a considerable increase in the customer charge, and the ultimate result was a far more modest increase (or, in the Columbia case, no increase at all). Whereas granting the proposed customer charges could have resulted in rate shock for residential customers in these cases, the actual outcomes of these cases reflect the principle of gradualism. Similarly, PGW's current proposed increase in its residential customer charge is unduly large, and in the interest of maintaining gradualism, it should not be granted.

Q. Please explain how PGW's proposed increase to the customer charge would violate the principle of gradualism.

A. Gradualism requires that sudden, adverse changes to customer rates should be minimized.[17] PGW proposes to increase the fixed customer charge for residential customers by over thirty percent. PGW's requested increase is more than double the

[10] Exh. BH-6, Pa. Pub. Util. Comm'n, Opinion and Order, PA PUC Docket No. R-2020-3018835, at 3 (Feb. 18, 2021).
[11] Exh. BH-6, Pa. Pub. Util. Comm'n, Opinion and Order, PA PUC Docket No. R-2020-3018835, at 264–265 (Feb. 18, 2021).
[12] Exh. BH-7, Pa. Pub. Util. Comm'n, Recommended Decision, PA PUC Docket No. R-2021-3030218, at 33, 44 (July 28, 2022).
[13] Exh. BH-8, Pa. Pub. Util. Comm'n, Order, PA PUC Docket No. R-2021-3030218, at 1–2 (Sept. 15, 2022).
[14] Exh. BH-9, Pa. Pub. Util. Comm'n, Recommended Decision, PA PUC Docket No. R-2022-3031113, at 26 (Oct. 11, 2022).
[15] Exh. BH-9, Pa. Pub. Util. Comm'n, Recommended Decision, PA PUC Docket No. R-2022-3031113, at 2 (Oct. 11, 2022).
[16] Exh, BH-10, Pa. Pub. Util. Comm'n, Order, PA PUC Docket No. R-2022-3031113, at 1–2 (Oct. 27, 2022).
[17] The foundational treatise of rate design principles, including the gradualism principle ("rate stability") is: Bonbright, James. *Principles of Public Utility Rates*. New York, NY. Columbia University Press, 1961.

increase that resulted from its 2017 rate case and nearly four times the increase from the 2020 rate case.

Q. Has the Commission recently made any statements about gradualism?

A. Yes. In Columbia's 2020 rate case, the Commission adopted the Administrative Law Judge's ("ALJ") recommendation to fully deny Columbia's request to increase its residential customer charge from $16.75 per month to $23.00 per month, endorsing the ALJ's finding "that the proposed increase to the residential customer charge violates the principle of gradualism."[18,19] In the 2021 UGI rate case, the Commission adopted the ALJ's recommendation to increase the customer charge by substantially less than the amount proposed by the utility, citing "reducing rate shock to customers" as part of its justification.[20]

Q. What conclusion do you draw from these past case examples?

A. I conclude that PGW's proposed increase to the residential customer charge is inconsistent with recent precedent in Pennsylvania and would violate the principle of gradualism. In short, I conclude that the proposed rate increase is too large.

V. PGW Has Not Justified the Need to Increase the Residential Customer Charge for Economic Efficiency

A. PGW's Assessment of Economic Efficiency is Flawed

Q. What is the connection between PGW's CCOSS analysis and its rate design

[18] Exh. BH-11, Pa. Pub. Util. Comm'n, Recommended Decision, PA PUC Docket No. R-2020-3018835, at 399–400 (Dec. 4, 2020).
[19] Exh. BH-6, Pa. Pub. Util. Comm'n, Opinion and Order, PA PUC Docket No. R-2020-3018835, at 264–265 (Feb. 18, 2021).
[20] Exh. BH-12, Pa. Pub. Util. Comm'n, Opinion and Order, PA PUC Docket No. R-2021-3023618, at 30 (Oct. 28, 2021).

proposal?

A. PGW suggests that increasing the customer charge would improve overall efficiency by better aligning rates with costs, as dictated by its CCOSS.[21] In PGW's view, efficiency could be improved by increasing the fixed residential customer charge, thereby reducing the gap between PGW's residential customer charge and the theoretical customer charge indicated by PGW's CCOSS.

Q. What does PGW mean when it refers to "efficiency?"

A. PGW is referring to *economic* efficiency, which is a theoretical condition of resource allocation that maximizes collective wellbeing. Economic efficiency is abstract and unmeasurable. In the gas utility context, economic efficiency means that customers are consuming the optimal amount of gas, and achieving efficiency could even mean *increasing* overall gas consumption—unlike energy efficiency, which targets reductions in consumption.

Q. What are the technical limitations of PGW's CCOSS for assessing economic efficiency?

A. PGW's CCOSS is based upon embedded costs.[22] While PGW's methodology for classifying certain costs as customer-related appears to be reasonable, making conclusions about *efficient* rate design based solely on this study is not reasonable, because the study is based upon historical (embedded) costs and is therefore not forward-looking.

Q. Why must efficient pricing be assessed on a forward-looking basis?

A. Economic theory holds that efficiency is maximized when prices are set to reflect

[21] PGW Statement No. 6, Direct Test. of Florian Teme, at 6:16–20, 8:5–9:4 (Feb. 27, 2023).
[22] Exh. BH-2, PGW Interrogatory Responses, Response to POWER-01-53.

marginal costs.[23] In the context of PGW's customer charge, marginal cost-based pricing would reflect the incremental cost of connecting an additional residential customer to the utility distribution system.[24]

Q. What is the implication of PGW's reliance on an embedded study for the aim of setting efficient rates?

A. The implication is that PGW's CCOSS does not provide a definitive answer about making rates efficient. To determine the theoretically efficient rate design, including the economically efficient level for the residential customer charge, PGW would need to consider marginal cost data.

B. The Commission Should Consider Multiple Goals of Rate Design, Not Just Economic Efficiency

Q. Is improving economic efficiency a worthy goal?

A. Yes. However, like other aspects of rate design, increasing efficiency is not the only consideration when assessing rate design options.

Q. Why do you say that economic efficiency is not the lone aim of rate design?

A. Efficiency is one worthy goal in rate design, but increasing efficiency is not a straightforward objective and it may conflict with other goals—a point that PGW seems to recognize. Given these tensions between competing goals, utilities and regulatory authorities generally strive to balance economic efficiency with other considerations, including gradualism, fairness, the avoidance of undue impacts on low-income, low-

[23] Lazar, Jim, et al., Regulatory Assistance Project, *Electric Cost Allocation for a New Era: A Manual*, at 79 (Jan. 2020), https://perma.cc/S267-RUUE.
[24] When rates based on marginal costs do not yield approved revenue requirements, they can be escalated to ensure recovery of approved costs.

usage, customers, and promoting energy efficiency and conservation.[25]

Q. Could PGW's focus on economic efficiency conflict with other rate design objectives?

A. Yes, it could. I've already discussed the conflict between PGW's proposal and adherence to the principle of gradualism. I also believe that PGW's emphasis on increasing economic efficiency may be in tension with the objectives of promoting reasonable conservation and energy efficiency. Implicit in PGW's argument for increasing the residential fixed charge in the name of economic efficiency is the view that *higher* gas consumption could be a desirable outcome. I will address this issue in more detail in a later section of my Testimony.

Q. How has PGW arrived at its specific proposal to increase the residential customer charge?

A. It is not entirely clear, but it appears that the proposed increase is based on judgment and not the outcome of any specific quantitative analysis. While PGW presents the results of its CCOSS in testimony, it does not ultimately suggest that these results be enacted in cost allocation or rate design. Instead, it has attempted to balance the cost-of-service results with other considerations.[26,27]

Q. Has PGW demonstrated a necessity to increase the residential customer charge?

A. No. PGW has not shown that increasing the residential customer charge is necessary or

[25] The need to balance efficiency with other goals for rate design was noted by James Bonbright in his seminal rate design treatise, where he attributed the "complexity" of "rate-structure problems" partially to "the necessity, faced alike by public utility managements and by regulating agencies, of taking into account numerous conflicting standards of fairness and functional efficiency in the choice of a rate structure." Further elucidating the concept of balancing objectives with reference to the specific challenge of designing rates to be both cost-reflective and simple, Bonbright wrote that, "as with other clashes among various desiderata of rate-making policy, the wise choice must be that of wise compromise." See: Bonbright, James. *Principles of Public Utility Rates*. New York, NY. Columbia University Press, 1961, at 288–289.

[26] PGW Statement No. 6, Direct Test. of Florian Teme, at 6:16–25 (Feb. 27, 2023).

[27] Exh. BH-2, PGW Interrogatory Responses, Response to POWER-01-52.

even warranted. While PGW cites concerns about efficiency and revenue stability, it is evident that the proposed increase is ultimately based upon PGW's judgment rather than relevant, forward-looking analysis. In my view, for the reasons discussed above, the balance of judgment should militate against increasing the residential charge. In the remainder of my testimony, I will consider two additional factors that weigh against increasing the residential customer charge: adverse impacts on low-income customers, and diminished incentives to conserve energy.

Q. Should PGW increase its residential fixed charge to promote revenue stability?

A. No. I understand that PGW favors greater fixed charge recovery because this recovery is *fixed*. In other words, raising fixed charges would increase the share of revenues that is assured to PGW. Yet PGW has not demonstrated that revenue sufficiency is a material concern, and even if it had, concerns about revenue sufficiency are not a reason alone to increase fixed charges.

