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April 4, 2023

Via Electronic Filing

Rosemary Chiavetta, Secretary
PA Public Utility Commission
400 North Street, 2nd Floor
Harrisburg, PA 17120

Re: PA Public Utility Commission v. Philadelphia Gas Works
2023 PGW Base Rate Case Filing – Docket No. R-2023-3037933

Dear Secretary Chiavetta:

On behalf of Philadelphia Gas Works ("PGW") enclosed for electronic filing please find the Supplemental Direct Testimony of Denise Adamucci (PGW St. No. 1-SD) and Ronald Amen (PGW St. No. 8-SD) with regard to the above-referenced matter. This filing replaces the document filed at 2466401, of which we have requested rejection due to a duplication in one of the testimonies. Copies to be served in accordance with the attached Certificate of Service.



Daniel Clearfield
DC/lww

Enclosure

cc: Hon. Charles E. Rainey, Jr., w/enc.
Cert. of Service w/enc.

CERTIFICATE OF SERVICE

I hereby certify that this day I served a copy of PGW's Supplemental Direct Testimony upon the persons listed below in the manner indicated in accordance with the requirements of 52 Pa. Code Section 1.54.

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Dated: April 4, 2023

Daniel Clearfield
Daniel Clearfield, Esq.

BEFORE THE
PENNSYLVANIA PUBLIC UTILITY COMMISSION

SUPPLEMENTAL DIRECT TESTIMONY OF

Denise Adamucci

ON BEHALF OF
PHILADELPHIA GAS WORKS

Docket No. R-2023-3037933

Philadelphia Gas Works

General Rate Increase Request

TOPICS:

Weather Normalization Adjustment

April 3, 2023

TABLE OF CONTENTS

I. INTRODUCTION..... 1

II. BACKGROUND..... 5

III. PGW’s WNA..... 7

IV. BENEFITS OF PGW’S WNA..... 9

V. IMPORTANCE OF WNA REMAINING IN PLACE FOR PGW..... 12

VI. CONSUMER PROTECTIONS 13

(A) Revenue Neutrality 14

(B) Other Consumer Protections 16

VII. ATRIUM ALTERNATIVE RECOMMENDATIONS..... 17

VIII. CONCLUSION 23

TABLE OF EXHIBITS

DA-1	Current WNA Tariff
DA-2	2006 WNA Report and Stipulation
DA-3	Proposed WNA Tariff

1 **I. INTRODUCTION**

2 **Q. PLEASE STATE YOUR NAME AND CURRENT POSITION WITH PGW.**

3 A. My name is Denise Adamucci and I am the Senior Vice President for Customer &
4 Regulatory Affairs at Philadelphia Gas Works (“PGW” or “Company”).

5 **Q. DID YOU PROVIDE DIRECT TESTIMONY IN THIS PROCEEDING?**

6 A. Yes. As part of PGW’s base rate filing made on February 27, 2023, I submitted Direct
7 Testimony as PGW Statement No. 1.

8 **Q. WHAT IS THE PURPOSE OF THIS TESTIMONY?**

9 A. The purpose of my Supplemental Direct Testimony is to address the Weather
10 Normalization Adjustment (“WNA”) clause in PGW’s Gas Service Tariff. I am
11 testifying regarding PGW’s position on the recommendations offered by Ronald Amen,
12 Managing Partner at Atrium Economics, LLC (“Atrium”), with possible modifications to
13 PGW’s WNA. In conjunction, I am also offering testimony to demonstrate the value of
14 the WNA to PGW’s financial health and stability, which in turn benefits ratepayers.

15 **Q. PLEASE EXPLAIN WHY PGW DID NOT INCLUDE THIS TESTIMONY WITH
16 ITS BASE RATE FILING ON FEBRUARY 27, 2023.**

17 A. In anticipation of the possibility of filing a base rate case by February 27, 2023 and due to
18 an anomaly that occurred in June 2022 with its WNA, which is further addressed below,
19 PGW took steps to contract for the services of an independent, third party consultant to
20 review its WNA formula. Those efforts resulted in PGW securing Atrium for this
21 purpose. Due to the need to follow a request for proposal process for this contract, and
22 the associated delays in securing Atrium, the review was not completed in time to submit
23 testimony with the February 27, 2023 filing. However, PGW believes that supplemental
24 testimony making recommendations for revisions to PGW’s WNA formula that should be

