



COMMONWEALTH OF PENNSYLVANIA

March 14, 2024

E-FILED

Rosemary Chiavetta, Secretary
Pennsylvania Public Utility Commission
Commonwealth Keystone Building
400 North Street
Harrisburg, PA 17120

Re: Petition of Philadelphia Gas Works for Approval of Demand Side Management Plan for FY 2024-2026 Philadelphia Gas Works Universal Service And Energy Conservation Plan For 2014-2016, 52 Pa. Code § 62.4 - Request for Waivers / Docket No. P-2014-2459362

Dear Secretary Chiavetta:

Pursuant to the rejection notice that we received today from the Secretary's Bureau, regarding our electronic filing of Admitted Statements and Exhibits on March 12, 2024.

We have cured the erroneous caption on the second page of the document and are therefore refileing the corrected version and serving all parties.

Attached please find the Office of Small Business Advocate's ("OSBA") corrected Admitted Statements and Exhibits.

As evidenced by the enclosed Certificate of Service, all parties will be served, as indicated.

If you have any questions, please do not hesitate to contact me. Thank you.

Sincerely,

/s/ Sharon E. Webb

Sharon E. Webb
Assistant Small Business Advocate
Attorney ID No. 73995

Enclosures

cc: Angela Vitulli
Emma Grazier
Parties of Record

**BEFORE THE
PENNSYLVANIA PUBLIC UTILITY COMMISSION**

Petition of Philadelphia Gas Works for :
Approval of Demand Side Management Plan for :
FY 2024-2026 :
And : **Docket No. P-2014-2459362**
Philadelphia Gas Works Universal Service :
and Energy Conservation Plan for 2014-2016 :
52 Pa. Code §62.4 – Request for Waivers :

**ADMITTED STATEMENTS AND EXHIBITS
BY THE OFFICE OF SMALL BUSINESS ADVOCATE**

The Office of Small Business Advocate (“OSBA”) introduces the following testimony and exhibits into the record in the above-captioned proceeding:

- OSBA Statement No.1, Direct Testimony and Exhibits IEC-1, Exhibit IEC-2, and signed Verification of Angela J. Vitulli
- OSBA Statement No. 1-S and signed Verification of Angela J. Vitulli

**BEFORE THE
PENNSYLVANIA PUBLIC UTILITY COMMISSION**

Petition of Philadelphia Gas Works for :
Approval of Demand Side Management Plan for :
FY 2024-2026 :
And : **Docket No. P-2014-2459362**
Philadelphia Gas Works Universal Service :
and Energy Conservation Plan for 2014-2016 :
52 Pa. Code §62.4 – Request for Waivers :

CERTIFICATE OF SERVICE

I hereby certify that true and correct copies of the foregoing have been served via email (*unless otherwise noted below*) upon the following persons, in accordance with the requirements of 52 Pa. Code § 1.54 (relating to service by a participant).

The Honorable F. Joseph Brady
Administrative Law Judge
Pennsylvania Public Utility Commission
801 Market St, Suite 4063
Philadelphia, PA 19107
fbrady@pa.gov
pmcneal@pa.gov
sdelvillar@pa.gov

Gina Miller, Esquire
Darryl A. Lawrence, Esquire
Office of Consumer Advocate
555 Walnut Street, 5th Floor
Harrisburg, PA 17101
OCAPGWDSM@paoca.org

Karen O. Moury, Esquire
Eckert Seamans Cherin & Mellott, LLC
213 Market St., 8th Floor
Harrisburg, PA 17101
kmoury@eckertseamans.com

Lauren M. Burge, Esquire
Eckert Seamans Cherin & Mellott, LLC
US Steel Tower
600 Grant Street, 44th Floor
Pittsburgh, PA 15219
lburge@eckertseamans.com

Charis Mincavage, Esquire
Adeolu A. Bakare, Esquire
McNees Wallace & Nurick LLC
100 Pine Street
P.O. Box 1166
Harrisburg, PA 17108-1166
cmincavage@mcneeslaw.com
abakare@mcneeslaw.com

John W. Sweet, Esquire
Elizabeth R. Marx, Esquire
Ria M. Pereira, Esquire
Lauren N. Berman, Esquire
Pennsylvania Utility Law Project
117 Locust Street
Harrisburg, PA 17120
emarxpulp@palegalaid.net
pulp@palegalaid.net

Joline Price, Esquire
Robert W. Ballenger, Esquire
Daniela Rakhlins Powsner, Esquire
Community Legal Services, Inc.
1424 Chestnut Street
Philadelphia, PA 19102
jprice@clsphila.org
rballenger@clsphila.org
drp@clsphila.org

/s/ Sharon E. Webb

Sharon E. Webb
Assistant Small Business Advocate
Attorney ID No. 73995

DATE: March 14, 2024



COMMONWEALTH OF PENNSYLVANIA
November 13, 2023

The Honorable F. Joseph Brady
Administrative Law Judge
Pennsylvania Public Utility Commission
801 Market St, Suite 4063
Philadelphia, PA 19107

Re: Petition of Philadelphia Gas Works for Approval of Demand Side Management Plan for FY 2024-2026 Philadelphia Gas Works Universal Service And Energy Conservation Plan For 2014-2016, 52 Pa. Code § 62.4 - Request for Waivers / Docket No. P-2014-2459362

Dear Judge Brady:

Enclosed please find the Direct Testimony and Exhibits of Angela Vitulli, labelled OSBA Statement No. 1, on behalf of the Office of Small Business Advocate (“OSBA”), in the above-captioned proceeding.

As evidenced by the enclosed Certificate of Service, all known parties will be served, as indicated.

If you have any questions, please do not hesitate to contact me.

Sincerely,

/s/ Sharon E. Webb

Sharon E. Webb
Assistant Small Business Advocate
Attorney ID No. 73995

Enclosures

cc: PA PUC Secretary Rosemary Chiavetta (Cover Letter & Certificate of Service only)
Angela Vitulli
Emma Grazier
Parties of Record

**BEFORE THE
PENNSYLVANIA PUBLIC UTILITY COMMISSION**

Petition of Philadelphia Gas Works for	:	
Approval of Demand-Side Management Plan	:	
for FY 2024-2026	:	
	:	Docket No. P-2014-2459362
Petition of Philadelphia Gas Works for	:	
Approval of Demand Side Management Plan	:	
for FY 2014-2016	:	
52 Pa. Code § 62.4 – Request for Waivers	:	
	:	

Direct Testimony and Exhibits of

ANGELA J. VITULLI

On Behalf of the

Pennsylvania Office of Small Business Advocate

Date Served: November 13, 2023

Date Submitted for the Record: _____

DIRECT TESTIMONY OF ANGELA J. VITULLI

1 **1. INTRODUCTION AND OVERVIEW**

2 **Q. Ms. Vitulli, please state your name and briefly describe your qualifications.**

3 A. My name is Angela Vitulli and I'm a Principal at Industrial Economics, Incorporated
4 ("IEc"), a consulting firm located at 2067 Massachusetts Avenue, Cambridge, MA 02140.
5 I am appearing in this proceeding on behalf of the Pennsylvania Office of Small Business
6 Advocate ("OSBA").

7 I have over fifteen years of experience in energy efficiency and clean energy program
8 design and evaluation. In addition to evaluating traditional demand side management
9 ("DSM") portfolios, I specialize in designing and evaluating technology demonstration and
10 pilot programs, and market transformation programs. I have served as a principal
11 investigator and contract manager for relevant contracts for the Department of Energy
12 ("DOE"), and the New York State Energy Research and Development Authority
13 ("NYSERDA"), the California Energy Commission, and the California Air Resources
14 Board. I am currently working on market evaluations of multiple heat pump programs for
15 NYSERDA.

16 I recently testified as an expert witness on behalf of OSBA in the Columbia Gas Works
17 Green Path Rider case. I have previously served as a DSM program design expert witness
18 for the Public Intervenor of the Province of New Brunswick. I currently serve as an expert
19 program evaluation advisor to Eversource in Massachusetts, helping the utility with
20 structuring evaluation projects for both electric and gas DSM programs, and reviewing
21 results and deliverables. I am an active participant in the energy program evaluation
22 community, and regularly provide workshops and presentations on evaluation
23 methodologies at the International Energy Program Evaluation Conference, the energy
24 evaluator's professional organization.

25 I also provide greenhouse gas ("GHG") strategy and management services to several
26 private sector clients. This work entails analyzing the cost-effectiveness of energy
27 efficiency, fuel switching, and green power and fuel options, to develop and implement
28 decarbonization strategies.

1 I obtained a B.A. degree in Tulane University in Political Science in 1996, *Phi Beta Kappa*,
2 and an M.A. degree Urban and Environmental Policy in 1999, with a concentration in
3 economics. My resume is contained in the Exhibit IEc-1.

4 **Q. Have you previously testified before the Commission?**

5 **A.** Yes, I testified on behalf of OSBA in the recent Columbia Gas Green Path Rider matter.

6 **Q. What is the purpose of this testimony?**

7 **A.** I was retained by the OSBA to review the Demand-Side Management Plan for FY 2024-
8 2026 (“DSM Plan”) proposed by the Philadelphia Gas Works (“PGW”), and to evaluate
9 whether the PGW’s program design is consistent with sound regulatory and economic
10 principles, and would be beneficial, on net, to small business customers.

11 **Q. Summarize your current conclusions and recommendations.**

12 **A.** The Commission should reject aspects of the proposed DSM Plan, for reasons that are
13 detailed in this testimony. The Commission should also consider enhanced oversight of
14 implementation to ensure that small business programs are being implemented as planned.
15 The Commission should approve the proposed programming with the exceptions noted
16 below.

- 17 • **The Commission should reject the proposed rebates for natural gas heat**
18 **pumps.** Natural gas heat pumps are not a proven technology; they have not been
19 widely demonstrated to be efficient and cost effective. Although the market for
20 *electric* heat pumps is growing, gas heat pumps are an emerging technology with
21 little to no market adoption. Pilot projects have been limited, and a common finding
22 across the limited number of pilot projects is that gas heat pump technology needs
23 additional development to optimize performance. Moreover, installers need extra
24 education and support through the complex retrofit process. Yet, I was only able to
25 identify two HVAC contractors in the Philadelphia area with installation
26 experience. In addition, I was only able to identify two other gas utilities in the US
27 that are providing incentives for this technology, out of dozens reviewed.

- 28 • **The Commission should reject the proposed rebates for natural gas boilers**
29 **and furnaces for new commercial construction.** There is a clear trend towards

1 all-electric construction of new commercial buildings. The model energy code for
2 commercial buildings will be net zero by 2031, and net zero buildings do not use
3 natural gas. Two states (New York and Washington), the District of Columbia, and
4 84 cities in 12 states have already adopted all-electric requirements for new
5 construction. Further, the City of Philadelphia has an official goal of carbon
6 neutrality by 2050. None of the above facts are compatible with locking small
7 businesses and property owners into gas-fired heating for the next 15-20 years. As
8 new buildings increasingly go all-electric, gas utilities will have a smaller customer
9 base for shouldering system infrastructure costs, and as a result, gas utility bills are
10 likely to increase over time for remaining customers.

- 11 • **The Commission should cap administrative spending.** PGW’s DSM programs
12 exhibit a history of high administrative spending and low program uptake, with no
13 clear explanation for these discrepancies. The Commission should consider
14 imposing a cap on total administrative spending at 41% of total incentive spending,
15 which is the ratio from the current plan. This admin-to-incentive spending ratio is
16 already high, and PGW’s proposal to increase it further does not seem justified.
- 17 • **The Commission should mandate that PGW provide specific reporting on plan**
18 **implementation,** including small business participation in the Small Business
19 Assessments (“SBA”) and Commercial Equipment Rebates (“CER”) programs
20 with respect to number of participants, annual savings, incentive payments,
21 customer costs, and TRC costs/benefits, on an annual basis. I further recommend
22 that the Commission require PGW to report on the marketing activities of the SBA
23 and CER programs on an annual basis. Given PGW’s lack of experience in serving
24 small business customers at scale, I recommend that the Commission require PGW
25 to report monthly to the Commission and to intervenors on the number of small
26 business participants in the SBA and CER programs. Finally, I recommend that
27 PGW be required to report on the ratio of small businesses (as defined by PGW) to
28 other commercial customers when reporting GS-commercial activity

29 **Q. How is your testimony organized?**

30 A. My testimony is organized in three parts:

- 1 • First, I summarize the design of the proposed DSM Plan.
- 2 • Second, I summarize the costs and benefits to ratepayers of the proposed DSM Plan.
- 3 • Third, I discuss concerns with aspects of program design.