VI. Increasing the Residential Customer Charge Would Harm Low-Income Customers

Q. Please explain your concerns about impacts to low-income customers.

A. PGW's proposal to increase the residential fixed charge would also increase the fixed proportion of customers' monthly bills (Table 1). For low-income customers, the increase to the fixed portion of the bill may be particularly deleterious because it is unavoidable. On the other hand, increases to variable rates can be mitigated by reducing gas consumption.

Table 1. Impact of rate changes to fixed share of residential bills, by usage

Usage tier	Monthly use (Mcf)	Fixed share (current)	Fixed share (proposed)	Change in fixed share
Low usage	30.5	24%	27%	3.8%
Typical usage	71	12%	14%	2.3%
High usage	229	4%	5%	0.9%

Source: Exh. BH-2, PGW Interrogatory Responses, Response to OCA-05-47, Attachment C; Response to POWER-01-57.

Q. Does PGW's Customer Responsibility Program ("CRP") address these concerns?

A. Not adequately. PGW incorrectly claims that CRP "render[s] the proposed changes moot" for low-income customers, low users of energy, and customers on fixed incomes.[28] However, only a small proportion of eligible households are enrolled in CRP.

Q. Why do you conclude that CRP participation is low?

A. Based on the latest available data from December 2022, only forty-one percent of confirmed low-income customers in PGW's service territory were enrolled in CRP.[29] In addition, PGW's count of confirmed low-income customers is likely incomplete, meaning that the percentage of enrolled versus eligible customers is probably even lower than reported. PGW identifies "confirmed low income" customers as those who have proactively sought assistance through CRP or Low Income Home Energy Assistance Program ("LIHEAP") grants or who have contacted PGW to self-declare their low-income status in the past two years.[30]

Q. Are there other reasons to be concerned about impacts to low-income, low-use customers?

A. Yes. In addition to the concerns already articulated about impacts to all low-income

[28] Exh. BH-2, PGW Interrogatory Responses, Response to POWER-01-62.
[29] Exh. BH-2, PGW Interrogatory Responses, Response to POWER-01-61.
[30] Exh. BH-2, PGW Interrogatory Responses, Response to CAUSE-01-3.

customers, the proposed fixed charge increase would disproportionately raise the bills of low-use customers—including low-income, low-use customers. Simply put, the lower a customer's monthly gas consumption, the greater the percentage increase in their bill. The relationship between consumption and bill impacts is shown below in Table 2.

Table 2. Impacts of rate changes on total bills for residential customers, by usage

Usage tier	Monthly use (Mcf)	Total bill (current)	Total bill (proposed)[31]	Percentage change in bill
Low usage	30.5	$63.00	$71.12	12.9%
Typical usage	71	$125.38	$137.73	9.9%
High usage	229	$368.75	$397.59	7.8%

Q. How would the two adverse effects of fixed charge increases impact low-income, low-use customers?

A. These two effects would interact unfavorably for low-income, low-use customers, as these customers would experience disproportionate bill increases while simultaneously suffering a decline in their ability to mitigate against the bill increases through conservation.

VII. Increasing the Residential Customer Charge Would Reduce Incentives for Conservation and Energy Efficiency

Q. What is the connection between customer charges and incentives for conservation and energy efficiency?

A. Recovering revenues through increased customer charges rather than increased variable rates will tend to reduce the incentive to conserve energy relative to alternative rate

[31] These values were calculated using PGW's response to OCA-05-47, Attachment C and differ slightly from the values provided in PGW's response to POWER-01-58. Both responses are included in Exh. BH-2, PGW Interrogatory Responses.

designs with lower fixed charges. That's because customers with higher fixed charges and lower variable rates stand to derive less of an economic benefit from conservation since a lower share of their monthly bill is avoidable. Meanwhile, under a low fixed charge and higher variable rate scheme, customers stand to benefit more from conservation and energy efficiency.

Q. Does PGW's proposal have adverse implications for conservation and energy efficiency?

A. Yes, I believe that it does. PGW proposes to recover a large share of its requested increase in residential class revenues through raising the residential customer charge rather than by increasing variable delivery charges. Specifically, PGW is proposing to increase its residential customer charge by about thirty-one percent and to increase its variable delivery charge for the residential class by only about eleven percent.[32] Favoring increases to fixed charges over increases to variable charges reduces incentives for conservation and energy efficiency and encourages *greater* consumption of gas.

Q. Has PGW introduced any evidence justifying that it is in the public interest for its residential customers to receive price signals that incentivize consuming more gas instead of rewarding efficiency?

A. No, and I do not believe that sending a price signal that deters energy efficiency is in the public interest. Rather, PGW has only suggested that increasing the fixed residential charge will improve economic efficiency. If PGW believes that a higher fixed charge/low variable rate regime is desirable, then it should provide evidence that such an approach is in the public interest and consistent with state policy and regulatory priorities.

Q. Has the relationship between customer charges and conservation been addressed in

[32] Exh. BH-2, PGW Interrogatory Responses, Response OCA-05-47, Attachment C.

any recent Pennsylvania proceedings?

A. Yes. In Columbia's 2020 rate case, the ALJ agreed with the Office of Consumer Advocate ("OCA") that a lower fixed monthly charge would provide greater incentive to customers to conserve energy and reduce consumption.[33] The Commission in turn accepted the ALJ's recommendations in that case.[34]

Q. Have other utility regulatory commissions recognized the detrimental impact of higher fixed customer charges?

A. Yes, the negative effects of increasing customer charges are well-recognized in both gas and electric proceedings. One example comes from a 2016 rate case in Maryland. While the Potomac Electric Power Company requested to increase its basic service charge for residential customers from $7.39 per month to $12.00 per month, the Maryland Public Service Commission approved a much smaller increase to only $7.60 per month and explained that the proposed change would result in customers having less control over their bills and would be antithetical to energy conservation efforts:[35]

> In arriving at this increase, we place emphasis on Maryland's public policy goals that intend to encourage energy conservation. Maintaining relatively low customer charges provides customers with greater control over their electric bills by increasing the value of volumetric charges. No matter how diligently customers might attempt to conserve energy or respond to AMI-enabled peak pricing incentives, they cannot reduce fixed customer charges.[36]

[33] Exh. BH-11, Pa. Pub. Util. Comm'n, Recommended Decision, PA PUC Docket No. R-2020-3018835, at 401 (December 4, 2020).
[34] Exh. BH-6, Pa. Pub. Util. Comm'n, Opinion and Order, PA PUC Docket No. R-2020-3018835, at 264–265 (February 18, 2021).
[35] Exh. BH-3, Maryland Pub. Serv. Comm'n, Order No. 87884, MD PSC Case No. 9418, at 110 (Nov. 15, 2016).
[36] Exh. BH-3, Maryland Pub. Serv. Comm'n, Order No. 87884, MD PSC Case No. 9418, at 110 (Nov. 15, 2016).

IX. Summary of Recommendations

Q. Please summarize your findings.

A. I find that PGW has not justified the need to increase its residential customer charge. Specifically, I find that:

- The proposed increase would violate gradualism and run counter to recent Pennsylvania regulatory precedent and rate design practices among peer utilities in the state.
- PGW has not demonstrated that the residential customer charge needs to be increased to promote economic efficiency.
- Increasing the residential customer charge would unduly harm low-income customers.
- Increasing the residential customer charge would blunt incentives for conservation and energy efficiency.

Q. Please summarize your recommendations.

A. I recommend that the Commission deny PGW's requested increase in the residential customer charge and instead maintain the residential customer charge at its current level.

X. Conclusion

Q. Does this conclude your testimony?

A. Yes.

VERIFICATION

I hereby verify that the facts contained in the foregoing testimony are true and accurate to the best of my knowledge, that I am duly authorized to make this verification, and that I expect to be able to prove the same at any hearing held in this matter. I understand that the statements herein are made subject to penalties of 18 Pa. C.S. § 4904 (relating to unsworn falsification to authorities).

Dated: May 31, 2023

/s/
Ben Havumaki

CERTIFICATE OF SERVICE

I hereby certify that I have this day served via email a true copy of this document upon the parties, in accordance with the requirements of 52 Pa. Code § 1.54 (relating to service by a party).

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Dated: May 31, 2023

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BEFORE THE
PENNSYLVANIA PUBLIC UTILITY COMMISSION

Pennsylvania Public Utility Commission, et al. v. Philadelphia Gas Works	Docket No. R-2023-3037933

DIRECT TESTIMONY OF MARK D. KLEINGINNA (CORRECTED)

ON BEHALF OF

POWER INTERFAITH

July 17, 2023

POWER Interfaith Statement No. 1

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EXHIBIT LIST

Exh. MDK-1, Mark D. Kleinginna Curriculum Vitae.

Exh. MDK-2, PGW, Business Diversification Study.

Exh. MDK-3, Ariel Drehobl, et al., American Council for an Energy Efficient Economy, *How High Are Household Energy Burdens?* (Sept. 2020).

Exh. MDK-4, PGW, FY 2024 Capital Budget Filing (Jan. 3, 2023).

Exh. MDK-5, PGW, Interrogatory Responses.

Exh. MDK-6, PGW, 2023 Base Rate Case Public Input Hearing Transcript (May 23, 2023).

Exh. MDK-7, Philadelphia Gas Commission, PGW FY 2024 Capital Budget Review Proceeding, Public Hearing Transcript (Mar. 7, 2023).

Exh. MDK-8, New York Public Service Commission, Case 19-G-0066, Order Approving Non-Pipes Alternative Projects Amortization Period and Shareholder Incentive Mechanism for Specified Projects (June 17, 2022).