1 implemented in future heating seasons is important to ensure that customers are protected
2 against unusually large and unprecedented adjustments such as occurred in June 2022.
3 Given the significant attention that PGW's WNA has garnered since June 2022 and
4 because it is the subject of a separate proceeding pending before the Commission, it is
5 PGW's view that the parties are not prejudiced by addressing this issue on a timeframe
6 that slightly varies from the remainder of the base rate case. This is particularly true
7 given the importance of a comprehensive review of the WNA and the implementation of
8 a long-term mechanism that provides financial stability for PGW, while fairly charging
9 customers for weather-related variations in PGW's service territory. Further, it is
10 noteworthy that the recommended changes to PGW's WNA will not have any effect on
11 the level of requested rate relief that is approved as part of this base rate case proceeding.

12 **Q. YOU INDICATED THAT PGW'S WNA IS ALSO BEING ADDRESSED IN A**
13 **SEPARATE PROCEEDING. PLEASE EXPLAIN.**

14 A. In June 2022, customers experienced unusually large and unanticipated WNA charges
15 when the tariffed WNA formula was applied to several days of May 2022 usage due to
16 the much warmer than normal weather experienced in Philadelphia during that month.
17 Since PGW did not believe that customers should be burdened with those charges, the
18 Company petitioned the Commission on June 30, 2022 for emergency relief so that it
19 could reverse those charges. The Commission issued an Emergency Order on July 1,
20 2022, authorizing PGW to depart from its Tariff and refund those charges to customers.¹
21 The Emergency Order was ratified on July 14, 2022, at which time the Commission also
22 noted that PGW had initiated an internal investigation into the WNA and directed the
23 Company to file a report with the Commission by August 15, 2022. This report was filed

¹ Docket No. P-2022-3033477.

1 on August 12, 2022. As a result of the Emergency Order, PGW refunded customers
2 approximately \$12,645,000.

3 In a separate proceeding voluntarily commenced on August 2, 2022, PGW filed
4 Supplement No. 152 to Gas Service Tariff – Pa. P.U.C. No. 2 (“Supplement No. 152”)
5 and a Petition for Approval on Less than Statutory Notice of Supplement Revising
6 Weather Normalization Adjustment (“Cap Petition”).² As filed, Supplement No. 152
7 proposed to revise PGW’s Gas Service Tariff – Pa. P.U.C. No. 2, Pages 149-150,
8 effective October 1, 2022. Through the proposed revision, PGW sought to add a control,
9 or cap, to its WNA prior to the start of the WNA cycle beginning on October 1, 2022.
10 PGW’s WNA cycle is the period of October 1 through May 31 of each year. The purpose
11 of this proposal was to prevent customers from being billed a WNA charge or credit of
12 greater than 25 percent of total delivery charges on any given bill during this heating
13 season.

14 On September 15, 2022, the Commission issued an Order suspending Supplement
15 No. 152 for investigation. On September 19, 2022, Administrative Law Judge (“ALJ”)
16 Guhl issued a Prehearing Order proposing a procedural schedule that would result in
17 Supplement No. 152 going into effect on April 1, 2023. To afford the parties and the
18 Commission additional time to review the WNA filing, PGW provided to the ALJ a
19 proposed procedural schedule and discovery modifications agreed upon by the parties,
20 which would result in the effective date being extended to October 1, 2023. Under that
21 schedule, PGW’s Direct Testimony was due on November 30, 2022.

² Docket Nos. R-2022-3034229 and P-2022-3034264.

1 On November 9, 2022, PGW filed a Petition for Leave to Withdraw Supplement
2 No. 152 (“Withdrawal Petition”) on the basis that the original purpose of the Cap Petition
3 had been rendered meaningless because the filing would no longer provide any protection
4 to consumers during the heating season that began on October 1, 2022. Since no ruling
5 was issued on the Withdrawal Petition prior to November 30, 2022, PGW consulted with
6 the parties and obtained agreement for an extension of time to February 14, 2023 for the
7 filing of Direct Testimony. Further, by email to ALJ Guhl dated November 29, 2022,
8 PGW requested that the procedural schedule be held in abeyance pending a ruling on the
9 Withdrawal Petition. ALJ Guhl granted the request to hold the procedural schedule in
10 abeyance by email dated November 29, 2022. Per ALJ Guhl’s request, PGW transmitted
11 a procedural schedule agreed upon by the parties on December 6, 2022, with which the
12 ALJ expressed no concerns. As of February 14, 2023, no ruling had been made on the
13 Withdrawal Petition and no procedural order had been issued on the revised schedule.