4 **2. DSM PLAN PROGRAM PROPOSAL AND DESIGN**

5 **Q. Describe the current policy environment facing natural gas utilities in the US.**

6 A. The future of natural gas as a fuel to heat residential and commercial buildings is highly
7 uncertain. Climate legislation and decarbonization policies already adopted by several
8 large states are a fundamental risk to the gas utility business model, as are gas hookup bans
9 adopted by several cities. Whole-building electrification requirements for new construction
10 have been adopted by New York State, Washington State, and Washington, D.C., along
11 with eighty-four other cities and towns across the U.S.¹ In addition, unprecedented federal
12 tax incentives and rebates for building decarbonization contained within the federal
13 Inflation Reduction Act will likely hasten the adoption of electric heat pumps, induction
14 stoves, and other technologies required to decarbonize the building sector.²

15 The world’s largest institutional investor, BlackRock, Inc., has communicated its
16 expectations to utilities that they must have clear energy transition plans and clear business
17 models for operating in a low-carbon future scenario.³ As markets for gas shrink, gas
18 utilities are facing a declining ratepayer base over time. Sustainable options for gas utilities
19 to pursue, such as hydrogen, are at an earlier stage, and it is unclear to what extent existing
20 gas infrastructure can be safely and economically repurposed to deliver hydrogen.⁴

¹ Building Decarbonization Coalition, *Database of Zero Emission Building Ordinances*, October 2023, available at: <https://buildingdecarb.org/zeb-ordinances>

² The White House, *Building a Clean Energy Economy: A Guidebook to the Inflation Reduction Act’s Investments in Clean Energy and Climate Action*, January 2023, available at: <https://www.whitehouse.gov/wp-content/uploads/2022/12/Inflation-Reduction-Act-Guidebook.pdf>.

³ BlackRock, *Climate risk and the global energy transition: investment stewardship*, February 2022, available at: <https://www.blackrock.com/corporate/literature/publication/blk-commentary-climate-risk-and-energy-transition.pdf>

⁴ See Jayanti (2022), “Repurposing pipelines for hydrogen: Legal and policy consideration,” *Energy Reports*.

1 Renewable natural gas, another option, has high demand, but feedstock and supply are
2 severely constrained; RNG will likely continue to be used mostly by large industrial
3 customers, which cannot electrify like residential and commercial buildings can, and do
4 not have other decarbonization options.⁵ As such, gas utilities have limited options for
5 retaining their existing customer base of commercial and residential customers. One
6 approach is to lock-in existing customers by subsidizing new gas heating equipment, as
7 heating equipment typically lasts fifteen years or more.

8 **Q. Provide an overview of PGW’s DSM program design, and in particular, the**
9 **components that serve small businesses.**

10 A. PGW’s Demand Side Management (DSM) program, marketed as EnergySense, is a
11 portfolio of conservation programs ostensibly designed to achieve three broad goals:

- 12 • Reduce customer bills;
- 13 • Maximize customer value; and,
- 14 • Help the Commonwealth and the City of Philadelphia reduce greenhouse gas emissions
15 and reduce PGW’s overall carbon footprint.⁶

16 PGW’s current DSM Plan (FY 2021-2023) includes rebate programs for residential and
17 commercial equipment, grant programs for residential construction, and two online smart
18 thermostat marketplaces. The proposed DSM Plan (FY 2025-2029) builds on the current
19 plan, with updated incentive amounts, new prescriptive offerings, and two new programs:
20 EnergySense Kits and Small Business Assessments.

21 The two programs in PGW’s proposed DSM portfolio that serve small businesses are the
22 Commercial Equipment Rebates (“CER”) program and the new Small Business
23 Assessments (“SBA”) program. The CER program issues prescriptive rebates on premium
24 efficiency gas appliances and heating equipment, including commercial boilers and water

Available at: <https://www.sciencedirect.com/science/article/pii/S2352484722024490>

⁵ See “Renewable Natural Gas: Potential Supply and Benefits,” July 2019. Available at:
<https://www.erm.com/globalassets/documents/mjba-archive/issue-briefs/rngsupplyandbenefits07152019.pdf>

⁶ PGW Revised Proposed DSM Implementation Program FY 25-29, pg. 4.

1 heaters, commercial cooking equipment, and low-flow faucet aerators and showerheads,
2 among other measures. Incentives for CER measures range widely between 17 and 71% of
3 incremental costs. The SBA program is a new program that seeks to encourage PGW's
4 small business customers to take advantage of prescriptive rebate programs (like the CER
5 program) by providing free walkthrough energy assessments and a limited number of no-
6 cost or low-cost energy efficiency measures (e.g., updating temperature set-points,
7 installing pipe wrap, minor air sealing, etc.). Eligible small businesses must be PGW
8 commercial customers with buildings under 50,000 square feet and annual gas usage less
9 than 300 mcf/yr. The incentive per small business customer will be limited to \$2,500 for
10 the energy assessment, with an additional \$500 available for direct-installation measures.

11 **3. DSM COSTS AND BENEFITS**

12 **Q. Is the proposed DSM Plan cost-effective?**

13 A. Yes, the projected TRC benefit cost ratio (BCR) for the proposed DSM Plan indicates it is
14 cost-effective. The portfolio total BCR is projected to increase from 2.14 in the Current
15 DSM Plan to 2.35 in the Proposed DSM Plan. Most program-specific BCRs are projected
16 to increase, except for the Commercial Equipment Rebates program and the Low-Income
17 Smart Thermostat program. As seen in Table 1 (below), actual cost-effectiveness (as
18 documented in annual reports) tends to outpace projections, except for the Residential
19 Equipment Rebates program and the Low-Income Smart Thermostat program.

1

Table 1: PGW DSM Program Projected and Actual TRC Benefit Cost Ratios⁷

Program	Current DSM Plan (FY 21-23)			Proposed DSM Plan (FY 25-29)
	Projected	Actual FY 21	Actual FY 22	Projected
Residential Equipment Rebates	1.80	1.48	1.73	1.96
Residential Construction Grants	1.64	6.65	2.71	2.27
Commercial Equipment Rebates	4.05	6.77	4.22	3.28
Commercial Construction Grants	1.88	3.39	Not provided	-
Smart Thermostat Marketplace	3.30	3.47	3.47	5.34
LI Smart Thermostat Marketplace	2.92	Not provided	2.66	2.15
EnergySense Kits	-	-	-	7.78
Small Business Assessments	-	-	-	1.47
Portfolio Total	2.14	2.32	2.05	2.35

2 **Q. How could participating small business customers benefit from the DSM Plan?**

3 A. The DSM Plan’s new Small Business Assessments (SBA) program is specifically geared
4 towards PGW’s small business customers. The SBA program will provide interested small
5 businesses with free walkthrough energy assessments and a limited number of no-cost or
6 low-cost energy efficiency measures. To be eligible for the program, small businesses must
7 be PGW commercial customers with buildings under 50,000 square feet and annual gas
8 usage less than 300 mcf/yr.

9 During the free energy assessment, PGW-contracted technicians will identify energy
10 savings opportunities and perform free and low-cost energy efficiency improvements,
11 including installation of faucet aerators, pipe insulation, building control settings, and
12 minor air sealing measures. Although the proposed plan stipulates that small business
13 customers must agree to these measures as a condition of receiving the free assessment,
14 PGW indicated that it would modify this stipulation to state that “customers must agree to
15 free and low-cost energy efficiency improvements that do not negatively impact their

⁷ Table compiled from the following sources: PGW Revised Proposed DSM Implementation Program FY 25-29 (pg. 10), PGW Current DSM Implementation Plan FY 21-23 (pg. 10), PGW DSM Program Annual Report FY 2021 (pg. 6), and PGW DSM Program Annual Report FY 2022 (pg. 5).

1 business operations, and which are feasible”.⁸ The SBA incentive per small business
2 customer will be limited to \$2,500 for the energy assessment, with an additional \$500
3 available for direct-installation measures. PGW projects it will perform 30 assessments per
4 year from FY 25-29, for a total of 150 planned assessments.

5 PGW also intends to direct SBA program participants towards the Commercial Equipment
6 Rebates (“CER”) program. The CER program offers businesses rebates to offset the
7 incremental cost of a selection of high-efficiency commercial equipment, including
8 commercial boilers and water heaters, commercial cooking equipment, and more. PGW
9 intends for the CER program to provide benefits to small business customers that are
10 “reasonably commensurate to small businesses’ share of the GS-Commercial class load”
11 and will “provide separate reporting on actual small business participation in the CER
12 program with respect to number of participants, annual savings, incentive payments,
13 customer costs, and TRC costs/benefits”.⁹ PGW has also indicated that it will track the
14 number of small businesses that participate in the SBA program and then go on to
15 participate in the CER program as part of its annual reporting.¹⁰

16 **Q. Are you confident that the proposed plan will yield the benefits that PGW predicts?**

17 **A.** Based on PGW’s prior performance, I am not confident that the proposed plan will yield
18 the benefits that PGW predicts. The actual present values of net benefits under the current
19 plan, as reported in the FY 21 and 22 annual reports, are mere fractions of the plan’s
20 projected benefits (see Table 2 below). In addition, despite actual net benefits under the
21 current plan being significantly lower than projected, net benefits for the proposed plan are
22 *even higher* than those in the current plan, both in total and across all individual programs.
23 In response to an OSBA interrogatory on the matter, PGW indicated that actual net benefits
24 were lower than projected in the current plan for two reasons: low participation levels and

⁸ OSBA I-10

⁹ PGW Revised Proposed DSM Plan FY 25-29, pg. 24

¹⁰ OSBA I-11

1 lower than expected costs to acquire energy savings.¹¹ However, it is unclear how lower
2 than expected costs to acquire energy savings results in below-budget net benefits.

3 PGW has indicated that it is making changes to marketing. PGW has decreased its
4 marketing budget by \$120,000 per year by consolidating marketing activities through a
5 single vendor, and it indicates that it is reprogramming those funds to be used by in-house
6 staff.¹² PGW provided detail in their response to OSBA interrogatories indicating that it
7 will analyze gas usage, categorize small businesses using Standard Industrial Classification
8 (“SIC”) codes, and conduct outreach to specific customers based on likelihood of
9 benefiting from the CER program.¹³

10 It is possible that these changes will be successful in recruiting program participants, and
11 that some of the FY 2021 and 2022 challenges were due to COVID, but PGW’s track record
12 of vastly lower-than-expected participation calls into question its expectation that the
13 proposed plan will have higher-than-ever participation and net benefits. Given this, the
14 Commission should mandate that PGW provide reporting specific to actual small business
15 participation in the SBA and CER programs with respect to number of participants, annual
16 savings, incentive payments, customer costs, and TRC costs/benefits, on an annual basis.
17 To put a fine point on it, PGW should report on the split between small businesses, as
18 defined by PGW, and other customers when they report GS-commercial activity. I further
19 recommend that the Commission require PGW to report on marketing activities for the
20 SBA and CER programs on an annual basis, and on the number of small businesses served
21 by these programs monthly.

22 **Table 2: DSM Program Projected and Actual Present Value of Net Benefits (\$millions)¹⁴**

¹¹ OSBA I-6

¹² Direct Testimony of Theodore Love, pg. 16

¹³ OSBA II-2

¹⁴ Table compiled from the following sources: PGW Revised Proposed DSM Implementation Program FY 25-29 (pg. 10), PGW Current DSM Implementation Plan FY 21-23 (pg. 10), PGW DSM Program Annual Report FY 2021 (pg. 6), and PGW DSM Program Annual Report FY 2022 (pg. 5).