Exh. MDK-9, NYSEG, Non-Pipes Alternative 2021 Second Quarter Report (Aug. 30, 2021).

Exh. MDK-10, Colorado Public Utilities Commission, Proceeding No. 21R-0449G, Commission Decision Adopting Rules (Dec. 1, 2022).

Exh. MDK-11, PGW, 2022 Annual Comprehensive Financial Report (Feb. 24, 2023).

Exh. MDK-12, Philadelphia Gas Commission, PGW FY 2024 Capital Budget Review Proceeding, PGW Written Data Request Response to POWER-I-21.

Exh. MDK-13, PGW, Quarterly Sustainability Report (Apr. 2023).

Exh. MDK-14, Steve Schiller, et al., Lawrence Berkeley National Laboratory, *Cost of Saving Natural Gas Through Efficiency Programs Funded by Utility Customers: 2012–2017* (May 2020).

Exh. MDK-15, PA CSE Analysis of PGW Energy Efficiency Initiatives.

Exh. MDK-16, MMBtu Reduction Per Customer of PGW Energy Efficiency Initiatives.

* Exhibits are available for download here.

I. Witness Identification and Qualifications

Q. Please state your name, business name and address, and role in this proceeding.

A. My name is Mark D. Kleinginna. I work for Emergent Urban Concepts, LLC ("Emergent"), with a business address at 13 Kendall Avenue, Sleepy Hollow, NY 10591. I appear here in my capacity as an expert witness on behalf of POWER Interfaith.

Q. Please summarize your experience and expertise in the utility industry.

A. I have worked for 34 years in the energy industry as a consultant, analyst, manager, executive, and professor.[1] I have been employed by a utility consulting practice, a gas local distribution company, an end-user consulting company, a metals company, a retail energy provider, a broker, and a university, as well as being self-employed. I received a Bachelor of Science and a Master of Arts Degree in Economics from the Pennsylvania State University ("Penn State") in 1988 and 1990, respectively.

I also earned a Master of Professional Studies in Renewable Energy Systems and Sustainability with distinction from Penn State in 2021, where I now teach classes in renewable energy project management and finance, renewable energy integration and economics, and energy markets. Most recently, Emergent has been retained to manage a significant research project on geothermal technologies in Massachusetts, assist a utility in New York State to score utility thermal energy network applications, and develop non-pipeline alternatives ("NPAs") proposals for natural gas distribution companies in the New York City region.

Q. Have you ever testified before the Pennsylvania Public Utility Commission or other regulatory agencies?

[1] My curriculum vitae is attached as Exhibit MDK-1.

A. Yes. I have testified before the Pennsylvania Public Utility Commission in Equitable Gas Company's 1994 1307(f) (gas cost recovery) proceeding as well as in the 1997 West Penn Power electricity restructuring proceeding on behalf of Allegheny Industries. I testified at the Federal Energy Regulatory Commission in proceedings leading up to Order 2000. I have submitted testimony in proceedings before the Indiana Utility Regulatory Commission and the New York Public Service Commission on natural gas cost of service and rate design. I have also sponsored testimony before both the West Virginia and Kentucky Public Service Commissions. I also sponsored testimony in the FY 2024 PGW Capital Budget, FY 2023 PGW Capital Budget, and FY 2023 PGW Operating Budget proceedings before the Philadelphia Gas Commission. I testified before the Philadelphia City Council and the Massachusetts State Senate on decarbonization topics in April of last year as well.

II. Purpose of Testimony

Q. What is the purpose of your testimony?

A. The purpose of my testimony is to offer findings and recommendations regarding the following aspects of PGW's rate increase filing: (1) PGW's capital spending plan, how it affects energy affordability, and the need to systematically evaluate least cost alternatives, including NPAs, and (2) PGW's planned lobbying expenditures.

III. PGW's Capital Spending Plan and the Need to Evaluate Least Cost Alternatives, Including Non-Pipeline Alternatives, to Protect Energy Affordability

A. Overview

1. Capital Planning and Energy Affordability are Linked

Q. Have you reviewed PGW's 2023 Base Rate Case filing?[2]

A. Yes.

Q. Have you reviewed the Commission's regulations concerning ratemaking procedures and considerations for determining just and reasonable rates for PGW?[3]

A. Yes.

Q. Do you have any concerns about PGW's 2023 Base Rate Case filing?

A. Yes. I have concerns about the proposal to raise rates by $85.8 million (or 10.3% on a total revenue basis) annually and its negative impacts on energy affordability.[4] As PGW's Business Diversification Study noted, 23% of Philadelphians live below the poverty line, and "Philadelphian households on average spend around 6.7% of their income on energy, about double the national average, making Philadelphia one of the most energy-burdened cities in the United States."[5] The American Council for an Energy-Efficient Economy ("ACEEE") found in a 2020 report that median energy burden in Philadelphia is 9.5% for low-income households, with median energy burden at 3.2% for all households, indicating a higher energy burden in low-income households.[6] ACEEE also notes that 6%

[2] PGW, 2023 Base Rate Case Filing (Feb. 27, 2023).
[3] 52 Pa. Code §§ 69.2702–2703.
[4] PGW, 2023 Base Rate Case Filing, Vol. I, Statement of Reasons, at 1 (Feb. 27, 2023).
[5] Exh. MDK-2, PGW, Business Diversification Study, at 8.
[6] Exh. MDK-3, Ariel Drehobl, et al., American Council for an Energy Efficient Economy, *How High Are Household Energy Burdens*?, at 16 (Sept. 2020).

is considered by researchers to be a "high" energy burden, and 10% is considered a "severe" energy burden.[7]

Given these stakes, I am concerned, as I discuss further below, that PGW does not appear to be taking all possible steps to keep its capital and operating expenses as low as possible, thereby minimizing the need for rate increases that add to Philadelphians' energy burden. Notably, I am concerned by the capital and operating expense related to the plant in service (specifically the expenses associated with gas processing and distribution) as well as the pipeline replacement program that PGW is currently undertaking and plans to accelerate.

Q. Do you have any recommendations that could help mitigate your concerns about PGW's high levels of capital spending and its energy affordability impacts?

A. Yes. One of the key reasons PGW identifies for its proposed rate increase is its ongoing "initiatives to modernize its infrastructure" and "make its system safer and more efficient."[8] According to PGW's 2024 Capital Budget Forecast, it will spend $22,456,000 on gas processing and $140,734,000 on mains in the 2024 fiscal year.[9] PGW intends to fund its entire 2024 Capital Budget with $102,000,000 in debt, $41,000,000 from the Distribution System Improvement Charge ("DSIC"), $10,752,000 from a Pipeline and Hazardous Materials Safety Administration ("PHMSA") grant, and $53,207,000 from internally generated funds ("IGF").[10]

In order to avoid spending more on these initiatives than is necessary, it is

[7] Exh. MDK-3, Ariel Drehobl, et al., American Council for an Energy Efficient Economy, *How High Are Household Energy Burdens?* (Sept. 2020).
[8] PGW, Base Rate Case Filing, Vol. I, Statement of Reasons, at 1 (Feb. 27, 2023; PGW Rate Filing, Vol. II, Statement 1, Direct Test. of Denise Adamucci, at 4:18–19 (Feb. 27, 2023); PGW Rate Filing, Vol. II, Statement 7, Direct Test. of Robert Smith, at 7:1–11 (Feb. 27, 2023).
[9] PGW, Base Rate Case Filing, Vol. I, Part 2, at 181, 191 (Feb. 27, 2023).
[10] PGW, Base Rate Case Filing, Vol. I, Part 2, at 4 (Feb. 27, 2023).

essential to ensure that PGW is systematically examining least cost alternatives as part of its capital program. The desire to improve and modernize the PGW infrastructure should not take place in the vacuum of simply expanding and/or replacing the gas delivery system in-kind as though there were no alternatives to influence current design day, seasonal, and annual delivery conditions.

With regard to infrastructure planning and modernization, there are two possible approaches to meeting infrastructure requirements on the design day and throughout the year. First, one can assume a constant design day and annual throughput and in turn build, maintain, and replace its system to meet those requirements. Second, one can work to lower design day requirements as well as seasonal and annual requirements, and then build, maintain, and replace a system with lower capital requirements. If means can be identified to reduce design day throughput, then capital costs for distribution and gas processing infrastructure may be significantly reduced, as I discuss further below, which will help keep rates low and avoid exacerbating Philadelphians' energy burden.

Q. Is it important for PGW to examine least cost alternatives in its capital planning?

A. Yes. In my opinion, ensuring integrated and transparent consideration of least cost alternatives is the only way to ensure that rates are just and reasonable, because it is the only way to ensure that a utility is not overspending and unnecessarily contributing to ratepayers' energy burden.

2. The Role of Non-Pipeline Alternatives in Capital Planning that Maximizes Energy Affordability

Q. Do you have any recommendations about specific ways in which PGW could integrate consideration of least cost alternatives into its capital planning?

A. Yes. PGW should ensure that it is examining NPAs on equal footing alongside traditional

capital spending on new and replacement pipelines and gas processing plant, to ensure that the least cost solution to infrastructure needs is identified and implemented.