14 By Letter dated February 14, 2023, PGW notified the ALJ and the parties that it
15 did not intend to file Direct Testimony. By Prehearing Order issued on February 23,
16 2023, the ALJ dismissed the Withdrawal Petition as moot and retroactively adopted the
17 procedural schedule submitted by PGW on December 6, 2022. By a second Prehearing
18 Order also issued on February 23, 2023, ALJ Guhl directed that PGW’s Direct Testimony
19 be immediately filed by the close of business on February 23, 2023.

20 PGW’s Direct Testimony of Denise Adamucci (PGW Statement No. 1) was
21 served on the ALJ and the parties on February 23, 2023. Other Parties’ Direct Testimony
22 in that proceeding, which was originally due on April 6, 2023, is now due on April 13,

1 2023 pursuant to ALJ’s approval of an unopposed request submitted by the Office of
 2 Consumer Advocate (“OCA”).

3 **Q. WHY DOES PGW SEEK TO HAVE THE WNA ADDRESSED AS PART OF**
 4 **THIS BASE RATE PROCEEDING WHEN THE CAP PETITION PROCEEDING**
 5 **IS ALREADY PENDING AND EXPECTED TO BE COMPLETED BY OCTOBER**
 6 **1, 2023?**

7 A. The Cap Petition was focused on a proposal for a quick solution for the October 1, 2022
 8 through May 31, 2023 heating season to ensure that consumers were protected from an
 9 anomaly such as occurred with the June 2022 bills reflecting warmer than normal
 10 weather on several dates in May 2022. That proceeding was filed on August 2, 2022,
 11 before PGW had even completed its internal investigation or filed a report with the
 12 Commission describing its results, which occurred on August 12, 2022. Simply,
 13 insufficient time existed between the June 2022 billings and the onset of the next heating
 14 season to permit a comprehensive review of the WNA such as would be feasible in a base
 15 rate or other proceeding. Considering modifications to the WNA – beyond and/or in lieu
 16 of the 25% Cap proposed on August 2, 2022 – was not proposed and is not reasonable in
 17 the Cap proceeding.

18 **II. BACKGROUND**

19 **Q. PLEASE DESCRIBE PGW.**

20 A. PGW is owned by the City of Philadelphia and provides public utility services as a city
 21 natural gas distribution operation³ in the City of Philadelphia, consistent with Section
 22 2212 of the Public Utility Code.⁴ PGW came under the jurisdiction of the Commission
 23 on July 1, 2000.

³ 66 Pa. C.S. § 102 (definitions).

⁴ 66 Pa. C.S. § 2212.

1 **Q. HOW ARE JUST AND REASONABLE RATES FOR PGW DETERMINED?**

2 A. Just and reasonable rates are determined for PGW using the cash flow method. As PGW
3 is a city owned utility with no shareholders, all of the funds needed to run the Company
4 come from ratepayers or from borrowing – the costs of which then must be paid by
5 ratepayers. Therefore, rather than having its revenue requirement determined on the basis
6 of a fair rate of return on a used and useful rate base that is applicable to other natural gas
7 distribution companies (“NGDCs”), PGW’s rates are set by determining the appropriate
8 levels of cash and other financial metrics to enable PGW to pay its bills and maintain
9 access to the capital markets at reasonable rates. The Commission issued a Policy
10 Statement more fully setting forth these criteria, as well as the financial and other
11 considerations that are to be reviewed in setting PGW’s base rates at just and reasonable
12 levels.⁵

13 **Q. WITH RESPECT TO WEATHER-RELATED FACTORS, HOW HAVE THE**
14 **BASE RATES OF NGDCS TRADITIONALLY BEEN ESTABLISHED?**

15 A. Traditionally, the base rates of NGDCs have been established on a “weather normalized”
16 basis, i.e., rates are set to permit the company to earn at levels determined to be
17 reasonable assuming that, in the relevant test year, sales and revenues are at the levels the
18 utility would experience if the level of experienced degree days were identical to the
19 utility’s experienced average historic degree days (“HDDs”). Accordingly, when a year
20 is colder or warmer than some determined normal level, the NGDC typically earns more
21 or less than the normalized amount, all other things being equal.