Program	Current Plan (FY 21-23)			Proposed Plan (FY 25-29)
	Projected	Actual FY 21	Actual FY 22	Projected
Residential Equipment Rebates	\$2.38m	\$0.32m	\$0.50m	\$7.31m
Residential Construction Grants	\$0.42m	\$0.16m	\$0.29m	\$2.04m
Commercial Equipment Rebates	\$7.08m	\$1.77m	\$1.36m	\$10.36m
Commercial Construction Grants	\$0.58m	\$0.11m	Not provided	-
Smart Thermostat Marketplace	\$2.49m	\$0.02m	\$0.10m	\$2.64m
LI Smart Thermostat Marketplace	\$0.21m	Not provided	\$0.08m	\$0.32m
EnergySense Kits	-	-	-	\$5.25m
Small Business Assessments	-	-	-	\$0.19m
Portfolio Total	\$11.18m	\$1.95m	\$1.90m	\$25.22m

1

2

3 **Q. What is PGW’s track record in serving small businesses with its DSM plan?**

4 **A.** PGW has a weak track record in serving small businesses with its DSM plan. The FY 2022
5 annual report indicates that seven small businesses participated in the CER program that
6 fiscal year, 15.5% of total program participation.¹⁵ Although PGW did not publicly report
7 on small business participation in prior years, it revealed in response to an OSBA
8 interrogatory that it issued five rebates to small businesses in FY 2021 and six in FY 2020
9 – 13% and 15% of all CER rebates issued, respectively.¹⁶ The fact that PGW’s CER
10 program only served single digits of small businesses annually for the past three years,
11 compared to over 30 large businesses per year over the same period, is notably poor.^{17,18}

12

13 **Q. How does PGW forecast participation in their DSM programs (or in the SBA**
14 **program, specifically)?**

¹⁵ PGW DSM Program Annual Report FY 2022, pg. 9-11

¹⁶ OSBA I-8

¹⁷ OSBA I-8; FY 2022 Annual Report, pg. 10; FY 2021 Annual Report, pg. 11

¹⁸ PGW’s CER program served 38 large commercial customers in FY 2022, 35 in FY 2021, and 38 in FY 2020.

1 PGW does not provide specific rationale for how it projects program participation. In the
2 case of the SBA program, projected participation is simply a function of total budget
3 divided by expected cost per incentive: the 30 projected participants are exactly equal to
4 the \$90,000 budget divided by the \$3,000 expected cost per incentive.¹⁹ PGW confirmed
5 this formula in their response to OSBA II-6.

6 It does not appear that PGW conducts or references market research to inform how many
7 small businesses might reasonably be expected to participate in the SBA program. It also
8 appears that PGW does not factor its own internal capacity, consultant capacity, technician
9 capacity, or expected marketing effectiveness into its projected participation formula,
10 which is somewhat surprising in that PGW does not have a strong track record of serving
11 small business participants.

12 **Q. Are you confident that PGW’s marketing plan will effectively yield their expected**
13 **participation? Why or why not?**

14 **A.** PGW’s proposed marketing budget has decreased from \$360,000 per year in the current
15 plan to \$240,000 per year in the proposed plan.²⁰ In direct testimony, PGW indicated that
16 this reduction was due to consolidation of marketing activities through a single vendor,
17 although more detail was not provided on the exact nature of the cost savings.²¹ PGW has
18 introduced new components to their marketing strategy in the proposed plan, which now
19 includes supply chain and trade ally engagement and direct-to-customer marketing, in
20 addition to consumer-focused market awareness.²²

21 In terms of marketing for the SBA program, specifically, PGW has stated that it will
22 “perform targeted marketing to small business customers” and will also leverage its
23 relationships with neighborhood organizations and the Philadelphia Mayor’s Office of

¹⁹ Direct Testimony of Denise Adamucci, pg. 13, line 8

²⁰ PGW Current DSM Implementation Plan FY 21-23, pg. 8; PGW Revised Proposed DSM Implementation Plan FY 25-29, pg. 7

²¹ Direct Testimony of Theodore Love, pg. 16

²² PGW Revised Proposed DSM Implementation Plan FY 25-29, pg. 11-13

1 Sustainability when performing outreach.²³ PGW will also analyze the usage of small
2 business customers, classify businesses by SIC codes, and conduct outreach to specific
3 customers based on the potential to generate savings via the suite of measures offered in
4 the CER program.²⁴ Given that PGW is marketing to small businesses in a new way, while
5 simultaneously reducing the resources spent on marketing, I recommend that the
6 Commission require PGW to report on the marketing activities of the SBA and CER
7 programs on an annual basis. I also recommend that the Commission require PGW to report
8 monthly to the Commission and to intervenors on the number of small business participants
9 in the SBA and CER programs.

10
11 **Q. Are the administrative costs of the proposed plan reasonable and fully explained?**

12 **A.** No, the administrative costs in the proposed plan represent a significantly larger proportion
13 of portfolio costs than in the current plan, and these costs are neither reasonable nor fully
14 explained. When considering changes in program costs from plan-to-plan, it is more useful
15 to consider cost *ratios* rather than total costs. With cost ratios, factors like inflation or the
16 addition of new programs are held constant, providing a clearer picture of how overall
17 program spending has changed. As compared to the current plan, the ratio of administrative
18 costs to total costs would increase from 22.9% to 26.4% (a 15.3 percent change).²⁵ The
19 ratio of administrative costs to incentive costs would increase from 40.5% to 44.5% (a 9.9
20 percent change), meaning that for every \$1 spent on incentives, nearly \$0.50 is spent on
21 program administration.^{26,27}

²³ OSBA I-8

²⁴ OSBA II-2

²⁵ Current plan admin-to-total ratio is \$1,633,747/\$7,105,159 or 22.9%. Revised proposed plan admin-to-total ratio is \$3,350,862/\$12,714,214 or 26.4%. Percent change is (26.4-22.9)/22.9 or 15.3%.

²⁶ Current plan admin-to-incentives ratio is \$1,633,747/\$4,033,650 or 40.5%. Revised proposed plan admin-to-incentives ratio is \$3,350,862/\$7,526,604 or 44.5%. Percent change is (44.5-40.5)/40.5 or 9.9%.

²⁷ PGW Current DSM Implementation Plan FY 21-23, pg. 8; PGW Revised Proposed DSM Implementation Plan FY 24-26, pg. 7

1 In direct testimony, Denise Adamucci states, “While PGW has worked to simplify several
2 of the rebate programs to reduce administrative costs, several of the programs that were
3 added in Phase III and new programs proposed in Phase IV inherently have higher
4 administrative costs. Examples of this include the EnergySense Kit and Smart Thermostat
5 Marketplace programs, which require PGW to set up an online portal and mail items to
6 customers”.²⁸ As both Smart Thermostat Marketplace programs already have online portal
7 infrastructure in place, this does not seem like a reasonable explanation for the increase in
8 the admin-to-total cost ratio. With respect to the EnergySense Kit program, PGW clarified
9 that shipping costs will be included in the administrative budget rather than the incentive
10 budget.²⁹ Shipping costs and development of a webform do seem like reasonable factors
11 increasing the admin-to-total cost ratio, but they do not plausibly account for the entire
12 increase. In addition, if PGW has indeed simplified several of the rebate programs to reduce
13 administrative costs (as referenced above), then that should attenuate at least some of the
14 effect of shipping and web development on the ratio.

15 Finally, PGW references a difference in relative inflation rates for goods versus services as
16 an explanation for the increased ratio.³⁰ At the start of 2023, the ratio of services inflation
17 to goods inflation was 0.85, nearly one-to-one, indicating that any difference between the
18 two is not a plausible primary driver of PGW’s increased administrative cost ratios.³¹

19 While programs will require a base amount of spending on administration regardless of
20 participation numbers, PGW has a history of notably high administrative spending
21 combined with low program uptake. In FY 2021, PGW spent 67% of its administration
22 budget but only 33% of its incentive budget.³² In FY 2022, administrative spending was

²⁸ Direct Testimony of Denise Adamucci, pg. 4-5

²⁹ OSBA II-1

³⁰ OSBA II-1

³¹ Federal Reserve Bank of Richmond, *Watching Services Inflation in 2023*, available at:
https://www.richmondfed.org/research/national_economy/macro_minute/2023/mm_01_10_23

³² FY 2021 Annual Report, pg. 4

1 73% of budget, while customer incentives were only 56% of projections.³³ Given PGW’s
2 history of high administrative spending and low program uptake, along with its lack of a
3 clear explanation for the increase in the admin-to-total cost ratio, the Commission should
4 consider imposing a cap on administrative spending of 41% of incentive spending, which
5 is the ratio from the previous plan. This ratio is already high, and PGW’s plan to increase
6 further does not seem justified.

7
8 **4, PROGRAM DESIGN CONCERNS**

9 **Q. Are natural gas VRF heat pumps a proven technology widely demonstrated to be**
10 **efficient and cost effective?**

11 A. No, natural gas VRF heat pumps (hereafter “gas heat pumps”) are not a proven technology
12 widely demonstrated to be efficient and cost effective. Although the market for *electric*
13 heat pumps is growing, gas heat pumps are an emerging technology with little to no market
14 adoption. A 2022 analysis of the global market for heat pumps in the academic journal
15 *Nature Energy* makes no mention of gas heat pump technology.³⁴ Additionally,
16 commercial market research reports on heat pumps also make no mention of gas heat
17 pumps, indicating the deployment of this technology is very limited.³⁵ A 2019 industry
18 white paper by the Gas Technology Institute indicates a “weak business case” for gas heat
19 pumps due to lack of available evidence to support investment into the technology.³⁶

20 DSM programs like EnergySense are “deployment” programs designed to achieve
21 widespread market adoption of proven energy efficiency technologies, compared to pilot
22 programs which are meant to gather evidence that a technology is reliable or economically

³³ FY 2022 Annual Report, pg. 4

³⁴ Nature Energy (2022), *Heating Up the Global Heat Pump Market*, available at:
<https://www.nature.com/articles/s41560-022-01104-8>

³⁵ See reports from [Global Market Insights](#) and [Market Research Future](#) for examples.

³⁶ Gas Technology Institute (2019), *The Gas Heat Pump Technology and Market Roadmap*, Available at:
https://www.gti.energy/wp-content/uploads/2020/09/Gas-Heat-Pump-Roadmap-Industry-White-Paper_Nov2019.pdf

1 viable. Given the existing market research, gas heat pumps are best classified as an
2 emerging technology and should not be included in a deployment program. IEC was only
3 able to identify two publicly available case studies and pilot demonstrations of gas heat
4 pump technology in the U.S., and both are funded or otherwise connected to natural gas
5 industry advocates. A 2019 field study commissioned by the Department of Defense and
6 conducted by the Gas Technology Institute performed a side-by-side demonstration of gas
7 and electric heat pumps in a small office building at Naval Station Great Lakes. The study
8 found that the gas heat pump had lower life-cycle and energy costs than both the electric
9 heat pump and traditional HVAC systems, but noted that additional development was
10 needed to optimize gas heat pump performance and to reduce installed costs in order to
11 improve regional economics and support broader market adoption.³⁷ A 2021 study funded
12 by the California Energy Commission and conducted by the Gas Technology Institute
13 installed gas heat pumps at two restaurant sites in Los Angeles and found that the gas heat
14 pumps increased energy efficiency and reduced operating costs at both sites, but required
15 complex retrofits during installation.³⁸

16 In addition, PGW provided two case studies as supplements to OSBA interrogatories. The
17 first was conducted by PGW itself and involved the installation of two gas heat pumps on
18 a large building in Philadelphia, which resulted in an estimated savings of \$20,000 per year
19 for the property manager.³⁹ The second was conducted in 2020 by gas heat pump
20 manufacturer Yanmar. The project involved the installation of two gas heat pumps at a
21 restaurant in Vancouver, Canada, and the case study estimated that operating costs were
22 lower than those of a hypothetical electric heat pump.⁴⁰

³⁷ DoD Strategic Environmental Research and Development Program, *Gas Engine-Driven Heat Pump Cold Climate Field Demonstration*, Available at: <https://serdp-estcp.org/projects/details/0786546a-b196-4f7a-8524-d62bcf0dba16/ew-201515-project-overview>

³⁸ Gas Technology Institute (2021), *Commercial Gas Heat Pumps for Hot Water and A/C: Demonstration in Restaurant Applications*, Available at: https://www.gti.energy/wp-content/uploads/2021/03/WhitePaper-Commercial-Gas-Heat-Pumps-for-Hot-Water-AC-Demo-Restaurant-Applications_06Jan2021.pdf

³⁹ OSBA I-13, Attachment A

⁴⁰ OSBA II-4, Attachment A

1 The results from the limited number of existing case studies indicate that gas heat pumps
2 offer lower energy and life-cycle costs compared to traditional HVAC systems and may
3 also have a slight efficiency and cost advantage compared to electric heat pumps (although
4 this result is highly location and energy price dependent). However, a common finding
5 across these limited number of pilot projects is that gas heat pump technology needs
6 additional development to optimize performance and installers need extra education and
7 support through the complex retrofit process, indicating that this technology is not yet at a
8 stage where it could be broadly classified as “proven.”