Q. What are NPAs?

A. NPAs are methods of meeting peak and seasonal loads that do not require new natural gas pipeline or other gas plant to be developed. NPAs can advance energy affordability by lowering capital needs and lowering upstream transportation and gas costs if deployed to reduce peak and seasonal loads. Specifically, according to National Grid, an NPA is "any targeted investment or activity that is intended to defer, reduce, or remove the need to construct or upgrade components of a natural gas system, or 'pipeline investment.'"[11] As Con Edison has noted, "[n]on-pipeline alternatives have the potential to reduce peak gas load, defer or eliminate gas infrastructure, and improve grid reliability."[12]

An NPA can include "any action, strategy, program, or technology that meets this definition and these requirements."[13] As National Grid explains, "[s]ome technologies and methodologies that can be applicable as an NPA investment include demand-side measures, such as demand response, sewer heat recovery, advanced controls strategies, new business models, energy efficiency or electrification."[14]

Q. How do NPAs relate to demand-side management ("DSM") programs?

A. NPAs are a capital planning concept. In the phrase NPA, the term "alternative" refers to the deployment of an NPA as an alternative to traditional capital spending where an NPA is more cost effective. Reducing the amount of capital in service in this fashion can generate both lower upfront spending requirements as well as savings over time through

[11] National Grid, *What is an NPA?*, https://perma.cc/WMR7-PVKU.
[12] Con Edison, *Non-Pipeline Alternatives for Natural Gas Customers,* https://perma.cc/MXQ2-3427.
[13] National Grid, *What is an NPA?*, https://perma.cc/WMR7-PVKU.
[14] National Grid, *What is an NPA?*, https://perma.cc/WMR7-PVKU.

reduced operating expenses and debt financing expenses. Many of the same measures used in DSM programs, such as energy efficiency and demand response, can function as NPAs if they are integrated into the capital planning process.

Q. You have expressed a particular concern with energy burden on residential ratepayers, and identified how NPAs could mitigate that concern. Do NPAs benefit other rate classes as well?

A. Yes. As I discuss in detail further below, rates for each class are assessed using a class cost of service study ("CCOSS"). The CCOSS is driven by design day requirements, which produce a capital planning need that then contributes to the revenue requirement. As such, revenue requirement savings that accrue from reduced design day requirements will flow through to all customer classes. This includes not just residential customers, but also small businesses and larger commercial and industrial ("C&I") customers.

Additionally, NPAs function by identifying ways in which spending a smaller amount of money can save a larger amount of money that would otherwise go to traditional capital spending. It may be that, in some instances, energy efficiency or demand response incentives targeted to C&I customers could allow deferral or avoidance of capital investments that would result in future savings for all rate classes. For example, in a particular constrained area of PGW's system, geotargeted enhanced demand response incentives to C&I customers could offer a revenue stream to C&I customers while deferring and avoiding the need for capital investments that would add to rate pressure. The interconnected nature of capital planning involving NPAs is another reason why, as I discuss in more detail below, I recommend that PGW convene a collaborative working group to chart a path forward on NPAs.

3. How Non-Pipeline Alternatives Work

Q. How could PGW employ NPAs to lower its overall capital and operating costs?

A. As PGW points out in its most recent Capital Budget filing, "[a] major driving factor in determining key components of PGW's Capital Budget and Forecast requirements is the design day/design hour forecast prepared by the Gas Management area."[15] NPAs can help reduce design day demand on the gas system by reducing the demand for gas that needs to be delivered on the coldest days and in the coldest hours of the heating season. As I discuss in detail below, this in turn can reduce the amount of capital required to be in service and the associated operating expenditures and debt financing costs.

Q. Please explain how PGW's unique situation with respect to providing design day deliverability is conducive to NPAs.

A. PGW is unlike many other gas utilities because it maintains and operates two liquefied natural gas ("LNG") facilities in its service territory to meet a large portion of its design day requirement. This means that NPAs that function to lower design day volumes can help reduce the potential diameter of distribution pipeline on a gas utility's distribution system and reduce the need for LNG on the PGW system. This means that the typical cost-benefit analysis for NPAs is enhanced on the benefit side due to the higher capital costs associated with deliverability for the PGW system because of PGW's need to continually invest in and maintain the LNG asset. This cumulative effect of a design day reduction makes NPAs all the more compelling for PGW's system.

Q. Please explain how PGW's status as a municipal utility is conducive to NPAs.

[15] Exh. MDK-4, PGW, FY 2024 Capital Budget Filing, at 11 (Jan. 3, 2023).

A. Unlike investor-owned utilities, PGW is not subject to pressure from shareholders to grow its capital base and thereby generate a higher rate of return on equity from shareholders, since PGW has no shareholders and does not generate a return on equity. As such, PGW is well-positioned to innovate and lead on developing transparent and even-handed systems for NPA deployment that help keep Philadelphians' energy burden to the minimum necessary.

Q. Do you have any other reasons to believe that PGW is well-positioned to lead and innovate on NPAs?

A. Yes. PGW has a history of innovation and deployment of new technology and systems. As PGW's Business Diversification Study notes, "PGW was founded in 1836 to deliver gas lighting for streets, businesses, and homes in Philadelphia."[16] Subsequently, "[i]n 1926, PGW helped the City of Philadelphia become one of the first cities in the United States to actively replace coalfired hot water heaters with water heaters powered by natural gas."[17] Later, in the 1950s, "PGW expanded its services by maintaining retail appliance stores and switching production from coal gas to the purchasing of natural gas."[18] My recommendations that PGW lead on deployment of NPA programs is consistent with this prior history of deployment of new technology and new systems to serve Philadelphians.

Additionally, PGW has already implemented several energy efficiency programs that could serve as incubators for future more targeted NPA measures.[19] These programs have been very successful on a customer-by-customer basis in reducing usage, as I

[16] Exh. MDK-2, PGW, Business Diversification Study, at 11.
[17] Exh. MDK-2, PGW, Business Diversification Study, at 11.
[18] Exh. MDK-2, PGW, Business Diversification Study, at 11.
[19] Exh. MDK-5, PGW, Interrogatory Responses, Response to POWER-01-32.

discuss below, and indicate great promise for more integrated and systematic deployment of NPAs to lower the cost of service.

Q. Is there time to consider NPAs, given that some capital needs may be urgent? For example, don't some pipelines need to be replaced right away?

A. Yes. It is true that areas of PGW's system may have pipelines that need to be replaced as soon as possible due to their deteriorated condition. However, according to PGW's own projections, it will take decades to replace all of the pipelines that it plans to replace.[20] As I discuss below, starting with examining pipeline segments that PGW plans to replace no earlier than two years from the FPFTY will provide ample time to examine whether NPAs can help lower costs, for example, by allowing the replacement of a pipe with one of smaller diameter. There is even more time, of course, to examine potential least cost solutions for pipeline replacement that is slated to occur in five years, or a decade, or further out in time.

Q. Is there any indication that PGW's customers support NPAs?

A. Yes. At the public input hearing for this proceeding, numerous customers expressed their support for NPAs. For example, one commenter called upon the Commission to "require PGW to meet with stakeholders to plan for a non-pipeline alternative."[21] Another commenter testified that "[w]e want to talk about non pipe alternatives. I'm asking the PUC to reject this proposed base rate increase. It's going to harm our low-income neighbors, and we will get no value for our money."[22] A further commenter testified that

[20] PGW Statement No. 7, Direct Test. of Robert K. Smith, at 2:17-3:5 (Feb. 27, 2023).
[21] Exh. MDK-6, PGW, 2023 Base Rate Case Public Input Hearing Tr. at 24:23–24 (May 23, 2023).
[22] Exh. MDK-6, PGW, 2023 Base Rate Case Public Input Hearing Tr. at 31:18–22 (May 23, 2023).

"we really need a mandate for PGW to come to the table with various stakeholders to discuss non-pipe alternatives."[23]

This is consistent with public support for NPAs expressed at the public hearing convened as part of the Philadelphia Gas Commission proceeding to review PGW's proposed FY 2024 Capital Budget. As one commenter at that public hearing testified, "Philadelphia is an incredibly energy-burdened city and this proposed rate increase will hurt the Philadelphians who are already struggling the most...I'm asking you to please prioritize non pipeline alternatives to help struggling Philadelphia families save on energy costs now and to ensure that our City remains a great place for my daughter and all of our kids to grow up."[24]

4. Examples of Non-Pipeline Alternatives

Q. Please describe some examples of basic NPA types. To start, how could a weatherization and energy efficiency NPA work, and how it would work to lower the design day requirement?

A. Weatherization and energy efficiency function to reduce energy usage throughout the heating season, rather than seeking to surgically lower the design day through measures that reduce the highest demand requirements. These measures generally include tightened building envelopes which will certainly lower energy consumption during the entire heating season. But they will also lower design day loads due to the efficiencies of needing to burn less gas for the same level of comfort.

Q. How could a demand response NPA measure help lower the design day requirement?

[23] Exh. MDK-6, PGW, 2023 Base Rate Case Public Input Hearing Tr. at 42:5–7 (May 23, 2023).
[24] Exh. MDK-7, Philadelphia Gas Commission, PGW FY 2024 Capital Budget Review Proceeding, Public Hearing Tr., at 85:8–21 (Mar. 7, 2023).

A. Demand response is the action of consumers on an energy system to reduce demand during times of high stress on the system during demand peaks. These actions can be voluntary (at the discretion of the customer) or involuntary (at the discretion of the utility). For PGW, a demand response NPA lowers the need for investment in both pipeline and peak supply investment by reducing the design day demand.