⁵ 52 Pa. Code §§ 69.2702, 2703.

1 **Q. WHAT IS THE PURPOSE OF A WNA?**

2 A. A WNA mechanism is one way in which to balance out the effects of weather by
3 permitting the utility to reconcile its revenues when experienced HDDs in a given period
4 are less than a determined normal level. Correspondingly, when experienced HDDs
5 exceed normal levels, the utility adjusts its charges to provide a credit to customers. The
6 goal of a WNA is to merely to permit the utility to recover its authorized weather-
7 adjusted level of earnings and, for a cash flow regulated utility, the company's authorized
8 level of cash and liquidity.

9 **III. PGW'S WNA.**

10 **Q. PLEASE DESCRIBE PGW'S WNA.**

11 A. PGW's WNA is a long-standing automatic adjustment clause that adjusts billings to
12 customers based upon the degree to which actual weather in its service territory varies
13 from "normal" weather levels. This clause affords PGW, regardless of the weather that is
14 experienced in Philadelphia, an opportunity to recover through its volumetric rates the
15 fixed costs that are incurred to operate the natural gas utility and provide safe and reliable
16 service to its customers. The Commission-approved WNA is applied to customer usage
17 from October 1 through May 31. As established by the Tariff, the charges or credits are
18 calculated on the basis of a formula that considers normal (or historic) heating degree
19 days ("NHDDs") and actual heating degree days ("AHDDs") for the billing cycle's
20 usage. PGW's WNA in its current Tariff is attached as Exhibit DA-1.

1 **Q. WHEN WAS PGW'S WNA ORIGINALLY AUTHORIZED BY THE**
2 **COMMISSION?**

3 A. The Commission originally authorized PGW's WNA in 2002.⁶ The WNA was approved
4 as a three-year pilot in a settlement of the 2002 base rate case. The settling parties
5 included PGW, the Office of Trial Staff ("OTS") - which was the predecessor of the
6 Bureau of Investigation and Enforcement ("I&E"), the OCA, the Office of Small
7 Business Advocate ("OSBA"), and the Philadelphia Industrial and Commercial Gas
8 Users Group ("PICGUG"). In the Recommended Decision ("R.D.") adopted by the
9 Commission, the ALJ approved the WNA and observed that the WNA "will provide
10 more certainty in PGW's level of annual revenues."⁷ In addition, the R.D. referenced
11 OCA's Statement in Support, which emphasized the "unique, immediate circumstances
12 facing this municipally-owned utility."⁸ PGW was authorized to implement the WNA as
13 soon as system modifications were completed. The WNA was implemented on
14 December 1, 2002.

15 **Q. WHAT UNIQUE, IMMEDIATE CIRCUMSTANCES WAS PGW FACING AT**
16 **THAT TIME?**

17 A. Prior to implementation of the WNA, PGW had experienced years in which warmer than
18 normal weather severely reduced the Company's cash flow and debt service coverages,
19 which negatively affected PGW's bond rating and created a consistent need to request
20 additional rate relief to stave off financial crisis. As a result of experiencing a number of
21 winters in which abnormal weather caused severe shortfalls in earnings and liquidity, the
22 establishment of a WNA was a crucial requirement if the Company was to return to

⁶ *Pa. Public Utility Commission v. Philadelphia Gas Works*, Docket No. R-00017034 (Order entered August 8, 2002, Ordering Paragraph No. 5) ("2002 Base Rate Case").

⁷ *2002 Base Rate Case* (Recommended Decision dated July 29, 2002, at 10-11).

⁸ *Id.* (R.D. at 11).

1 financial health in the long term. Those experiences led to the WNA being proposed and
 2 approved in the 2002 base rate proceeding.