9 **Q. Is it typical for utility energy conservation programs to incentivize small businesses**
10 **to invest in emerging technologies?**

11 **A.** No. DSM programs are “deployment” programs; deployment programs are designed to
12 achieve widespread market adoption of proven energy efficiency and clean energy
13 technologies. Typically, emerging technologies are relegated to testing in the context of
14 smaller pilot programs, which are not widespread programs open to entire customer
15 classes. The role of pilot programs is to gather evidence that a technology is usable and
16 reliable, prior to widespread deployment.

17 IEc conducted research on gas utilities to understand the frequency of incentivizing gas
18 heat pumps. I reviewed websites for 30 U.S. gas utilities, but found only two that offer
19 targeted incentives for these products: Chattanooga Gas and Atlanta Gas Light.^{41,42} Table
20 3 below contains the list of gas utilities from our search that do not incentivize these
21 products. Included in this table are eight utility sponsors of the Gas Technology Institute’s
22 2019 white paper on the roadmap for gas heat pump technology, indicating that even
23 utilities interested in gas heat pumps from a technological perspective do not consider them

⁴¹ Chattanooga Gas: <https://www.chattanoogaagas.com/business/business-rebates.html>

⁴² Atlanta Gas Light: <https://www.atlantagaslight.com/business/ways-to-save.html>

1 suitable for widespread deployment.^{43,44} As such, it is safe to conclude that subsidizing gas
 2 heat pumps is not common practice.

3
 4 **Table 3: U.S. Gas Utilities that Do Not Provide Incentives for Gas HPs**

Utility	States Served	Rebate URL
Black Hills Gas	AR, CO, IA, NE, SD	Link
CenterPoint Energy	IN, OH	Link
ConEdison	NY	Link
D.C. Sustainable Energy Utility	D.C.	Link
Dominion Energy	VA, NC	Link
DTE Energy	MI	Link
Duke Energy	IN, NC, SC, KY	Link
Intermountain Gas Co.	ID	Link
National Fuel Gas	NY, PA	Link
National Grid	MA, NY	Link
New Jersey Natural Gas	NJ	Link
New Mexico Gas Company	NM	Link
Nicor Gas	IL	Link
NYSEG	NY	Link
Oklahoma Natural Gas	OK	Link
PECO	PA	Link
Peoples Gas & North Shore Gas	IL	Link
PG&E	CA	Link
SoCal Gas	CA	Link
Southern Connecticut Gas	CT	Link
Southwest Gas	AZ	Link
TECO Peoples Gas	FL	Link
Texas Gas Service	TX	Link
UGI Utilities, Inc.	PA	Link
Unitil	MA, ME, NH	Link
Washington Gas	MD, VA	Link
Wyoming Gas, LLC	WY	Link
Xcel Energy	CO, MI, MN, NM, ND, SD, TX, WI	Link

⁴³ Gas Technology Institute (2019), *The Gas Heat Pump Technology and Market Roadmap*, Available at: https://www.gti.energy/wp-content/uploads/2020/09/Gas-Heat-Pump-Roadmap-Industry-White-Paper_Nov2019.pdf

⁴⁴ Sponsoring U.S. utilities that do not currently offer commercial rebates for gas heat pumps include Dominion Energy, DTE, Intermountain Gas Co., New Jersey Natural Gas, NYSEG, Oklahoma Natural Gas, SoCal Gas, and TECO Peoples Gas.

1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
25
26

Q. Are natural gas heat pumps appropriate for a small business context?

It is possible that gas heat pumps are appropriate in some small business contexts, but the technology is so new to the market that sufficient evidence does not yet exist to support this claim. As described in the previous question, an extensive search of U.S. gas utilities found only two that offer commercial rebates for this technology. The settings of the limited number of publicly available case studies cited above (a small office building on a military base and two Los Angeles restaurants) are not comprehensive enough to draw the conclusion that gas heat pumps are appropriate across many types of Philadelphia’s small businesses. In addition, PGW’s Technical Resource Manual (“TRM”) defines a 20-year measure life for gas heat pumps, meaning that small business customers will be locked into this emerging technology for decades.⁴⁵ As the oldest publicly available case study is barely four years old, there is not yet sufficient field evidence on the lifetime efficiency and cost effectiveness of gas heat pumps, and therefore, this technology’s appropriateness in the small business context (or any context) is not well-established.

PGW provided two case studies on gas heat pump installation as responses to OSBA interrogatories. The first study involved a large commercial building with many small business tenants. In this case, the building management company undertook the financial burden of the extensive retrofit and installation process rather than the small business tenants themselves, providing no direct evidence of the feasibility of a single small business owner’s investment in gas heat pump technology.⁴⁶ The second study was conducted in 2020 by gas heat pump manufacturer Yanmar, and reviewed the installation of two gas heat pumps at a restaurant in Vancouver, Canada.⁴⁷ Although it is promising that the case study estimated a reduction in installation and operating costs for the restaurant as compared to a hypothetical electric heat pump system, the case study relies on local average

⁴⁵ 2024-2026 PGW Technical Reference Manual, pg. 50

⁴⁶ OSBA I-13, Attachment A

⁴⁷ OSBA II-4, Attachment A

1 utility costs as opposed to site-specific costs. And moreover, this single study does not
2 provide the necessary evidence to indicate that gas heat pumps are appropriate across many
3 small business contexts.
4

5 **Q. Are there sufficient contractor resources in the Philadelphia area capable of installing**
6 **and maintaining natural gas heat pumps?**

7 A. No, based on a web search, there appear to be no HVAC companies in the Philadelphia
8 area that advertise specific expertise with the installation and maintenance of gas heat
9 pumps.⁴⁸ In response to an OSBA interrogatory, PGW indicated that it was aware of only
10 two companies in its service area with this experience.⁴⁹ This is clearly insufficient HVAC
11 contractor coverage, especially for an emerging technology, which by its nature typically
12 has more service calls, and especially in the context of serving small business customers.

13 **Q. Is it appropriate for PGW to continue to give rebates for natural gas boilers and**
14 **furnaces for new construction?**

15 A. In my opinion, no. The useful life of HVAC systems is around 15 or 20 years. By
16 subsidizing gas heating equipment in new construction, PGW is encouraging lock-in to gas
17 heating. In 15 or 20 years, it is unlikely that gas will be the dominant, or the most cost-
18 effective, fuel for space heating. Model building energy code, which states use as the basis
19 for their building energy codes, is moving towards an all-electric code for new
20 construction. By 2031, the model energy code for commercial buildings, ASHRAE 90.1,
21 will be a net zero carbon code.⁵⁰ Commercial buildings are increasingly built to all-electric

⁴⁸ Based on a Google search of “Philadelphia AND hvac contractor AND gas heat pump” conducted on October 25, 2023.

⁴⁹ OSBA II-3

⁵⁰ “ASHRAE is furthering its commitment to reducing GHG emissions by strengthening the building decarbonization components of ASHRAE standards, including in [ANSI/ASHRAE/IES Standard 90.1, Energy Efficiency Standard for Sites and Buildings Except Low-Rise Residential Buildings](#) and to reach net-zero-energy by 2031.” From *ASHRAE Expands Commitment to Reduce Greenhouse Gas Emissions by Releasing Building Performance Standards Guide and Redesigned Decarbonization Webpage*, Press Release, February 3, 2023. Available at: <https://www.ashrae.org/about/news/2023/ashrae-expands-commitment-to-reduce-greenhouse-gasemissions-by-releasing-building-performance-standards-guide-and-redesigned-decarbonization-webpage>

1 standards. Two states (New York and Washington), the District of Columbia, and 84 cities
2 in 12 states have already adopted all-electric requirements for new construction.⁵¹ Further,
3 the City of Philadelphia has an official goal of carbon neutrality by 2050, which is also not
4 compatible with locking small businesses into gas-fired heating for the next 15-20 years.⁵²
5 As buildings increasingly go all-electric, gas utilities will have a smaller customer base for
6 shouldering system infrastructure costs, and as a result, gas prices are likely to increase.

7 Given the clear national policy and building code trajectory towards all-electric new
8 construction, along with the City of Philadelphia’s own carbon neutrality goals, subsidizing
9 gas heating in new construction is not appropriate. Heating commercial buildings with gas
10 heat in 20 years is going to seem as antiquated as heating buildings with heating oil today.
11 Encouraging lock-in to gas may hurt businesses that occupy these buildings in the future
12 with higher energy and retrofit costs, and thus may depress the value of the real estate
13 assets, which is hurtful to both building owners as well as the City of Philadelphia.

⁵¹ Building Decarbonization Coalition, *Database of Zero Emission Building Ordinances*, October 2023, available at: <https://buildingdecarb.org/zeb-ordinances>

⁵² Confirmed via email correspondence with the City of Philadelphia Office of Sustainability (Nidhi Krishen, Deputy Director for Climate Solutions) on October 30, 2023.

EXHIBIT IEc-1

RESUME FOR

ANGELA J. VITULLI

Angela Vitulli has over 20 years of experience in program design and evaluation, and over fifteen years of experience in energy efficiency and clean energy program design and evaluation. In addition to evaluating traditional demand side management (DSM) portfolios, she specializes in designing and evaluating energy efficiency and clean energy technology demonstration and pilot programs, and market transformation programs. She has served as a principal investigator and contract manager for relevant contracts for DOE, NYSERDA, the California Energy Commission, and the California Air Resources Board. Ms. Vitulli also provides GHG strategy and management services to private sector clients. This work entails assisting clients in analyzing energy efficiency, fuel switching, and green power and fuel options, as well as vetting carbon offset projects.

Education

Master of Arts in Urban and Environmental Policy, Tufts University
Bachelor of Arts in Political Science, Tulane University, *Phi Beta Kappa*

Select Program Evaluation Experience

For the **PENNSYLVANIA OFFICE OF THE SMALL BUSINESS ADVOCATE** served as an expert witness in the matter of the Columbia Gas' proposed Green Path Rider, which was a propose that relied heavily on carbon offsets to reduce greenhouse gas (GHG) emissions associate with gas usage. Assisted OSBA in renewing and analyzing evidence provided by other intervenors. Analyzed the economic and regulatory considerations of the proposed tariff. Provided an expert report and testimony that explained the challenges of using carbon offsets as proposed, and recommendations to bolster safeguards and ensure transparency.

For the **NEW BRUNSWICK OFFICE AG OFFICE, PUBLIC INTERVENER'S OFFICE**, served as an expert witness on a proposed NB Power DSM plan. Conducted analyses of cost-effectiveness and feasibility of the proposed portfolio of residential, commercial, and demand response programming, including comparisons with past performance and with programming of similar utilities. Developed an expert report and testimony, and assisted the Public Intervener in renewing and analyzing evidence provided by other stakeholders.

For the **NEW YORK STATE ENERGY RESEARCH AND DEVELOPMENT AUTHORITY (NYSERDA)**, managing a series of evaluative case studies of NYSERDA heat pumps and building decarbonization programs, including the NYSERDA Building of Excellence Program and Comfort Home program. Currently managing a case study of NYSERDA's and the New York City Housing Authority's pilot project to install window unit heat pumps in public housing. These case studies feature analysis fuel savings and GHG reduction from pilot efforts, as well as lessons learned from implementation that inform scale up of similar programs and strategies within the State of New York.

For the **NEW YORK STATE ENERGY RESEARCH AND DEVELOPMENT AUTHORITY (NYSERDA)**, managed a three year contract to evaluate programs within NYSERDA's Technology and Market Development (T&MD) portfolio, which includes: solar PV cost reduction, smart grid, advanced buildings technology development, energy codes and standards, and combined heat and power. Evaluation work includes formative evaluation/strategic planning and evaluability assessment; impact and process evaluation; and market assessment and characterization. She managed process, market, and impact evaluation of NYSERDA's Advanced Buildings

Technology Development program, which provides R&D subsidies to NY State firms developing and commercializing building energy efficiency technologies including next generation HVAC and new applications for LED lighting.