Q. How could an advanced controls NPA measure allow for a lower design day requirement?

A. Advanced controls, much like demand response, would enable PGW or the customer to lower usage both generally and during peak periods. This would lower the design day requirement, which is a significant cost causation factor on the PGW system. Advanced controls would allow for certain temperature set points during high demand times of the day. The simplest application of this NPA is a smart thermostat, which has actually produced very favorable results for PGW over the past few years in terms of reduction in load per dollar.[25]

Q. How could a thermal energy network NPA work, and how could it help lower the design day requirement?

A. A thermal energy network utilizes movement of a fluid such as water through a pipe network to transfer heat from a source to a sink. In certain instances, the source can be groundwater from a geothermal bore hole. Other sources can include excess heat from a data center, a wastewater treatment plant, nearby bodies of water like ponds and rivers, as well as latent heat in the fluid itself, which could include the wastewater mains.[26] The

[25] Exh. MDK-5, PGW, Interrogatory Responses, Response to POWER-01-32; Exh. MDK-15, PA CSE Analysis of PGW Energy Efficiency Initiatives.

[26] Latent heat in wastewater can be harvested through a heat exchanger and then utilized to pre-heat water in a tank or in a boiler, thereby reducing energy needs significantly. *See*, *e.g.*, *World's Largest Wastewater Energy Transfer Project Underway for Toronto Hospital*, Environmental Science and Engineering Magazine (Nov. 3, 2021), https://perma.cc/RJX7-AUXU.

network can be utilized as a source of heat or cooling itself or it can be used in conjunction with a heat pump or network of heat pumps. By reducing the demand for gas for heating, this can help reduce the design day requirement and costs to serve an area of the distribution system. As I discuss below, PGW is currently exploring the feasibility of this measure through its Geothermal Feasibility Study.[27]

Q. Could you describe, using an illustrative example, how a gas utility might reduce its capital spending through the planned and systematic deployment of NPAs?

A. Yes. A gas utility may want to serve new load or need to replace leak-prone pipeline in a district. Serving the new load may require looping or incremental compression. Pipe replacement would require new pipeline at a certain diameter. The dispatch on a cost per MMBtu/d basis of various NPAs in a portfolio of solutions would rank the available NPAs to most effectively help serve the requirements.

In some cases, this portfolio of solutions would be less expensive than the addition of compression or looping, or could allow the replacement of pipe at a smaller diameter, thereby reducing costs. Emergent has developed just such a dispatch model utilizing solutions that include retrofitting fan coils and burner controls, façade overclads, domestic hot water electrification, various forms of heat recovery, thermostat controls, and thermal network implementation. This model allows the analyst to cost out the various solutions and dispatch them in a least-cost manner against the capital and operating costs of installing or replacing the gas plant.

These solutions can also be ranked in terms of how long they would take to implement, as timing is always an important factor. Since these solutions require less or the same amount of time to implement as most gas infrastructure capital investments,

[27] *See infra* at III.B.3.

NPAs can and should be considered in the annual capital budgeting as well as the rate-making process.

Q. Are there gas utilities in other jurisdictions that have implemented NPAs or are considering them?

A. Yes. Gas utilities in New York and Colorado have implemented or are developing NPAs. The New York Public Service Commission approved implementation of NPAs in the Con Edison territory via an order dated June 17, 2022.[28] New York State Electric and Gas ("NYSEG") has utilized NPAs to meet load growth in its Lansing area since 2021, with measures there including air source heat pumps, ground source heat pumps, energy efficiency, industrial heat recovery, fuel switching, and education and outreach.[29] Additionally, the Colorado Public Utility Commission has issued an order that requires gas utilities to develop an NPA analysis framework and screen certain proposed capital investments for NPAs.[30]

B. The Potential for Savings from Non-Pipeline Alternatives

1. Background

Q. How can one estimate the potential for savings from NPAs?

A. To start, it's important to note that the costs and benefits from NPAs will generally be highly specific to the location in which they are deployed. The nature, vintage, and configuration of distribution infrastructure in a particular area will determine whether and to what degree a potential NPA solution generates savings as compared to traditional capital solutions. So it is actually difficult to estimate in an abstract or generic way. This

[28] Exh. MDK-8, New York Public Service Commission, Case 19-G-0066, Order Approving Non-Pipes Alternative Projects Amortization Period and Shareholder Incentive Mechanism for Specified Projects (June 17, 2022).
[29] Exh. MDK-9, NYSEG, Non-Pipes Alternative 2021 Second Quarter Report, at 2–6 (Aug. 30, 2021).
[30] Exh. MDK-10, Colorado Public Utilities Commission, Proceeding No. 21R-0449G, Commission Decision Adopting Rules, at 83 (Dec. 1, 2022).

is why, as I discuss in more detail below, I recommend that PGW convene a collaborative working group to evaluate potential NPA savings opportunities in its service territory.

To estimate potential savings, I prepared some illustrative quantitative analyses that indicate that substantial savings are achievable if PGW were to integrate NPAs more fully into its capital planning. I say more fully because, as I discuss further below, PGW is already executing certain NPA initiatives. My recommendations build on that work and integrate it more thoroughly into the capital planning process so that the greatest possible savings can be realized for ratepayers.

Q. In your quantitative analysis, you draw on data from PGW's class cost of service study. How does a class cost of service study relate to the potential for savings from NPAs?

A. The classification step in the class cost of service study ("CCOSS") informs how the costs in various accounts in capital and operating expenses are caused. Classification is the step where we assign every account based on cost causation into the demand (or capacity) class, or volumetric class or customer class of costs. By looking at this classification process, we can see that in certain cases, the amount demanded by the system is what causes costs to increase. So if the demand is reduced, the cost of providing service for that particular account is reduced.

Q. Please explain the steps undertaken in a class cost of service study.

A. There are three steps undertaken in a CCOSS. These are functionalization, classification, and allocation.[31] To functionalize costs, we must determine the purpose of each specific account represented by the plant in service or the operating expense serves. For instance,

[31] *See* Darryl Tietjen, Pub. Util. Comm'n of Texas, *Tariff Development I: The Basic Ratemaking Process, Briefing for the NARUC/INE Partnership*, at 8, slides 43–44 (2023), https://perma.cc/DY3R-PZFU; Kim Wissman, NARUC, *Embedded Cost of Service*, at 12–25 (2023), https://perma.cc/RP87-2CNT.

the services accounted for in Account 380 serve to deliver gas from the distribution main to a particular customer.[32] Consequently, Account 380 serves a customer function. Distribution Mains (Account 376) serve to deliver gas from upstream or on-system receipt points to load centers, therefore we functionalize these costs into the distribution function.

Once each of the costs is functionalized, they are then classified according to cost causation principles. Here we determine on what factor or basis does the cost of each account vary. For instance, in the case of gas processing, the size of that plant is based on daily sendout for the design day.[33] These costs are therefore classified as demand costs. Distribution mains deliver gas all year round, but are sized to deliver gas on the design day PGW has chosen to classify costs associated with distribution mains based on both demand and commodity in a 50/50 fashion.[34]

After classification has occurred, the analyst allocates these costs to customer classes based on factors such as rate class contribution to annual throughput (commodity), design day (demand), and customer (number of customers). This allows for capital and operating expenses to be spread to each customer class of service, thereby allowing for the rate analyst to see if certain customer classes are being unfairly burdened by the rate design (current or proposed) according to embedded cost causation.

Q. Please discuss cost causation when it comes to gas processing.

A. PGW has chosen to classify gas processing costs (which they refer as storage expenses) as based on demand (also referred to as capacity).[35] PGW chose to allocate these costs on

[32] 18 C.F.R. § 201 (defining each account in the Uniform System of Accounts for gas utilities).
[33] PGW Statement No. 5, Direct Test. Of Constance E. Heppenstall, at 5:9-11 (Feb. 27, 2023).
[34] PGW Statement No. 5, Direct Test. of Constance E. Heppenstall, at 5:15-20 (Feb. 27, 2023).
[35] PGW Statement No. 5, Direct Test. Of Constance E. Heppenstall at 5:9-11 (Feb. 27, 2023).

the basis of a Maximum Day Excess Factor. This is calculated as the difference of the class contribution to design day less the class contribution to the average day. This suggests that the costs for the gas processing plant in PGW's view are related to the existence of the excess demand over the average demand on the system.[36] In other words, the need for the gas processing plant is derived from the need to deliver much more gas on the design day than on the average day. It is clear that if the design requirement were able to be lower, we could lower the capital and the operating expenses associated with gas processing since these costs are caused by the design requirement being so much greater than the average daily requirement.

Q. Please discuss cost causation when it comes to gas distribution.

A. PGW has chosen to classify distribution mains as 50% capacity/demand related and 50% commodity related.[37] This suggests that the costs for distribution mains in PGW's view are related to the need to deliver gas from receipt points to load centers both throughout the year as well as in the design day. It does seem clear that the need for distribution mains is derived from the need to deliver gas on the design day as well as on the average day. It is therefore also clear that if the design requirement and the average daily requirement were able to be lower, we could lower the capital and (and potentially the operating expenses) associated with distribution mains.

Q. Why does cost causation matter when discussing NPAs?

A. Cost causation matters when discussing NPAs because it gives us a data-driven starting point to see how reductions in requirements might affect the long-term costs to serve the customer base.

[36] PGW Statement No. 5, Direct Test. Of Constance E. Heppenstall at 5:9-11 (Feb. 27, 2023).
[37] PGW Statement No. 5, Direct Test. of Constance E. Heppenstall, at 5:15-20 (Feb. 27, 2023).

Q. Is it the case that a unit reduction in the design day would result in a one for one reduction in unit cost for the overall system?