3 **IV. BENEFITS OF PGW'S WNA**

4 **Q. WHAT SPECIFIC BENEFITS DID PGW IDENTIFY AS PART OF ITS**
 5 **PROPOSAL TO ESTABLISH A WNA IN 2002?**

6 A. As PGW explained in 2002, implementation of the WNA would: (i) stabilize cash flow
 7 from year-to-year; (ii) possibly reduce the need for short-term borrowing from year-to-
 8 year; (iii) positively affect PGW's credit rating; and (iv) reduce the need for costly base
 9 rate proceedings.⁹

10 **Q. HOW DOES PGW'S STATUS AS A MUNICIPALLY OWNED UTILITY**
 11 **FACTOR INTO THE IMPORTANCE OF A WNA?**

12 A. A WNA-type clause is particularly appropriate for a municipally owned utility because
 13 under the cash flow method of ratemaking, ratepayers provide revenues to cover the
 14 entire costs of service – but only the cost of service. In PGW's case, the Commission
 15 approves the overall cost of service or revenue requirement and establishes volumetric
 16 rates on the basis of a number of factors, including the anticipated revenues that will be
 17 collected assuming that normal weather is experienced in PGW's service area. To the
 18 extent that lower than expected revenues are collected due to warmer weather which
 19 departs from the normal weather PGW would not recover its Commission-authorized cost
 20 of service and would either have to take on more debt or reduce spending to address the
 21 shortfall. By contrast, if the weather is colder than normal, PGW would recover a higher
 22 level of revenues than the Commission has approved in the context of determining
 23 revenue requirements.

⁹ 2002 Base Rate Case, PGW St. 2 at 3 (Direct Testimony of Craig White).

1 **Q. HOW DOES THE WNA ADDRESS THESE VARIATIONS IN REVENUE**
 2 **COLLECTIONS CAUSED BY DEPARTURES FROM NORMAL WEATHER?**

3 A. The WNA minimizes the degree to which shortfalls or windfalls occur. For a municipal
 4 utility that utilizes a WNA, ratepayers are assigned the same responsibilities or obtain the
 5 same benefits that they would if the weather experienced in the service territory reflected
 6 the normal weather on which the calculations of anticipated revenues are based. The
 7 WNA does this through a Commission-approved formula that results in the imposition of
 8 a credit on customers' bills if PGW collects more revenues than anticipated due to colder
 9 than normal weather or in a charge on customers' bills if PGW collects lesser revenues
 10 than anticipated due to warmer than normal weather. Through these credits and charges,
 11 the WNA was designed with a goal of ensuring that that PGW collects the revenues that
 12 are needed – no more and no less – to have sufficient cash to provide safe and reliable
 13 natural gas service as a natural gas utility to its customers.

14 **Q. DID OTHER PARTIES IN THE 2002 BASE RATE CASE RECOGNIZE THE**
 15 **VALUE OF THE WNA TO PGW?**

16 A. Yes, the witness for then OTS agreed that a WNA clause would be reasonable since
 17 PGW's rates are established using the cash flow method of ratemaking.¹⁰ Similarly,
 18 OCA's witness described PGW as being "unique" among NGDCs in Pennsylvania since
 19 it is a municipal utility and operates on a cash flow basis according to statute with no
 20 source of equity financing in the sense of a traditional investor-owned utility.¹¹

¹⁰ 2002 Base Rate Case, OTS St. 4 at 10 (Direct Testimony of Paul Metro).

¹¹ 2002 Base Rate Case, OCA St. 3 at 3-4 (Direct Testimony of Thomas Catlin).

1 **Q. DID PGW FILE A REPORT WITH THE COMMISSION AT THE CONCLUSION**
2 **OF THE THREE YEAR PILOT?**

3 A. Yes. PGW filed a WNA Report on May 4, 2006 (“2006 WNA Report”), which examined
4 the performance of the WNA over the prior three years and its effect on reducing
5 volatility of earnings and concluded that both the Company and its customers had
6 benefited from the existence of the WNA over this period. Additionally, PGW filed a
7 Stipulation entered into by OCA and OTS agreeing to a continuation of the WNA clause
8 on a permanent basis. The 2006 WNA Report and Stipulation are attached as Exhibit
9 DA-2.