For **EVERSOURCE MASSACHUSETTS**, providing energy efficiency program evaluation oversight and review, including reviewing work plans, methods, and deliverables for market and impact evaluations. Provides recommendations to Eversource's evaluation contractors, to improve the technical quality of evaluation designs as well as the communications of evaluation results. Also assisting Eversource in developing and implementing research plans for a myriad of topics including non-energy benefits in low-income settings; measures development for home energy automation interventions; and incentive levels for home energy offerings.

For the **NEW YORK STATE ENERGY RESEARCH AND DEVELOPMENT AUTHORITY (NYSERDA)**, currently supporting the Innovations and Research program, which houses the Advanced Buildings R&D program, to select and automate tracking of macroeconomic metrics of decarbonization in NYS, including building sector GHG intensity. Also conducting market research with NYSEDA grantees, partners, and the investment community to identify persistent gaps in bringing technologies to market, to inform future programming.

For the **California Energy Commission**, led a large team of internal staff and subcontractors to develop methods and tools to forecast the carbon reduction and co-benefits of the Agency's energy efficiency and renewables R&D and market transformation grant program funded by California's Electricity Program Investment Charge (EPIC). The project first entailed first characterizing the current CEC EPIC portfolio developing a taxonomy of benefits that could result from grant investments (i.e., carbon reduction, air emissions reduction, health benefits, job impacts, utility cost reduction, on-bill customer savings). For each benefit, Ms. Vitulli's team reviewed existing quantification and monetization methods, and recommended approaches for adaptation and/or new methods development for EPIC's context. Developed user-friendly analytical tools to operationalize methods, and to forecast carbon reductions and co-benefits. Also served as principal investigator for the Building Energy Efficiency/Zero Net Energy research area of the project, and led analyses of on-bill savings and other benefits forecast from market adoption of funded construction approaches and technologies.

For the **DEPARTMENT OF ENERGY'S BUILDING TECHNOLOGY OFFICE**, led evaluation efforts for the Building America Program, which aims to improve the efficiency of new residential construction via R&D, large scale technology demonstration, peer-to-peer information exchange, and market diffusion of cost-effective, integrated building design and engineering approaches. Conducted an in-depth quantitative analysis of the energy savings and other impacts of selected technologies and construction techniques, including net economic benefits, net environmental benefits (including GHG reductions), and estimation of other non-energy benefits. Assessed market adoption of supported technologies, the extent to which benefits can be attributed to BTO, and the return on BTO's investment relative to benefits. Additional, related analyses and projects include citation analysis of Building America publications and publications of associated building science experts; and concurrent strategic planning efforts to utilize information generated by the evaluation to inform near-term BTO program planning. Presented methodology at the American Evaluation Association conference in 2016 and a [paper on findings](#) at the IEPPEC conference in Vienna in 2018.

For the **CALIFORNIA AIR RESOURCES BOARD (CARB)**, evaluated economic innovations resulting from AB 32, the State's Global Warming Solutions Act, passed in 2006, including renewable fuels market development spurred by the Low Carbon Fuel Standard (LCFS). Conducted a market evaluation and contribution analysis to assess the role of LCFS to renewable fuels market trends in California and nationally.

For the **NEW YORK STATE ENERGY RESEARCH AND DEVELOPMENT AUTHORITY (NYSERDA) CODES PROGRAM**, assisted the Authority in developing a Stretch to Zero program design. Managed market research to inform the development of a zero-based stretch code pilot, including researching research on provisions used in other jurisdictions, Conducted interviews with municipal leaders in NYS, including code officials, to gauge barriers and factors that influence acceptability. Worked with client to draft adoption levels, tiers, and incentive structure. Provided input on how to structure forthcoming pilot based on market research.

For the **NEW YORK STATE ENERGY RESEARCH AND DEVELOPMENT AUTHORITY (NYSERDA) CODES PROGRAM**, conducted the multi-year Codes process evaluation from 2015-2017 Managed baseline and follow up process evaluation to assess the impact of NYSEDA codes training on regular practices of code officials, architects, and engineers. Utilized in-person, phone, and web-based surveys to gather data. Analyzed changes in knowledge directly following training, as well as changes in behavior six months after training, including barriers to behavior change. Compared the practices of participants with those of non-participants.

For **NYSERDA MARKET INSIGHTS**, conducted focus groups with residents and business owners to gather information on 1) attitudes towards planned, large scale wind and solar development in their communities, and 2) likely conditions for engendering siting acceptance through engagement in the development process and community compensation process. Successfully managed conversations among participants who varied greatly in their understanding of energy and climate change issues, as well as perceptions of the benefits and drawbacks of proposed projects. The project resulted in recommendations for improving community engagement and siting process to ensure the viability of siting LSR projects critical for meeting CLCPA climate targets; several IEc recommendations were included in the *Accelerated Renewable Energy Growth and Community Benefit Act of 2020*.

For **NYSERDA'S COMMUNICATIONS OFFICE**, managed barriers and opportunities research on community choice aggregation (CCA) growth in New York State, including assessing relevant NYS energy sector policies, market conditions, and information gaps that affect CCA adoption. Developed recommendations on state-level policy changes and incentive design to support CCA, as well as communication strategies for local governments, environmental advocates, and the general public.

For the **MASSACHUSETTS EXECUTIVE OFFICE OF ENERGY AND ENVIRONMENTAL AFFAIRS**, led the consulting team supporting the Governor's Massachusetts Zero Net Energy Building Task Force, a 70-member public/private task force which was charged with developing public policy recommendations to move Massachusetts towards a zero net energy real estate climate by 2030. Provided regular facilitation support to task force and its working groups; participants included representatives from state and local government, electric utilities, architecture and engineering firms, builders, code officials, and environmental advocacy organizations. Assisted the Task Force in synthesizing recommendations and developing the [Task Force's report](#) to the Governor. Results included two state-funded ZNEB demonstration projects, including the construction of the Lowell Courthouse, the nation's first zero net courthouse; and passage, adoption, and success the Massachusetts "stretch" building energy code, the first of its kind.

For **Natural Resource Canada, (NRCan)**, conducted strategic planning to assist the Agency in developing a comprehensive, data driven approach to building sector energy efficiency programming, informed by experience of U.S. DOE's Buildings Technology Office (BTO). Assisted NRCan in adapting BTO's "ecosystem" programmatic approach to administer a coordinated portfolio of R&D, market stimulation, and codes and standards approaches to reduce building EUI and carbon emissions.

EXHIBIT IEc-2

REFERENCED INTERROGATORY RESPONSES

- 1 OSBA I-6
- 2 OSBA I-8
- 3 OSBA I-10
- 4 OSBA I-11
- 5 OSBA I-13
- 6 OSBA II-1
- 7 OSBA II-2
- 8 OSBA II-3
- 9 OSBA II-4
- 10 OSBA II-6

**Response of Philadelphia Gas Works
to the Interrogatories of OSBA, Set I
Docket No. P-2014-2459362**

OSBA to PGW I-6.

(References: Current DSM Implementation Plan FY 21-23, pg. 9; Proposed DSM Implementation Plan FY 24-26, pg. 10; DSM Program Annual Report FY 2022, pg. 5; DSM Program Annual Report FY 2021, pg. 6; DSM Program Annual Report FY 2020, pg. 5): Despite total benefits of the current plan being much lower than projected, benefits projections are even higher in the proposed plan (see table below).

Table: Total Resource Costs and BCRs in the Proposed and Current Plans with Actual Results from Annual Reports

	Total Proposed Plan	Total Current Plan	Actual FY 22	Actual FY 21	Actual FY 20
PV of Net Benefits	\$15,729,195	\$11,180,938	\$1,897,203	\$1,953,793	\$1,349,163
BCR	2.31	2.14	2.05	2.32	2.14

- (a) Why are the actual net benefits so much lower than projections?
- (b) What evidence does PGW have to support the increase in net benefits in the proposed plan?

Response:

- (a) Participation levels were not achieved at the levels initially projected, which led to lower than projected net benefits from the plan as a whole. However, the overall portfolio was cost-effective and provided significantly higher benefits than it cost. It is also worth noting that although overall participation was lower than projected, the BCR's are comparable between the projections and actual activity. Another factor related to the lower-than-projected net benefits has been identified by Theodore Love in his direct testimony, where he notes that PGW's cost to acquire energy savings have been near to or lower than its projected goal.
- (b) The increase in projected net benefits is directly related to the addition of new programs that are more cost-effective, notably ESK, which has the highest projected BCR of any program in the portfolio. PGW also anticipates an increase in participation in other programs, partially due to the increased awareness and outreach derived from the launch of these new programs. Lastly, PGW expects the public's general awareness around energy efficiency incentive programs to increase as federal tax incentives are made available to customers via the Inflation Reduction Act. A correlated increase in participation in utility-based rebate programs is reasonable to anticipate.

Response Provided By: Steven Jerue, Director of Customer Programs

Dated: October 2, 2023

**Response of Philadelphia Gas Works
to the Interrogatories of OSBA, Set I
Docket No. P-2014-2459362**

OSBA to PGW I-8.

(Reference: DSM Program Annual Report FY 2022, pg. 9-11): The FY 2022 DSM Program Annual Report is the first annual report to break down CER program participation by business size. The report indicates that 7 small businesses and 38 non-small businesses participated in the CER program in FY 2022 (15.5% small businesses). Overall program participation (small and non-small businesses combined) was 20% of PGW's goal for FY 2022 (45/220 applications).

- (a) Does PGW have data on small business participation in the CER program in FY 2021 or 2020?
- (b) How does PGW plan to recruit small business participants for the CER program moving forward given the low participation in FY 2022?
- (c) Why was overall CER program participation so low in FY 2022, and what evidence does PGW have that participation will be higher in the proposed plan?

Response:

- (a) Yes. PGW has data on small business participation in the CER program in FY 2020 and FY 2021. In FY 2021, five (5) rebates were issued to small business customers, accounting for 13% of commercial rebates issued. Rebates issued to small business customers accounted for the second highest category of rebates issued behind multifamily (23), and ahead of retail, lodging, office, service, and customers in other categories. In FY 2020, which was in the previous phase, PGW issued six (6) rebates to small business customers in the CER program, accounting for 15% of the commercial rebates issued. Pursuant to PGW's tariff, a "small business" is "a person, sole proprietorship, partnership, corporation, association or other business whose annual gas consumption does not exceed 300 Mcf."
- (b) PGW will perform targeted marketing to small business customers. Additionally, PGW will leverage its relationships with neighborhood organizations and CDCs to raise awareness. Philadelphia's Mayor's Office of Sustainability has also expressed interest in the program and will be an asset when performing outreach for SBA. The SBA program is solely available to small businesses, and an important component is to provide information on commercial rebate opportunities, in addition to the direct install measures that may be provided. PGW expects that the SBA program will also result in increased activity for small businesses in the CER program.

**Response of Philadelphia Gas Works
to the Interrogatories of OSBA, Set I
Docket No. P-2014-2459362**

- (c) The overall participation in FY 2022 was lower than projected due to the volume of rebate applications received. However, the projected participation in the proposed plan is representative of historical participation rates as well as the number of projects that PGW currently has in its pipeline that are scheduled to close in the future. Additionally, PGW anticipates increased rebate activity for CER over the next several fiscal years due to tax credits that will be made available to customers via the Inflation Reduction Act of 2022, which will further incentivize customers to purchase high efficiency equipment.

Response Provided By: Steven Jerue, Director of Customer Programs

Dated: October 2, 2023

**Response of Philadelphia Gas Works
to the Interrogatories of OSBA, Set I
Docket No. P-2014-2459362**

OSBA to PGW I-10.

(Reference: Proposed DSM Implementation Plan FY 24-26, pg. 29): The proposed SBA program specifies that small business participants “must agree” that the technician conducting the energy assessment can “perform free and low-cost energy efficiency improvements, such as updating temperature set-points, installing pipe wrap, low-flow devices, minor air sealing, and similar measures.”

(a) Is there flexibility in this stipulation based on business type or owner preference? For example, updating temperature set points may not be feasible for some businesses, such as food service or gyms. And low flow devices may not be suitable for commercial kitchens.