A. No. Gas systems are to a significant degree fixed cost based. There might be little that a reduction in annual or design day volumes would do to reduce aggregate system costs immediately. However, gas system planning to protect energy affordability should not be done just in the vacuum of the short run. It is also a medium and long-term proposition. Over time, reductions in both design day requirements and annual requirements will reduce capital and operating expenses. Additionally, as I discuss further below, there are near term savings opportunities from NPAs as well.

Q. So where do you see the potential for savings?

A. As PGW replaces mains across its system, as it is doing through its pipeline replacement program, there may be significant opportunities to lower costs by reducing design and annual requirements on particular portions of the distribution system. Appropriately geotargeting NPA deployment where it can be most impactful can help realize those lower costs. This means that lower design and annual requirements for a portion of the system are not diluted as they might be if applied across the fixed cost base of the entire system.

2. Analysis of Potential Savings

Q. Have you quantified the costs associated with new pipeline investment vs. the costs of NPAs?

A. I have. I look at the PGW system on an aggregate basis and then drill down to a specific example of the potential deployment of NPAs for the PGW system.

Q. Please explain the analysis you conducted to illustrate the potential for NPAs on an aggregate basis.

A. According to PGW witness Constance E. Heppenstall's testimony, for FY 2024, system peak on PGW's peak day to its firm customers is projected at 576,510 MCF/d.[38] The total embedded cost of distribution mains for the FY 2024 year is $921,366,324.[39] This means that the embedded cost per MCF/d of peak day delivery is $1,598.18 MCF/d, which is derived by dividing the embedded cost of mains by the total firm peak day delivery. Because these are embedded costs (the historical costs incurred to build the system), they are likely quite a bit lower than current costs of adding or replacing pipeline.

To derive a current cost in $/MCF/d of deliverability, I took the following steps:

1. I determined that PGW has approximately 3,043 miles of distribution mains.[40]

2. I determined that PGW replaced and added 37.5235 miles of distribution mains in FY 2022.[41]

3. The cost of this pipeline was $73,749,968.[42]

4. I divided the mileage of the new mains by the total mains in the system to find that PGW replaced and added about 1.23% of its system distribution mains in 2022.

5. Now, 1.23% of the peak is 7,109 MCF/d of deliverability.[43]

6. Dividing the cost of $73,749,968 by the gained deliverability of 7,109 MCF/d gives a current cost of $10,374.18 MCF/d.

[38] PGW Statement No. 5, Direct Test. of Constance E. Heppenstall, Exh. CEH-1, Schedule F, at 2 (Feb. 27, 2023). I calculated this figure by subtracting from PGW's listed Peak Day Capacity of 650,379 Mcf the 73,869 Mcf listed as "interruptible."
[39] PGW, 2023 Base Rate Case Filing, Vol. I, Part 1, I.A.4.b, at page 51, line 24 (Feb. 27, 2023).
[40] Exh. MDK-11, PGW, 2022 Annual Comprehensive Financial Report, at 133 (2022 figure of 3,043 miles).
[41] Exh. MDK-5, PGW, Interrogatory Responses, Response to POWER-01-29(c).
[42] Exh. MDK-5, PGW, Interrogatory Responses, Response to POWER-01-29(c). This figure was derived by adding the $70,148,834 total for FY 2022 in the Fiscal Year Main Replacement Budget Category Spending Against All Budget Years Table to the $3,601,134 total for FY 2022 in the Fiscal Year Main Addition Budget Category Spending Against All Budget Years Table.
[43] I calculated this by multiplying 576,510 by 0.0123.

As we can see, the current cost of mains to maintain deliverability on the PGW system (at $10,374.18 MCF/d) exceeds the embedded cost ($1,598.18 MCF/d) by 649%. In theory, any measure that provides deliverability at a cost less than the current cost of deliverability of $10,374.18/MCF/d should be considered by PGW in order to lower the rate burden of its customer base. PGW can, and should, design its system to get the most possible value out of each dekatherm at the lowest possible cost.

Q. Have you prepared an analysis of how costs could be lowered if peak day requirements were to be reduced?

A. Yes. PGW's current cost estimate for an 8-inch main is $1,425,600[44] per mile and the current cost for a 10-inch main is $2,428,800 per mile.[45] These average costs suggest that, if NPAs were implemented such that the diameter of pipeline replacement was reduced by 2 inches, then in this 10-inch to 8-inch hypothetical, savings of $1,003,200 per mile would result.

Q. How much would peak day usage need to be reduced to cover a reduction of 2 inches from 10 inches to 8 inches?

A. The amount of gas that can be delivered in a pipeline is directly proportional to the square of the radius of the pipe. So, for an 8-inch pipe there is a radius of 4 inches. Four inches squared is 16 square inches. A 10-inch pipe has a radius of 5 inches. Five inches squared is 25 square inches. So, a 10-inch pipe can carry 25/16 as much gas as an 8-inch pipe. This means that for an 8-inch pipe to serve the same customers on the peak day, usage would need to be reduced by 36%.

Q. What is the key takeaway from this illustrative quantitative analysis?

[44] Exh. MDK-5, PGW, Interrogatory Responses, Response to POWER-01-22.
[45] Exh. MDK-5, PGW, Interrogatory Responses, Response to POWER-01-22.

A. There is a direct, positive connection between reductions in peak load for a pipe and reduction of the capital cost of pipeline replacement. This is relevant, because PGW is currently in the process of a massive, multi-decade program of pipeline replacement that my fellow witness, Dorie Seavey, Ph.D., estimates will cost $6 to $8 billion by 2058.[46] With a capital investment program of this magnitude, it is essential for a utility to identify any and all ways to reduce costs.

Q. Can NPAs reduce peak load to a meaningful degree?

A. Yes. There are measures such as improving the building envelope in energy inefficient housing stock via weatherization and other measures and incentivizing the use of demand response measures like smart thermostats, all of which would reduce peak load in a particular area and would contribute towards reducing system peak load. While the precise figures will necessarily be building- and neighborhood-specific, if these measures are deployed in a geotargeted fashion and aggregated, I believe a reduction of 36%, as I discuss above in regard to the hypothetical replacement of a 10-inch pipe with an 8-inch pipe, is achievable. If PGW were able to accomplish this reduction in peak requirement on a certain mile of distribution system using an NPA portfolio for less than $1,003,200, then a very strong case for the NPA portfolio is made. In fact, as I discuss below, these types of analyses should be conducted for every new or replacement main installation on the PGW system.

3. Analysis of PGW's Current Non-Pipeline Alternatives Initiatives

Q. Please describe PGW's current NPA initiatives.

[46] Exh. DKS-2, Dorie Seavey, *Philadelphia's Gas Pipe Replacement Plan*, at 25 (Mar. 2023).

A. In the Philadelphia Gas Commission proceeding to review PGW's proposed FY 24 Capital Budget earlier this spring, PGW was asked to describe any evaluations of NPAs that it has conducted.[47] In response, PGW identified its Geothermal Feasibility Study (evaluating potential thermal network deployment[48]), its utilization of cured-in-place liners to rehabilitate existing pipelines where possible, and its energy efficiency programs (Energy Sense and Home Comfort).[49] PGW also described the lifetime MMBtu savings of its Energy Sense and Home Comfort programs.[50] In response to a question about PGW's NPA initiatives at the public hearing in that proceeding, PGW vice president Mr. Elliot S. Gold stated that "[W]e are and have been pursuing several NPA-related initiatives for some years now. Most notably would be our portfolio of energy efficiency programs."[51]

In this proceeding, when asked to describe its NPA-related initiatives in question POWER-01-36, PGW responded that PGW "engages in activities that might be viewed by POWER as meeting this term," including "PGW's low income weatherization program and its voluntary demand side management program[.]"[52] PGW also provided docket numbers for its Universal Service and Energy Conservation Plan ("USECP") and its Demand-Side Management Plan.[53]

Q. Have you prepared any quantitative analysis of these NPA initiatives?

[47] Exh. MDK-12, Philadelphia Gas Commission, PGW FY 2024 Capital Budget Review Proceeding, PGW Written Data Request Response to POWER-I-21.
[48] Exh. MDK-12, Philadelphia Gas Commission, PGW FY 2024 Capital Budget Review Proceeding, PGW Written Data Request Response to POWER-I-21; *see also* Exh. MDK-5, PGW, Interrogatory Responses, Response to POWER-01-38; Exh, MDK-13, PGW, Quarterly Sustainability Report (Apr. 2023).
[49] Exh. MDK-12, Philadelphia Gas Commission, PGW FY 2024 Capital Budget Review Proceeding, PGW Written Data Request Response to POWER-I-21.
[50] Exh. MDK-12, Philadelphia Gas Commission, PGW FY 2024 Capital Budget Review Proceeding, PGW Written Data Request Response to POWER-I-21.
[51] Exh. MDK-7, Philadelphia Gas Commission, PGW FY 2024 Capital Budget Review Proceeding, Public Hearing Tr., at 71:13–17. (Mar. 7, 2023).
[52] Exh. MDK-5, PGW, Interrogatory Responses, Response to POWER-01-36.
[53] Exh. MDK-5, PGW, Interrogatory Responses, Response to POWER-01-36.