10 **Q. HAS PGW’S WNA REMAINED IN PLACE SINCE ITS INITIAL**
11 **IMPLEMENTATION IN 2002?**

12 A. Yes.

13 **Q. HAS THE WNA BEEN MODIFIED SINCE IT WAS FIRST IMPLEMENTED?**

14 A. Yes. Based on a settlement reached in PGW’s 2017 base rate case, normal weather is
15 currently determined on the basis of a twenty year average of HDDs.¹² The settling
16 parties agreeing to shift from the use of a thirty year normal to the twenty year normal
17 included PGW, I&E, OCA, OSBA, the Retail Energy Supply Association, PICGUG, the
18 Coalition for Affordable Utility Services and Energy Efficiency in Pennsylvania
19 (“CAUSE-PA”) and the Tenant Union Representative Network and Action Alliance of
20 Senior Citizens of Greater Philadelphia (“TURN”). No other changes have been made
21 since 2002, other than the refunds referenced herein in 2022.

¹² *Pa. Public Utility Commission v. Philadelphia Gas Works*, Docket No. R-2017-25867833 (Order entered November 8, 2017, at pages 17-18 and Ordering Paragraph No. 3) (“2017 Base Rate Case”).

1 **V. IMPORTANCE OF WNA REMAINING IN PLACE FOR PGW**

2 **Q. PLEASE BRIEFLY EXPLAIN THE FINANCIAL METRICS THAT ARE**
3 **IMPORTANT TO PGW.**

4 A. As explained by PGW witness Golden during this proceeding, the Company's operations
5 are entirely funded from rates either indirectly or as a result of short-term or long-term
6 borrowing (which then must be paid back from rates charged to ratepayers) or directly
7 through charges to customers. Company witness Golden identified PGW's most
8 important financial metrics as:

- 9 1) Bond debt service coverage ratios;
- 10 2) End of year days cash on hand and liquidity balance;
- 11 3) Debt to equity capitalization ratio; and
- 12 4) Bond rating agency requirements to maintain bond rating.

13 (PGW Statement No. 2 at 13). Because PGW is a cash flow regulated utility, these
14 financial metrics are critical to ensure that PGW's cash obligations are fulfilled so that its
15 current bond rating and financial viability are maintained. Without a WNA that provides
16 financial certainty that PGW will recover its costs of operating a natural gas utility that
17 delivers natural gas service to consumers in its service territory, these metrics are
18 threatened, thereby jeopardizing PGW's current bond rating and financial viability.

19 **Q. PLEASE DESCRIBE THE EFFECTS OF THE EXISTING WNA ON PGW'S**
20 **CREDIT RATING.**

21 A. Because the existing WNA has eliminated the effect of abnormal weather on earnings
22 and cash flow, it has had a very positive effect upon the way in which PGW has been
23 viewed by the financial community. Weather-related reductions in earnings and cash
24 flow prior to implementation of the WNA threatened PGW's ability to successfully issue
25 additional long-term debt, the Company's only available source of long-term external
26

1 capital. The rating agencies have clearly indicated their reliance upon the WNA to
2 operate as a risk-mitigating tool, which has resulted in PGW achieving higher credit
3 ratings.¹³ Of note, absent the WNA, PGW would need to seek Commission approval for
4 significantly higher base rates to guard against financial risks that might occur due
5 abnormal weather in its service territory. During this proceeding, PGW witness James C.
6 Lover testified as to the significant effects of bond ratings and financial certainty on the
7 Company's ability to sustain its operations as a natural gas utility. (PGW Statement No.
8 3 at 9-19).

9 **VI. CONSUMER PROTECTIONS**

10 **Q. PLEASE DESCRIBE THE IMPORTANCE OF CONSUMER PROTECTIONS TO**
11 **PGW IN THE CONTEXT OF REVIEWING THE WNA.**

12 A. In any discussion concerning modifications to the WNA, it is imperative that consumer
13 protections be a focal point. As discussed above, the continued implementation of a
14 WNA offers revenue neutrality, which preserves the Company's financial health and
15 stability, particularly in view of its status as a city owned gas utility with rates that are
16 established through a cash flow method. Financial stability for a Company that is
17 responsible for maintaining the infrastructure necessary to provide safe and reliable
18 natural gas service to over one-half million customers in Philadelphia directly benefits the
19 ratepayers. Despite the critical role of the WNA in preserving PGW's financial health, in
20 PGW's view it is also important to protect customers, to the extent possible, from
21 unusually large increases resulting from abnormal weather occurring in Philadelphia

¹³ <https://www.fitchratings.com/research/us-public-finance/fitch-upgrades-philadelphia-pa-gas-works-revs-to-a-outlook-stable-17-02-2022>

1 during the winter heating season. In summary, the implementation of a WNA should aim
2 to achieve revenue neutrality and protect consumers from significant rate increases.