(b) Is this list of required measures exhaustive? If not, can PGW provide the complete list of measures?

Response:

(a) Yes. PGW can modify to state that customers must agree to free and low-cost energy efficiency improvements that do not negatively impact their business operations, and which are feasible. PGW believes that requiring customers to accept measures is an important component of program design, and necessary to achieve cost-effective savings. This flexibility will allow for a better customer experience.

(b) PGW has a list of measures; however, it is not exhaustive and PGW will be amenable to accepting other measures as long as they produce verifiable natural gas savings. The most common measures will be faucet aerators, pipe insulation, building control settings, and minor air sealing opportunities.

Response Provided By: Steven Jerue, Director of Customer Programs

Dated: October 2, 2023

**Response of Philadelphia Gas Works
to the Interrogatories of OSBA, Set I
Docket No. P-2014-2459362**

OSBA to PGW I-11.

(Reference: Proposed DSM Implementation Plan FY 24-26, pg. 29): PGW suggests that the SBA “will serve as a lead generator to direct customers towards PGW’s prescriptive rebate programs, namely CER, ...”. Will PGW track and report the number of small businesses that participate in the SBA program and then go on to participate in the CER program as part of annual reporting or evaluation?

Response: Yes. PGW will track and report the number of small businesses that participate in the SBA program and then go on to participate in the CER program as part of its annual reporting.

Response Provided By: Steven Jerue, Director of Customer Programs

Dated: October 2, 2023

**Response of Philadelphia Gas Works
to the Interrogatories of OSBA, Set I
Docket No. P-2014-2459362**

OSBA to PGW I-13.

(Reference: Proposed DSM Implementation Plan FY 24-26): A PGW's proposed DSM plan also describes VRF heat pumps as "an emerging technology." There appear to be no available statistics on the market penetration of gas VRF heat pumps because they are so new.

- (a) What is the rationale for including a technology in the proposed plan that unproven in the marketplace?
- (b) What evidence does PGW have that these gas VRF heat pumps will achieve sustainable market penetration?
- (c) Does PGW have a list of contractors in the service area that currently service VRFs?
- (d) Why would a small business customer be better served by a gas VRF than an electric one?

Response:

- (a) Though the VRF heat pump is new to the EnergySense portfolio, it is not unproven in the marketplace. When making the recommendation to include VRF natural gas heat pumps in its Plan, PGW's energy efficiency team collaborated with the PGW Marketing Department, who have received positive feedback on the measure from both industry colleagues and PGW customers. PGW reviewed several case studies on projects throughout North America where the measure was installed and achieved significant savings. Locally, PGW worked with the owners of the Bok Building, a former trade school in South Philadelphia that currently functions as a multi-use commercial property with over 200 artists, entrepreneurs, small businesses, and community services operating out of the building. The PGW Marketing team proposed the installation of (2) 10-ton Yanmar natural gas heat pumps which are located on the building's rooftop. The project was very well received by the owners of the Bok, and a case study was completed on the project, which is included in PGW's response as Attachment A.

Cutting-edge technological measures like the VRF heat pump are precisely the type of measures that should be part of demand-side management programs. Utility rebate programs can play a significant role in promoting market transformation. since these measures are relatively new and have a significant incremental cost,

- (b) Sustainable marketing penetration is a holistic approach whose aim is to ensure that PGW is providing the consumer with alternative reliable solutions and affordable alternative solutions; hence, PGW is seeking incentives. The VRF natural gas heat pump technology

**Response of Philadelphia Gas Works
to the Interrogatories of OSBA, Set I
Docket No. P-2014-2459362**

itself shows promise for market penetration due to its convenience because the features and benefits lower the total customer operating cost to ensure business sustainability. Furthermore, PGW has evidence that the VRF heat pump technology works, from local examples like the Bok Building referenced above, and other utility programs and manufacturer case studies. The popularity and market penetration of the measure is difficult to predict, as for any other newer measure.

- (c) PGW has a list of contractors who have installed this measure. Two companies that PGW has worked with directly are TriStar Companies and CoolSys.

- (d) Although this measure is not specifically intended for small businesses, businesses operating out of small or older buildings may not have electric service capable of handling additional electric load to run electric cooling or heating. For these businesses, the cost of enlarging existing electric service may be prohibitive. Additionally, high electric demand charges during peak business hours can be costly for small businesses who rely on electric heat pumps for heating and cooling. PGW does not apply demand charges for buildings that use natural gas to primarily heat or cool their building. VRF natural gas heat pumps are similarly well suited for retrofitting multifamily buildings.

Response Provided By: Steven Jerue, Director of Customer Programs

Dated: October 2, 2023

The Bok Building – Out with the Old and in with the New

In the heart of South Philadelphia at 9th and Mifflin Streets, the Bok Building is a 340,000 square foot former trade school built in the 1930s. In 2015, when parent company Scout and their managing partner, Lindsey Scannapieco took over the space, the team did a light renovation instead of destroying the old vocational school that has stood there for more than 75 years. The approach of reusing the existing infrastructure within the building creates an affordable workspace for a diversified end user. Matching tenants with spaces that can accommodate their needs; while offering amenity and economic opportunity to the neighborhood.

The tenants in the current building are home to over 200 Philadelphia artists, entrepreneurs, small businesses and community services including ceramic designers to glass blowers to architecture offices to a daycare and a soccer sports center.

THE CHALLENGE:

Various businesses within the Bok building require different demands for energy. The question was how to deliver it to each tenant area of the building most effectively. Some of the challenges faced were ordering and waiting for early morning fuel deliveries, adding in the cost of labor to assist with these efforts. Scout made updates to the space by advancing their energy use from oil to natural gas.

THE SOLUTION:

In 2017, the Scout team worked with PGW to incorporate a new high pressure gas service. The reasons to convert to natural gas include affordability, cleaner burning fuel which results in less maintenance, and a better working environment for their team in the boiler room.

Scannapieco said, “We were looking for a more efficient and affordable way to heat our building. Our boilers are now gas-fired and extremely efficient.” Incorporating natural gas has resulted in an annual savings of over \$20,000 per year.



Photographer Sam Oberter courtesy of the Bok Building

About The Bok Building

Through transformation and new ownership innovation, the BOK is now owned and operated by Scout, a multi-disciplinary design and development firm with a mission in transforming vacant and underutilized spaces in creative ways.

Scout reduced the building greenhouse gas emissions by transforming the heating system from oil to natural gas. Converting to affordable natural gas also reduced the Bok annual O&M cost by over \$20,000. The gas heat pump units are 50% more efficient than conventional heating equipment in the heating mode.

The Bok Building

In 2020, the Bok was in need of additional cooling capacity; however, the building's electrical service couldn't handle any additional electrical loads. While seeking a feasible solution, the Bok was in communication with PGW. The PGW Marketing team proposed the installation of (2) 10-ton Yanmar natural gas heat pumps (GHP) which are located on the building's rooftop. The natural gas heat pumps helped reduce Bok's electric demand, especially in the summer. This demand can cause a significant increase in the total cost of electricity for the building. The GHP units are 50% more efficient than conventional heating equipment in the heating mode. Scout also thinks about their overall impact on the environment. As an old building, they are committed to reusing as much as possible within the building and invest in the existing infrastructure to make it more efficient.

The Bok team has worked hard to make a block-long aging building with a scale and scope come back to life in many ways through their overall energy use and through their creative vendors who occupy the space. Overall, the Bok building's energy updates are all part of transforming the space into the future.



△ 10-ton Yanmar natural gas VRF heat pump located on the Bok Building rooftop.



△ Exterior of the Bok Building entrance near 8th and Mifflin Streets.

CUSTOMER SUCCESSES:

The Philadelphia Gas Works has helped these customers evaluate their energy challenges with natural gas energy solutions that fit their need:

LUXURY MIXED-USE SKYSCRAPER

FMC TOWER installed two rooftop 65 kW Capstone CHP microturbines to cover the cost to heat water throughout the entire building with zero byproduct.

CORPORATE OFFICE/OPERATIONS CENTER PHILADELPHIA GAS WORKS NORTH OPERATIONS CENTER HEADQUARTERS

Installed two 65 kW Capstone microturbines with on-board heat exchangers that produce 865,000 BTU's an hour in the form of hot water. Also, home to two outdoor Yanmar 10-ton units for heating and cooling.

BLOOD/PLASMA DONATION CENTER AND CORPORATE OFFICE

THE AMERICAN RED CROSS OF SOUTHEASTERN PENNSYLVANIA installed all-new natural gas-fired boilers; three condensing boilers to keep the HVAC and mechanical systems running through a combination of building automation and pneumatic control system; a fourth boiler for steam generation was installed to control humidity in the labs.

CORPORATE BUILDING

PGW HEADQUARTERS integrates a state-of-the-art 200kW microturbine CHP technology into its existing Philadelphia facility at 800 West Montgomery Avenue.

CS-0523-BOK

**Response of Philadelphia Gas Works
to the Interrogatories of OSBA, Set II
Docket No. P-2014-2459362**

OSBA to PGW II-1

(Reference: PGW Response to OSBA Interrogatories I-5): PGW states that both administrative costs and incentive rates have been adjusted to account for inflation and economic uncertainty. Also, the new EnergySense Kit and SBA programs “inherently have higher administrative costs” due to online portal development and shipping costs.

- a. If administrative costs and incentive rates were each adjusted for inflation and economic uncertainty, why has the ratio of administrative costs to incentive costs increased by 4.4 percentage points (or 10.9%)?
- b. Are shipping costs for the EnergySense Kit Program incorporated into the incentive budget or the administrative budget?
- c. Aside from inflation, portal development, and shipping costs, what other factors account for the higher administrative costs for the new EnergySense Kit and SBA programs?

Response:

- a. Firstly, the revised plan covers a more extensive period than the Phase III plan. Additionally, the launch of new programs and incentives such as the ESK and SBA necessitate a higher administrative budget. Moreover, the relative inflation rates for energy efficiency products and services are not congruent. The increased ratio accounts for the possibility that services inflation in the energy efficiency sector has outpaced goods’ inflation.
- b. Shipping costs for the EnergySense Kit Program are included in the program’s administration budget.
- c. The administration budgets in these programs also account for contractor costs, i.e., the costs associated with vendors administering the program.

Response provided by: Steven Jerue, Director of Customer Programs

Dated: October 26, 2023

**Response of Philadelphia Gas Works
to the Interrogatories of OSBA, Set II
Docket No. P-2014-2459362**

OSBA to PGW II-2

(Reference: PGW Response to OSBA Interrogatories I-8): PGW attests that it will “perform targeted marketing to small business customers” to increase small business participation in the CER program.

- a. How will this planned target marketing differ from past marketing towards small businesses?
- b. What evidence does PGW have that the planned target marketing will increase small business participation beyond current levels?
- c. Are PGW staff or consultant resources increasing for marketing? If yes, by how much?

Response:

- a. Unlike past marketing efforts, PGW’s planned targeted marketing to small businesses will entail, among other things, analyzing the usage of small business customers, classifying businesses by SIC codes, and conducting outreach to specific customers based on the potential to generate savings via the suite of measures offered in the CER program. PGW also plans to partner with neighborhood associations and business districts. This approach is well suited to the CER program because it is narrowly tailored to the customer segments that are readily identifiable to benefit from the program’s offerings.
- b. PGW believes and is confident that its planned targeted marketing will increase small business participation beyond current levels due to the holistic and hands-on approach.
- c. PGW will perform some of the marketing activities in-house, rather than through a consultant; therefore, PGW staff resources for marketing will be increasing to the extent that consultant’s activity will decrease.

Response provided by: Steven Jerue, Director of Customer Programs

Dated: October 26, 2023

**Response of Philadelphia Gas Works
to the Interrogatories of OSBA, Set II
Docket No. P-2014-2459362**

OSBA to PGW II-3

(Reference: PGW Response to OSBA Interrogatories I-13c): How many local contractors are on PGW's list of contractors with experience installing natural gas VRF heat pumps?

Response: PGW is aware of two companies in our service area with extensive HVAC installations background & long experience installing VRF heat pumps.