A. Yes. I quantified the cost per MMBtu removed for the energy efficiency initiatives described in PGW's response to POWER-01-36 concerning NPAs,[54] using data provided about those initiatives in response to POWER-01-32.[55] I relied upon the methodology employed in a study by Lawrence Berkeley National Laboratory to assess the cost-effectiveness of energy efficiency measures.[56] The study recommends the calculation of a metric called Program Administrator Cost of Saved Energy ("PA CSE") for Natural Gas which is equal to Capital Recovery Factor * (Program Administrator Costs) divided by the Annual Natural Gas Savings (in therms). The Capital Recovery Factor[57] is equal to:

$$CRF = \frac{r(1+r)^N}{(1+r)^N - 1}$$

I calculated the Capital Recovery Factor as 0.05783 by using a discount rate equal to 4% and assuming a 30-year life.[58] I then calculated the PA CSE for the portfolio of PGW NPA measures discussed above. The portfolio of measures yielded an overall PA CSE of $7.11.[59] This rate is significantly below the cost of delivered gas to customers' burner tip across all customer classes,[60] thereby illustrating the value of these measures to the customer and the system.

Q. What does the analysis tell you about the relative values of each of the measures?

[54] Exh. MDK-5, PGW, Interrogatory Responses, Response to POWER-01-36.
[55] Exh. MDK-5, PGW, Interrogatory Responses, Response to POWER-01-32.
[56] Exh. MDK-14, Steve Schiller, et al., Lawrence Berkeley National Laboratory, *Cost of Saving Natural Gas Through Efficiency Programs Funded by Utility Customers: 2012–2017* (May 2020).
[57] Exh. MDK-14, Steve Schiller, et al., Lawrence Berkeley National Laboratory, *Cost of Saving Natural Gas Through Efficiency Programs Funded by Utility Customers: 2012–2017*, App. 2, at 18 (May 2020).
[58] Variable "r" is the discount rate; I used a discount rate of 4%, based on estimated costs of debt. Variable "N" is the estimated useful life of the measure; I used an estimated useful life of 30 years.
[59] Exh. MDK-15, PA CSE Analysis of PGW Energy Efficiency Initiatives.
[60] PGW 2023 Base Rate Case Filing, Volume III, Gas Service Tariff - Pa P.U.C., No 2, One Hundred Tenth Revised Page No. 83 (Feb. 27, 2023) (listing a gas cost of $0.49740 per Ccf for Residential and Public Housing, Commercial Customers, and Industrial Customers, and a distribution charge of $0.83603 per Ccf for Residential, $0.77175 per Ccf for Public Housing, $0.59702 per Ccf for Commercial Customers, and $0.61095 per Ccf for Industrial Customers).

A. Each measure can now be ranked from most to least effective in terms of MMBtu reduction per dollar spent.[61] From this we see, for instance, that low-income thermostats (PA CSE of $2.25) are more cost-effective than residential equipment rebates (PA CSE of $3.10), which are more cost-effective than Home Comfort (PA CSE of $9.83). This allows the analyst to see the "low-hanging fruit" in terms of deployment but also shows in absolute terms that even the Home Comfort measure is cheaper than delivered gas.

Q. Did you prepare any other analyses on the deployed NPA measures in which PGW is engaged?

A. Yes. I prepared an illustrative analysis of the estimated reduction in load per customer for each of these deployed NPA measures.[62] One of the key takeaways from this analysis is that just with an existing residential portfolio of measures—Home Comfort, Residential Equipment Rebates, and Low Income Smart Thermostats—we can reduce a residence's consumption by 39.26 MMBtu annually.[63] If we assume for the purpose of analysis that the gas in PGW's system has an energy content 1,037 MBtu/MCF[64] and that average consumption per residence is 71.3 MCF per year,[65] then this is a reduction of 37.86 MCF annually, or 53.1%. This indicates that the peak day could be reduced with appropriate further application of already existing measures to get to the 36% demand reduction required to move from a 10-inch pipe to an 8-inch pipe.

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[61] Exh. MDK-15, PA CSE Analysis of PGW Energy Efficiency Initiatives.
[62] Exh. MDK-16, MMBtu Reduction Per Customer of PGW Energy Efficiency Initiatives.
[63] Exh. MDK-16, MMBtu Reduction Per Customer of PGW Energy Efficiency Initiatives. I calculated this annual 39.26 MMBtu savings figure by adding the annual MMBtu savings of the Home Comfort (19.88), Residential Equipment Rebates (13.61), and Low Income Smart Thermostats (5.78) measures.
[64] The U.S. Energy Information Administration ("EIA") states that in 2020, the U.S. annual average heat content of natural gas delivered to customers was 1,037 Btu per cubit foot. EIA, *Frequently Asked Questions* (2023), https://perma.cc/8NBG-VW57.
[65] I calculated this by taking the daily residential throughout on Page 6 of Schedule F to Exh. CEH-1 of Ms. Heppenstall testimony (95,409), multiplying it by 365, and dividing by the number of residential customers (488,206).

Q. How should NPAs be deployed in general?

A. NPAs should not be just deployed on a one-off, single measure basis. A portfolio approach will allow for the NPAs to deliver a cumulative effect to deliver peak day load reduction. When looking to reduce peak load on a certain portion of the system to reduce the diameter of replacement pipe, for instance, it would make sense to deploy a combination of residential customer measures and a combination of commercial customer measures as appropriate to maximize effectiveness. An example of an portfolio approach to deployment of NPA measures is illustrated in the NYSEG Lansing NPA report.[66]

C. Evaluation and Recommendations

Q. In addition to what PGW is already doing on NPAs, what else would be beneficial?

A. PGW's NPA initiatives, as I have discussed above, have delivered positive results for customers in terms of savings. However, it would be highly beneficial for energy affordability to fully integrate consideration of NPAs into the capital planning and forecasting process in order to identify anticipated capital needs that could be deferred or reduced through less capital-intensive NPAs. This requires taking a planned and systematic approach.

Q. Is this an issue that is currently adequately addressed through either PGW's Long-Term Infrastructure Improvement Plan, its Universal Service and Energy Conservation Plans, or its Demand-Side Management Plan?

A. No. The fragmentation of various aspects of NPA initiatives into separate dockets does not allow for the type of full integration of NPAs into capital planning that I recommend in order to optimize energy affordability. The Long-Term Infrastructure Improvement

[66] Exh. MDK-9, NYSEG, Non-Pipes Alternative 2021 Second Quarter Report, at 4 (Aug. 30, 2021) (discussing NYSEG's planned NPA portfolio).

Plan ("LTIIP") is focused on property eligible for DSIC recovery, while the Universal Service and Energy Conservation Plan and Demand-Side Management Plan do not address capital savings or forward-looking capital planning. What is needed is integrated evaluation and deployment of NPAs to ensure least-cost solutions are selected across all capital projects. This requires breaking down silos and considering where non-capital expenditures, such as energy efficiency programming, can be paired with and integrated into appropriate capital planning to unlock net savings for ratepayers. Only with such an integrated planning and evaluation process can energy affordability be optimized.

Q. How should PGW treat investment in NPAs vs conventional installation and replacement of gas processing and distribution plant?

A. NPAs should be treated as alternatives to longterm capital investment in every instance where PGW could use them to lower capital investment in distribution or processing plant by lowering design day and annual requirements. Before capital projects are approved, they should be subjected to an NPA screening process, and before any increase in base rates is approved by this commission, NPAs must be demonstrated to have been rigorously analyzed included in the least cost planning.

Q. What are your recommendations?

A. I recommend that PGW fully integrate consideration of NPAs into its capital planning in order to ensure least cost alternatives are selected, which will help protect energy affordability. In order to do that, I recommend several specific measures.

Q. Please describe those measures.

A. I recommend that PGW initiate an NPA pilot program, developed through a working group process that I describe below. The screening parameters and specific NPA projects for the pilot should be developed through a collaborative working group convened within

one month following the entry of the Final Order in this proceeding. This working group should include interested parties from this rate case, interested Commission staff, and any other interested stakeholders. The working group should meet at least monthly to develop screening parameters that can be used to identify cost-effective NPA projects that can function to defer or avoid capital spending investments. PGW should report to the Commission on the progress of the working group monthly. In the course of developing screening parameters, the working group should implement a community outreach plan and convene at least two public meetings in Philadelphia in which members of the public are invited to share their views on NPA screening criteria and NPA project development. The working group should complete its work and deliver a final report on the screening parameters to the Commission no later than six months from the entry of a Final Order in this proceeding.

Q. Are there particular principles the NPA screening criteria should include?

A. Yes. The working group should prepare the final list of criteria, but I will offer a non-exclusive list of recommended criteria to include. First, the screening criteria should examine whether a particular potential NPA measure would be cost-effective (including consideration of peak savings, commodity savings, capital costs savings, operating costs savings, and saved gas costs) and fully consistent with all safety requirements. Second, the criteria should prioritize NPA deployment in low-income communities, so that NPA measures like building envelope improvements can maximize their usefulness in advancing energy affordability and reducing energy burden. Third, the criteria should prioritize NPA deployment by union workers, to promote union workforce development and support well-paying union jobs in Philadelphia. Fourth, the criteria should maximize

synergy with and use of Inflation Reduction Act[67] funds that are available for two key NPAs, building energy efficiency measures[68] and thermal energy networks (also known as network geothermal installations).[69]

Q. What is the next step you recommend following establishment of screening criteria?

A. Once the screening parameters are complete, the working group should identify at least ten potential NPA deployment opportunities, through a process that should involve at least two public meetings in Philadelphia to solicit community views on opportunities for NPA deployment. PGW should then conduct a competitive public procurement for each opportunity, allowing bidders to propose a portfolio of different NPA solutions to meet the identified system need. PGW should provide regular updates on the status of the pilots at the monthly meetings of the collaborative working group, and implement a community outreach plan to ensure community members in project locations are informed, engaged, and have opportunities for input into project deployment. I recommend that deployment of the identified NPA pilot projects be commenced within twelve months from entry of a Final Order in this proceeding. Once projects have begun, PGW should provide updates on the performance of the pilots on a monthly basis to the collaborative working group. Overall, the goal of the pilot is to maximize learning for both PGW and non-utility market participants that can then be applied to future NPA deployment.