3 **(A) Revenue Neutrality**

4 **Q. PLEASE DESCRIBE WHAT YOU MEAN ABOUT THE WNA AFFORDING**
5 **PGW REVENUE NEUTRALITY.**

6 A. During the rate case, the Commission will determine what revenue requirements are
7 needed by PGW to ensure that it covers its debt service ratio, has sufficient days cash on
8 hand and can fund the necessary upgrades and improvements to the infrastructure to
9 ensure safe and reliable gas service. Once the Commission determines the appropriate
10 level of revenue requirements, the rates will be established based on a number of factors,
11 including its projected pro forma revenues in the relevant test year if the weather is
12 normal in its service territory. The WNA merely permits PGW to collect the level of
13 revenues that has been authorized by the Commission when the weather departs from its
14 normal patterns. Regardless of the weather that is experienced in PGW's service territory
15 during any particular heating season, the Company bears the same responsibilities to
16 provide safe and reliable gas service, meet its debt service coverage ratios and otherwise
17 have sufficient cash on hand to effectively operate a natural gas distribution company.

18 **Q. SOME CRITICS OF THE WNA HAVE REFERRED TO IT AS A MECHANISM**
19 **THAT PERMITS THE SHIFTING OF RISK DUE TO CHANGES IN THE**
20 **WEATHER FROM THE UTILITY TO RATEPAYERS. PLEASE ADDRESS**
21 **THIS CRITICISM.**

22 A. Given PGW's structure of being funded solely by ratepayers, as opposed to having
23 shareholders that invest in the Company, this criticism has no applicability. As the
24 ratepayers comprise the only group funding PGW's operations, no shifting of the risk is
25 possible. If ratepayers do not assume the risk of changing weather, through an
26 adjustment mechanism such as the WNA, PGW's continued ability to provide safe and

1 reliable natural gas service will be jeopardized due to the lack of financial stability and
 2 certainty, as well as inadequate cash on hand to fund its day-to-day operations. Such
 3 inability will directly impact ratepayers.

4 **Q. HAS THE COMMISSION EXPRESSED ITS SUPPORT FOR THE REVENUE**
 5 **NEUTRALITY AFFORDED BY WNAS?**

6 Yes. The Commission approved a WNA for Columbia Gas of Pennsylvania, Inc.
 7 (“Columbia”) in May 2013, which remains in its Tariff today.¹⁴ Additionally, in
 8 September 2022, the Commission approved a WNA for UGI Utilities, Inc. (“UGI”).
 9 While some of the elements of Columbia’s and UGI’s clauses vary from PGW’s current
 10 WNA, the basic purpose is the same – financial health and stability for the utility. Of
 11 particular note, Chairman Gladys Brown Dutrieuille issued a statement in connection
 12 with the Commission’s approval of UGI’s WNA, noting that the “decoupling of
 13 uncontrollable weather from revenues should stabilize UGI’s cashflow, and in turn, allow
 14 UGI to focus on operational items within its control, namely infrastructure upgrades and
 15 repairs.”¹⁵ This observation demonstrates the important benefits to ratepayers, and a
 16 cashflow utility such as PGW, of a WNA.

17 **Q. IN ADDITION, HAS THE GENERAL ASSEMBLY EXPRESSED SUPPORT FOR**
 18 **WNAS?**

19 A. Yes. The passage of Act 58 of 2018 added Section 1330 to the Public Utility Code,
 20 enabling utilities to seek approval of alternative rates, including decoupling
 21 mechanisms.¹⁶

¹⁴ *Pa. Public Utility Commission v. Columbia Gas of Pennsylvania, Inc.*, Docket No. R-2012-2321748 (Order entered May 23, 2013); Columbia’s Supplement No. 350 to Tariff Gas – Pa. P.U.C. No. 9, Page Nos. 162-163.