Response provided by: Steven Jerue, Director of Customer Programs

Dated: October 26, 2023

**Response of Philadelphia Gas Works
to the Interrogatories of OSBA, Set II
Docket No. P-2014-2459362**

OSBA to PGW II-4

(Reference: PGW Response to OSBA Interrogatories I-13, Attachment A): PGW provides a case study detailing the installation of two natural gas VRF heat pumps on a large building housing over 200 tenants. The building's owner and operator made the initial investment in the heat pumps. Has PGW conducted or reviewed any case studies where the small business itself made the investment in the natural gas heat pump? If so, what were the results?

Response: Please refer to the attached case Study of a small business restaurant that installed natural gas VRF with economic analysis.

Response provided by: Steven Jerue, Director of Customer Programs

Dated: October 26, 2023



EARLS FIR STREET RESTAURANT VANCOUVER, BRITISH COLUMBIA

“The Yanmar gas-driven heat pumps were ideal when it came time to add air-conditioning to our busy restaurant. They only require single-phase power to operate and use significantly less electricity than any other electrical heat pumps! Using natural-gas our operating costs is also much less and we understand that by using renewable natural gas, they would easily be carbon-neutral.”



PROJECT OVERVIEW

Earls Fir Street Restaurant in Vancouver is a member of the Earls Restaurant Group, which was founded more than 30 years ago by a father and son team. This restaurant worked with Yanmar’s dealer LSM Energy Solutions (Div. of Lee’s Sheet

Metal), to install a pair of Yanmar 12-ton natural gas-powered Variable Refrigerant Flow (VRF) outdoor units on the roof along with interior ducted round flow and wall mounted indoor units for heating and cooling.

REASON FOR CHOOSING YANMAR

As a restaurant, guest comfort while dining is of high importance, but equally important is worker comfort in a hot kitchen environment. Having air conditioning allows for better productivity and less worker fatigue.

When it came time to select a new HVAC system for the restaurant, the customer found out they would have to upgrade the power connection service, which was very expensive and would take a significant amount of time. LSM Energy Solutions, the local Yanmar dealer, presented Yanmar’s natural gas-powered system as an alternative; this system reduced power consumption by 90 percent for the same tonnage of

heating and cooling, which allowed the customer to avoid costly electrical infrastructure upgrades and installation delays (including upgrades from the local utility provider).

Since Yanmar’s system is VRF, the customer was able to select multiple indoor unit types to best serve the building’s needs, as well as create multiple zones for maximum comfort.

Additionally, Vancouver can get very cold during the winter months, and Yanmar’s system is effortlessly able to provide heat even in freezing cold temperatures due to engine heat recovery technology built in.

ABOUT YANMAR AMERICA ENERGY SYSTEMS

Yanmar America Energy Systems is the North, Central and South American headquarters for the company’s Variable Refrigerant Flow and Combined Heat and Power systems. Yanmar Energy Systems Canada is located in

Hamilton, Ontario, and supports variable refrigerant flow and combined heat and power systems sales and service for Canadian customers. Our team and products are focused on sustainability, reliability, and efficiency.





EARLS FIR STREET RESTAURANT VANCOUVER, BRITISH COLUMBIA

QUICK FACTS

APPLICATION: Restaurant
LOCATION: Vancouver, BC
COMMISSIONING DATE: August 2018
PRODUCT INSTALLED: NNCP144J x 2

OVERVIEW

Reduced operation costs
 Reduced installation costs
 Zone control
 Efficient heating capability



RESULTS

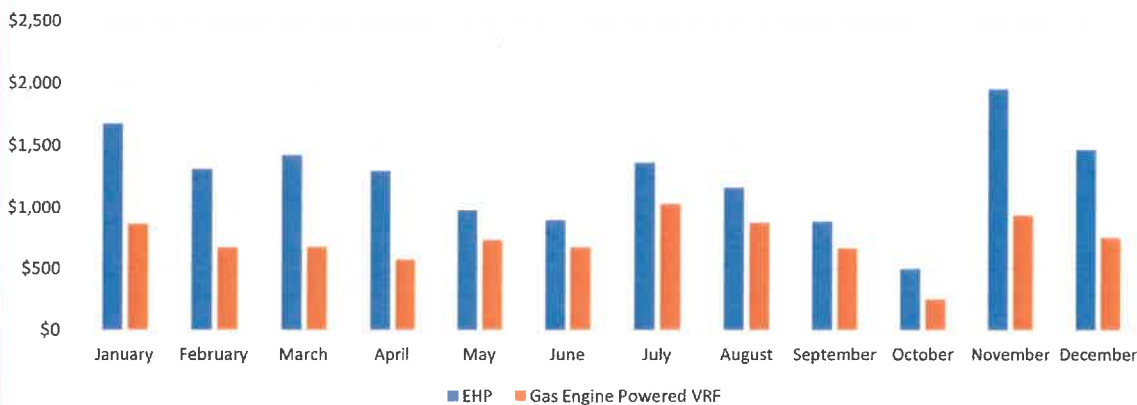
By installing a pair of whisper-quiet Yanmar 12-ton (cooling capacity) natural gas-powered Variable Refrigerant Flow (VRF) outdoor units, Earls Fir Street Restaurant was able to reduce operation and installation costs from an electric-based system.

By using natural gas as an energy source, the building produces lower amounts of harmful emissions than traditional heating and cooling equipment. Earls Fir Street Restaurant now enjoys more control over guest comfort with zone control and

efficient heating and air conditioning.

The restaurant was able to avoid costly electrical system upgrades by switching to Yanmar VRF units.

YANMAR VRF Operating Costs in 2020



Operating costs data is a calculated estimate based only on remote monitoring data and local average utility costs or bills.



**Response of Philadelphia Gas Works
to the Interrogatories of OSBA, Set II
Docket No. P-2014-2459362**

OSBA to PGW II-6

(Reference: Direct Testimony of Denise Adamucci, pg. 13, line 8):
PGW has lowered projected participation in the Small Business Assessments program from 34 to 30 small businesses per year in the Revised Plan.

- a. Has PGW conducted or reviewed any market research that informed the projected participation of small businesses, either in the Proposed Plan or the Revised Plan?
- b. Comparing the budget and projected participation between the Proposed Plan and the Revised Plan, it appears that projected participation is simply a function of the total budget divided by the expected cost per incentive.^{1,2} Is this the formula PGW uses to set projected participation for the SBA program?
- c. How does PGW factor in its own internal capacity, consultant capacity, expected marketing effectiveness, or small business interest in the SBA program if they are relying on the above formula to project participation?

Response:

- a. PGW conducted market research on the cost of assessments, which informed the projected participation of small businesses – since participation is a function of the total budget divided by the expected cost per incentive. As evident, projected participation in this program represents the maximum number of projects that can be completed given the proposed budget.
- b. Yes. Projected participation in the SBA program is a function of the total budget divided by the expected cost per incentive.
- c. PGW expects to contract with a consultant that will have the capacity to perform the assessments given the program's budget and projections. PGW will conduct outreach and identify viable leads that can be passed on to the consultant. It expects that its staff time and resources will be fairly minimal and can be focused during times when other programs experience a slowdown. As this is a new program, we cannot predict the level of small business interest. For this reason the program will roll out its outreach slowly and deliberately to avoid oversubscription early.

Response provided by: Steven Jerue, Director of Customer Programs
Dated: October 26, 2023

¹ Proposed Plan: 34 Projected SBA Participants = \$100,000 Incentive Budget/\$3,000 per Assessment

² Revised Plan: 30 Projected SBA Participants = \$90,000 Incentive Budget/\$3,000 per Assessment

**BEFORE THE
PENNSYLVANIA PUBLIC UTILITY COMMISSION**

Petition of Philadelphia Gas Works for	:	
Approval of Demand-Side Management Plan	:	
for FY 2024-2026	:	
	:	Docket No. P-2014-2459362
Petition of Philadelphia Gas Works for	:	
Approval of Demand Side Management Plan	:	
for FY 2014-2016	:	
52 Pa. Code § 62.4 – Request for Waivers	:	
	:	

VERIFICATION

I, Angela J. Vitulli, hereby state that the facts set forth in the Direct Testimony labelled OSBA Statement No. 1 and associated Exhibits IEC-1 and IEC-2 are true and correct to the best of my knowledge, information, and belief, and that I expect to be able to prove the same at a hearing held in this matter. I understand that the statements herein are made subject to the penalties of 19 Pa. C.S. § 4904 (relating to unsworn falsification to authorities).

Date: November 13, 2023

AVitulli

Angela J. Vitulli



COMMONWEALTH OF PENNSYLVANIA

January 11, 2024

The Honorable F. Joseph Brady
Administrative Law Judge
Pennsylvania Public Utility Commission
801 Market St, Suite 4063
Philadelphia, PA 19107

Re: Petition of Philadelphia Gas Works for Approval of Demand Side Management Plan for FY 2024-2026 Philadelphia Gas Works Universal Service and Energy Conservation Plan For 2014-2016, 52 Pa. Code § 62.4 - Request for Waivers / Docket No. P-2014-2459362

Dear Judge Brady:

Enclosed please find the Surrebuttal Testimony of Angela J. Vitulli, labeled OSBA Statement No. 1-S on behalf of the Office of Small Business Advocate (“OSBA”), in the above-captioned proceeding.

As evidenced by the enclosed Certificate of Service, all known parties will be served, as indicated.

If you have any questions, please do not hesitate to contact me.

Sincerely,

/s/ Sharon E. Webb

Sharon E. Webb
Assistant Small Business Advocate
Attorney ID No. 73995

Enclosures

cc: PA PUC Secretary Rosemary Chiavetta (Cover Letter & Certificate of Service only)
Angela Vitulli
Emma Grazier
Parties of Record

**BEFORE THE
PENNSYLVANIA PUBLIC UTILITY COMMISSION**

Petition of Philadelphia Gas Works for	:	
Approval of Demand-Side Management Plan	:	
for FY 2024-2026	:	
	:	Docket No. P-2014-2459362
Petition of Philadelphia Gas Works for	:	
Approval of Demand Side Management Plan	:	
for FY 2014-2016	:	
52 Pa. Code § 62.4 – Request for Waivers	:	
	:	

**SURREBUTTAL TESTIMONY
OF
ANGELA J. VITULLI**

**On Behalf of the
Pennsylvania Office of the Small Business Advocate**

Date Served: January 10, 2024

Date Submitted for the Record: _____

1 **I. INTRODUCTION**

2 **Q: PLEASE STATE YOUR NAME AND POSITION FOR THE RECORD.**

3 A: My name is Angela Vitulli and I'm a Principal at Industrial Economics, Incorporated ("IEc"), a
4 consulting firm located at 2067 Massachusetts Avenue, Cambridge, MA 02140. I am appearing in
5 this proceeding on behalf of the Pennsylvania Office of Small Business Advocate ("OSBA").

6 **Q: WHAT IS THE PURPOSE OF YOUR SURREBUTTAL TESTIMONY?**

7 A: The purpose of my Surrebuttal Testimony is to respond to the Rebuttal Testimonies of Denise
8 Adamucci, Michel Farag, and Theodore Love submitted on behalf of Philadelphia Gas Works
9 ("PGW").

10 **II. RESPONSE TO PGW WITNESS DENISE ADAMUCCI**

11 **Q: PLEASE DESCRIBE THE ROLE OF OSBA AND ITS EXPERT WITNESSES IN THIS**
12 **PROCEEDING.**

13 A: Witness Adamucci "strongly encourage[s] OSBA to help promote these [proposed DSM]
14 programs and their benefits to small business customers" and asks for OSBA's support with small
15 business outreach.¹ Witness Adamucci also criticizes that my direct testimony does not
16 recommend any "concrete steps [PGW could take] to increase small business participation."²

17 On advice of Counsel, the role of OSBA is to represent the interests of small business consumers
18 in regulated utility matters before the PA Public Utility Commission, federal regulatory agencies,
19 and in state and federal courts. OSBA also works directly with small businesses to assist with
20 questions or concerns about their telecommunications, water, gas, and electric services. OSBA
21 does not participate in marketing utility programs to its constituents; advocating for a utility in
22 this way is inappropriate given the Office's purpose.

¹. Adamucci Rebuttal Testimony, Pg. 9

² *Id.*

23 Further, I am under contract to OSBA to provide expert perspectives on this proceeding. My role
24 is to analyze the past performance of PGW’s DSM program, review the proposed program, and
25 provide my perspective on whether the program serves the best interest of small business
26 ratepayers. My role is not to provide marketing recommendations to PGW.