Q. What else do you recommend?

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[67] Inflation Reduction Act of 2022, Pub. L. 117–169, 136 Stat. 1818.
[68] The White House, Building a Clean Energy Economy: A Guidebook to the Inflation Reduction Act's Investments in Clean Energy and Climate Action, Version 2, at 105–112 (Jan. 2023), https://www.whitehouse.gov/wp-content/uploads/2022/12/Inflation-Reduction-Act-Guidebook.pdf.
[69] The White House, Building a Clean Energy Economy: A Guidebook to the Inflation Reduction Act's Investments in Clean Energy and Climate Action, Version 2, at 14, 106 (Jan. 2023), https://www.whitehouse.gov/wp-content/uploads/2022/12/Inflation-Reduction-Act-Guidebook.pdf.

A. In order to promote transparency, and to help foster a market of NPA solution providers, I recommend that PGW file biannually (every six months) with the Commission, beginning with twelve months from the entry of a Final Order in this proceeding, a publicly-accessible NPA Implementation Report. This report should identify all NPA initiatives conducted in the prior year and report in detail on their costs and benefits to date, as well as all NPA initiatives under consideration for the coming year. The report should contain information on both peak demand and commodity savings for PGW as well as direct savings for customers.

IV. PGW's Proposal to Recover Lobbying Expenses Through Rates

Q. What is the definition of lobbying in Pennsylvania?

A. It is defined as "[a]n effort to influence legislative action or administrative action in this Commonwealth," including "direct or indirect communication,"; "office expenses"; and "providing any gift, hospitality, transportation or lodging to a State official or employee for the purpose of advancing the interest of the lobbyist or principal."[70]

Q. Has PGW included lobbying expenses in its FPFTY 2024 expenses?

A. Yes, PGW has included $100,000 of lobbying expenses in its FPFTY 2024 revenue requirement.[71]

Q. Are lobbying expenses recoverable from ratepayers?

A. Typically not. Under 66 Pa. C.S. § 1316(a), "no public utility may charge to its consumers as a permissible operating expense for ratemaking purposes any direct or indirect expenditure by the utility for political advertising."[72] In defining "political

[70] 65 Pa. C.S. § 13A03.
[71] Exh. MDK-5, PGW, Interrogatory Responses, Response to POWER-01-9.
[72] 66 Pa. C.S. § 1316(a).

advertising," Section 1316(d) states that "[t]he term includes money spent for lobbying."[73] I note that the Commission has in the past disallowed recovery for utilities' lobbying expenses pursuant to this statutory prohibition.[74]

Q. What is your recommendation regarding the lobbying expenses included in PGW's revenue requirement?

A. I recommend that the Commission exclude the lobbying expenses from the FPFTY 2024 revenue requirement. This adjustment reduces PGW's operating expenses by $100,000.

Q. Has PGW included any gas industry trade association dues in its FPFTY 2024 expenses?

A. Yes. PGW maintains membership in the American Gas Association ("AGA"), among others.[75]

Q. How much does PGW pay in dues to AGA?

A. PGW's 2023 membership dues are $488,670.[76]

Q. Does PGW omit any portion of its AGA dues from its revenue requirement to account for AGA's lobbying activity?

A. No.[77]

Q. Does AGA engage in dues-funded lobbying activity?

A. Yes. AGA's invoices contain a disclaimer that states the portion of utility members' dues "that is allocable to lobbying."[78] PGW's invoices for its last four quarterly payments of

[73] 66 Pa. C.S. § 1316(d).
[74] *See, e.g.*, *Pa. Pub. Util. Comm'n v. Philadelphia Gas Works*, Docket No. R-00061931, 2007 WL 7233943 (Pa. P.U.C. Sept. 28, 2007) (disallowing PGW's requested recovery of lobbying expenses and affirming that "the Commission's prior consistent treatment" of lobbying expenses was to "exclude the claim from recovery within base rates.").
[75] Exh. MDK-5, PGW, Interrogatory Reponses, PGW Response to POWER-01-12.
[76] Exh. MDK-5, PGW, Interrogatory Responses, PGW Response to POWER-01-14, Attachment, at 21 ("Dues for 2023 membership year: $488,670.00.").
[77] Exh. MDK-5, PGW, Interrogatory Responses, Response to POWER-01-14(c).
[78] Exh. MDK-5, PGW, Interrogatory Responses, Response to POWER-01-14, Attachment.

AGA dues list portions allocable to lobbying of 5.1% and 3.4% in 2022 and 2023, respectively.[79]

Q. Does this concern you?

A. Yes.

Q. Why?

A. As I explained above, lobbying costs are not appropriate for recovery from ratepayers. Thus, any portion of trade association dues that is flagged as allocable to lobbying should also not be recovered from ratepayers.

Q. What is your recommendation with regard to PGW's recovery of its AGA dues through rates?

A. I recommend the Commission disallow the portion of AGA's dues that AGA itself characterizes as allocable to lobbying. Since PGW's AGA dues for 2023 were $488,670, and AGA reports that 3.4% of its dues for 2023 are allocable to lobbying, it would be appropriate for the Commission to disallow $16,615 of AGA dues.

V. Summary of Recommendations

Q. Could you provide a summary of your recommendations?

A. Yes. I recommend that the Commission condition approval of any rate increase on implementation of the following recommendations:

1. The Commission should require that PGW fully integrate consideration of NPAs into its capital planning in order to ensure least cost alternatives are selected.

[79] Exh. MDK-5, PGW, Interrogatory Responses, Response to POWER-01-14, Attachment, at 20, 21 (listing 5.1% and 3.4% as the portions of dues "allocable to lobbying" for 2022 and 2023 membership years, respectively).

2. The Commission should require that PGW initiate an NPA pilot program, developed through a working group process that I describe below:

a. The screening parameters and specific NPA projects for the pilot should be developed through a collaborative working group convened within one month following the entry of the Final Order in this proceeding.

b. This working group should include interested parties from this rate case, interested Commission staff, and any other interested stakeholders.

c. The working group should meet at least monthly to develop screening parameters that can be used to identify cost-effective NPA projects that can function to defer or avoid capital spending investments.

d. PGW should report to the Commission on the progress of the working group monthly.

e. In the course of developing screening parameters, the working group should convene at least two public meetings in Philadelphia in which members of the public are invited to share their views on NPA screening criteria.

f. The working group should complete its work and deliver a final report on the screening parameters to the Commission no later than six months from the entry of a Final Order in this proceeding.

g. The screening parameters should: First, examine whether a particular potential NPA measure would be cost-effective (including consideration of peak savings, commodity savings, capital costs savings, operating costs savings, and saved gas costs) and fully consistent with all safety requirements. Second, prioritize NPA deployment in low-income communities, so that NPA measures like building envelope improvements can maximize their usefulness in advancing energy

affordability and reducing energy burden. Third, prioritize NPA deployment by union workers, to promote union workforce development and support well-paying union jobs in Philadelphia. Fourth, maximize synergy with and use of Inflation Reduction Act funds that are available for two key NPAs, building energy efficiency measures and thermal energy networks (also known as network geothermal installations).

h. Once the screening parameters are complete, the working group should identify at least ten potential NPA deployment opportunities through a process that should involve at least two public meetings in Philadelphia to solicit community views on opportunities for NPA deployment. PGW should then conduct a competitive public procurement for each opportunity, allowing bidders to propose a portfolio of different NPA solutions to meet the identified system need. PGW should provide regular updates on the status of the pilot at the monthly meetings of the collaborative working group and implement a community outreach plan to ensure community members in project locations are informed, engaged, and have opportunities for input into project deployment. I recommend that deployment of the identified NPA pilot projects should be commenced within twelve months from entry of a Final Order in this proceeding. Once deployed, PGW should provide updates on the performance of the pilots on a monthly basis to the collaborative working group. Overall, the goal of the pilot is to maximize learning for both PGW and non-utility market participants that can then be applied to future NPA deployment.

3. The Commission should require that PGW file biannually (every six months) with the Commission, beginning with twelve months from the entry of a Final Order in this

proceeding, a publicly-accessible NPA Implementation Report. This report should identify all NPA initiatives conducted in the prior six months and report in detail on their costs and benefits to date, as well as all NPA initiatives under consideration for the coming year. The report should contain information on both peak demand and commodity savings for PGW as well as direct savings for customers.

4. The Commission should exclude from PGW's revenue requirement and disallow cost recovery for lobbying expenses ($100,000) as well as the portion of AGA dues allocable to lobbying ($16,615).

VI. Conclusion

Q. Does this conclude your testimony?

A. Yes.

VERIFICATION

I hereby verify that the facts contained in the foregoing testimony are true and accurate to the best of my knowledge and that I am duly authorized to make this verification, and that I expect to be able to prove the same at any hearing held in this matter. I understand that the statements herein are made subject to penalties of 18 Pa. C.S. § 4904 (relating to unsworn falsification to authorities).

Dated: July 17, 2023

/s/
Mark Kleinginna