27 **Q: IS ANNUAL REPORTING ON MARKETING AND PARTICIPATION FOR PGW’S**
28 **SMALL BUSINESS ASSESSMENTS (“SBA”) AND COMMERCIAL EQUIPMENT**
29 **REBATES (“CER”) PROGRAMS SUFFICIENT?**

30 A: I recognize that PGW views reporting on marketing efforts and program participation more
31 frequently than annually as burdensome. However, given PGW’s track record of not meeting
32 program uptake goals, a greater level of transparency via higher-frequency reporting is
33 appropriate to ensure the SBA and CER reach the target number of ratepayers.

34 **Q: MS. ADAMUCCI SUGGESTS THAT OSBA’S TESTIMONY IMPLIES THAT PGW IS**
35 **“DOING SOMETHING NEFARIOUS” BY OFFERING REBATES ON GAS**
36 **APPLIANCES THAT WILL LOCK CUSTOMERS INTO NATURAL GAS FOR THE**
37 **LIFE OF THESE APPLIANCES.³ DO YOU AGREE WITH THIS SUGGESTION?**

38 A: No, I do not think, nor does my testimony imply, that PGW is acting “nefariously” by proposing
39 to incentivize gas heat pumps for commercial customers. On the contrary, PGW is acting in an
40 economically rational manner to preserve its business model, which relies on the continued use of
41 natural gas as a primary energy source for commercial and residential customers. However,
42 promoting continued use of natural gas use for this building stock is at odds with the City of
43 Philadelphia’s decarbonization goals, and the Commonwealth of Pennsylvania’s Climate Action
44 Plan.^{4,5} The deployment of new natural gas technologies including gas-fired heat pumps

³ Adamucci Rebuttal Testimony, Pg. 6

⁴ See Direct Testimony of Angela Vitulli (pg. 19) and OSBA Responses to PGW Interrogatories Set I (pg. 1, 4, 6-7)

⁵ See also:

- City of Philadelphia Climate Action Playbook: <https://www.phila.gov/media/20210113125627/Philadelphia-Climate-Action-Playbook.pdf>
- PGW Business Diversification Study: <https://www.phila.gov/media/20211207134817/PGW-Business-Diversification-Study-2021-12.pdf>

45 contributes to path dependencies that promote natural gas “lock-in” or stymie progress towards a
46 clean energy transition.^{6,7} This is particularly problematic in new construction. Incentivizing gas
47 heat pumps promotes and facilitates gas lock-in for PGW’s commercial customers for 15 years or
48 more. As the energy system transitions away from natural gas for residential and commercial
49 buildings, PGW’s customer base will shrink, and customers still reliant on natural gas will
50 experience higher gas rates as the utility’s fixed costs are spread out over a small number of
51 customers.

52 **III. RESPONSE TO PGW WITNESS MICHEL FARAG**

53 **Q: MR. FARAG STATES THAT NATURAL GAS HEAT PUMPS ARE “MORE COMMONLY**
54 **USED IN OTHER COUNTRIES” AND ARE THUS APPROPRIATE TO INCLUDE IN**
55 **PGW’S DSM PROGRAM. DO YOU AGREE WITH THIS ASSERTION?**

56 **A:** No, I do not agree with this assertion. Mr. Farag states his claim without providing any supporting
57 evidence or citations of any kind. Moreover, there is a distinct absence of the mention of gas heat
58 pumps in relevant global market research reports. A 2022 analysis of the global market for heat
59 pumps in the widely respected academic journal *Nature Energy* makes no mention of gas heat
60 pump technology, indicating that the global deployment of gas heat pumps is limited and
61 certainly not “common”.⁸

62 **Q: MR. FARAG POINTS TO TWO CASE STUDIES AS EVIDENCE THAT GAS HEAT**
63 **PUMPS ARE “A PROVEN, COST-EFFECTIVE TECHNOLOGY THAT ARE**
64 **APPROPRIATELY INCLUDED IN THE DSM PROGRAM”.⁹ DO CASE STUDIES**
65 **PROVIDE SUFFICIENT EVIDENCE THAT A NEW TECHNOLOGY IS PROVEN,**
66 **COST-EFFECTIVE, AND APPROPRIATE FOR INCLUSION IN A DSM PROGRAM?**

• Pennsylvania Climate Action Plan: <https://www.dep.pa.gov/Citizens/climate/Pages/PA-Climate-Action-Plan.aspx>

⁶ Powers (2021), “Natural Gas Lock-In,” *Kansas Law Review*. <https://kuscholarworks.ku.edu/handle/1808/32781>

⁷ Fisch-Romito, *et al.* (2021), “Systematic map of the literature on carbon lock-in induced by long-lived capital.” <https://iopscience.iop.org/article/10.1088/1748-9326/aba660/meta>

⁸ Rosenow, *et al.* (2022), “Heating Up the Global Heat Pump Market,” *Nature Energy*. <https://www.nature.com/articles/s41560-022-01104-8>.

⁹ Farag Rebuttal Testimony, Pg. 2

67 A: No, the two case studies presented by PGW in response to OSBA interrogatories are not
68 comprehensive enough to draw the conclusion that gas heat pumps a suitable technology across
69 different types of buildings and use cases. The first study cited involves a large commercial
70 building with many small business tenants.¹⁰ In this case, the building management company
71 undertook the financial burden of the extensive retrofit and installation process rather than the
72 small business tenants themselves, providing no direct evidence of the feasibility of a single small
73 business owner’s investment in gas heat pump technology. The second study was conducted in
74 2020 by gas heat pump manufacturer Yanmar and reviews the installation of two gas heat pumps
75 at a restaurant in Vancouver, Canada.¹¹ Although it is promising that the case study estimated a
76 reduction in installation and operating costs for the restaurant as compared to a hypothetical
77 electric heat pump system, the case study relies on local average utility costs as opposed to site-
78 specific costs.

79 Typically, prior to including a technology within a DSM program, multi-site demonstration
80 projects and pilot programs are used to test the technology, over time, in a variety of real-world
81 conditions. In the US, typical sponsors of these types of pilot programs include DOE and DOE
82 national labs, the California Energy Commission, Bonneville Power Administration, and
83 NYSERDA. We have looked for, but have not found, these multi-site demonstration projects and
84 pilot programs.

85 **IV. RESPONSE TO PGW WITNESS THEODORE LOVE**

86 **Q: MR. LOVE STATES THAT “VRF HEAT PUMPS ARE RECOGNIZED IN MULTIPLE**
87 **UTILITY DSM PROGRAMS AND TECHNICAL REFERENCE MANUALS**
88 **THROUGHOUT THE UNITED STATES, FROM COLORADO TO IOWA AND**
89 **ILLINOIS”.¹² DO YOU AGREE WITH THIS ASSERTION?**

¹⁰ Farag Rebuttal Testimony, Exhibit MF-1

¹¹ Ibid.

¹² Love Rebuttal Testimony, Pg. 3

90 A: No, I do not agree with this assertion. My disagreement is threefold:

91 1. I conducted a search of 30 large, U.S.-based gas utility commercial rebate programs and
 92 found only two utilities that incentivized gas heat pumps (Chattanooga Gas and Atlanta Gas
 93 Light).¹³ An additional, comprehensive search of gas utilities in Colorado, Iowa, and Illinois
 94 uncovered no rebates for gas heat pumps in these three states (see **Table 1**). I am unable to
 95 locate any specific utilities incentivizing gas heat pumps in the three states referenced in Mr.
 96 Love’s rebuttal.

97 **Table 1. Comprehensive List of Gas Utilities’ Commercial Rebate Programs**
 98 **in Colorado, Iowa, and Illinois**

State	Gas Utility (with link to commercial equipment rebate program, if offered)	Incentivizes Gas Heat Pumps?
Colorado ¹⁴	Atmos Energy Corp	No
	Black Hills Colorado Gas	No
	Cheyenne Mountain Estates	No commercial rebate program
	City of Fort Morgan	No
	City of Walsenburg	No commercial rebate program
	Colorado Natural Gas, Inc	No
	Colorado Springs Utilities	No
	Durango Mountain Utilities	No commercial rebate program
	Xcel Energy	No (Does incentivize <i>electric</i> VRF heat pumps)
	Town of Ignacio	No commercial rebate program
	Town of Rangely	No commercial rebate program
Town of Walden	No commercial rebate program	
Iowa ¹⁵	Alliant Energy	No (shares rebate program w/ MidAmerican)
	Black Hills Energy	No
	MidAmerican Energy Co.	No (see Alliant Energy)
Illinois ¹⁶	Consumers Gas Co.	No commercial rebate program
	Illinois Gas Co.	No
	Liberty Utilities (Midstates Natural Gas) Corp.	No
	MidAmerican Energy Company	No
	Mt. Carmel Public Utility Co.	No commercial rebate program
	North Shore Gas Co.	No commercial rebate program
	Northern Illinois Gas Co. (Nicor)	No
Peoples Gas Light and Coke Co.	No	

¹³ OSBA Direct Testimony, Pg. 16

¹⁴ State of Colorado’s list of active energy providers: <https://drive.google.com/file/d/0B8qvU2knU8BkRks0RUhTVjIKN0U/view?resourcekey=0-nGmG-aHL0G8hJ2kR3JB13Q>

¹⁵ List of Iowa Utility Association members: <https://www.iowautility.org/members/>

¹⁶ Illinois Utility Database: <https://www.icc.illinois.gov/emdb/ucdb/search>

99 2. It is worth noting that Mr. Love uses the phrase “VRF heat pump” to refer to a technology
100 that is generally called a “natural gas heat pump” or “gas-fired VRF heat pump”. VRF heat
101 pump technology can be either gas- or electric-powered, and the more common usage of the
102 term refers to electric heat pumps. See the 2024 Illinois Technical Reference Manual
103 referenced in Mr. Love’s rebuttal as an example: “Variable Refrigerant Flow HVAC System”
104 (pg. 658) describes a specific type of electric heat pump, while “Commercial Gas Heat
105 Pump” (pg. 600), which is the type of device PGW proposes incentivizing, is listed as a
106 separate technology.¹⁷ It is possible that Mr. Love is referencing utility DSM programs
107 "throughout the United States" that incentivize *electric* VRF heat pumps, but that technology
108 is distinct from gas heat pumps and not part of PGW’s proposal.

109 3. Technical Reference Manuals (TRMs) are designed to provide deemed values for energy and
110 demand savings for a variety of energy efficiency measures. Although utilities use the
111 information in TRMs as a reference for their DSM programs, a particular technology’s
112 inclusion in a TRM is not evidence that the technology is proven or widely incentivized.¹⁸

113 **V. CONCLUSION**

114 **Q: DOES THAT COMPLETE YOUR SURREBUTTAL TESTIMONY?**

115 **A:** Yes.

¹⁷ See the “2024 Illinois Statewide Technical Reference Manual” here: https://www.ilsag.info/wp-content/uploads/IL-TRM_Effective_010124_v12.0_Vol_2_C_and_I_09222023_FINAL_clean.pdf

¹⁸ U.S. Department of Energy, “Guide for States on Establishing and Maintaining TRMs for Energy Efficiency Measures”, Available here: <https://www.energy.gov/sites/default/files/2021-09/emv-trm-report-summary.pdf>

**BEFORE THE
PENNSYLVANIA PUBLIC UTILITY COMMISSION**

Petition of Philadelphia Gas Works for	:	
Approval of Demand-Side Management Plan	:	
for FY 2024-2026	:	
	:	Docket No. P-2014-2459362
Petition of Philadelphia Gas Works for	:	
Approval of Demand Side Management Plan	:	
for FY 2014-2016	:	
52 Pa. Code § 62.4 – Request for Waivers	:	
	:	

VERIFICATION

I, Angela J. Vitulli, hereby state that the facts set forth in the Surrebuttal Testimony labeled OSBA Statement No.1-S are true and correct to the best of my knowledge, information, and belief, and that I expect to be able to prove the same at a hearing held in this matter. I understand that the statements herein are made subject to the penalties of 19 Pa. C.S. § 4904 (relating to unsworn falsification to authorities).

Date: 01/10/2024



Angela J. Vitulli