¹⁵ *Pa. Public Utility Commission v. UGI Utilities, Inc. – Gas Division*, Docket No. R-2021-3030218 (Order entered September 15, 2022; Brown Dutrieuille Statement).

¹⁶ 66 Pa.C.S. § 1330.

1 ***(B) Other Consumer Protections***

2 **Q. HAS PGW SOUGHT TO INCORPORATE OTHER CONSUMER**
3 **PROTECTIONS IN THE WNA?**

4 A. Yes. Aside from the inherent protection to consumers of ensuring PGW’s status as a
5 financially strong and stable Company that provides safe and reliable natural gas service,
6 the Company is offering modifications to the WNA that shield consumers from unusually
7 large increases caused by deviations in the weather from normal patterns. Further, PGW
8 has taken into consideration the importance of ensuring that it is not overcharging
9 customers, and that the WNA is easy to understand, to the extent possible.

10 **Q. IS PGW INTENDING TO OVERCHARGE CUSTOMERS WHEN IT UTILIZES**
11 **THE WNA?**

12 A. No. As I explained above, the WNA is intended only to ensure revenue neutrality, not to
13 permit PGW to collect revenues above the level authorized by the Commission. When
14 weather patterns in Philadelphia vary from the normal weather that has been used to
15 calculate the revenues that PGW expects to receive from approved rates, the WNA
16 operates to ensure that PGW collects neither more nor less than the authorized level of
17 revenues. Therefore, if the weather during a particular heating season is warmer than
18 normal, PGW’s revenues would be lower and may result in a charge to customers from
19 application of the WNA formula. By contrast, if the weather during a particular heating
20 season is colder than normal, PGW revenues would be higher and may result in a credit
21 to customers from application of the WNA formula. At all times, it is incumbent upon
22 PGW to ensure that the Delivery Charges plus the WNA do not exceed revenue levels
23 authorized by the Commission.

1 **Q. PLEASE EXPLAIN WHAT YOU MEAN BY EASE OF UNDERSTANDING.**

2 A. To the extent possible, the WNA should be designed in a manner that enables customers
3 to understand the charges and credits that PGW imposes pursuant to the established
4 formula that is wholly driven by weather. Additionally, PGW recognizes the value of
5 conveying as clearly as possible to customers that PGW is not making more money as a
6 result of WNA charges, but rather that the WNA charges are permitting PGW to collect
7 the amount of revenue that the Commission has authorized.

8VII. ATRIUM ALTERNATIVE RECOMMENDATIONS

9 **Q. PLEASE SUMMARIZE ATRIUM'S OBSERVATIONS CONCERNING PGW'S**
10 **WNA FORMULA.**

11 A. Atrium's observations about PGW's WNA can be summarized as follows:¹⁷

- 12 • Philadelphia's May weather is highly unpredictable and could deviate significantly
13 from normal. It is outside the typical shoulder months of April and October for heat-
14 related gas usage and recently has had distinctly different weather patterns than a
15 typical shoulder month relative to normal weather. PGW could consider whether
16 May should remain in the weather normalization period.
- 17 • The mechanism, as designed and currently structured, becomes highly sensitive once
18 large, warmer heating degree day variances are reached.
- 19 • Philadelphia weather is trending progressively warmer, and it may be beneficial to
20 PGW to use a shorter normal averaging period – i.e., 15 years, 10 years.
- 21 • The WNA performs well when total usage follows expected trajectories based on
22 historical relationships between heat load ("HL") and HDD. However, when HL is
23 unusually large or small compared to normal, the NHDD/AHDD factor in the formula

¹⁷ Exhibit RJA-1 - Atrium Report at 1-2 (Executive Summary).

1 will overestimate the impact of HDD when NHDD is significantly above AHDD
 2 (warmer than normal), and will underestimate the impact of HDD when HL is
 3 unusually small and when temperatures are colder than normal.

4 **Q. PLEASE DESCRIBE THE ALTERNATIVES THAT ATRIUM OFFERS.**

5 A. At the outset, it is noteworthy that Atrium confirms that PGW applied the WNA formula
 6 correctly and that the large and unprecedented increases that occurred in June 2022 were
 7 not the result of any errors on the part of PGW.¹⁸ However, Atrium believes that the
 8 current WNA formula is highly sensitive once large HDD variances are reached. The
 9 Atrium Report recognizes that the most immediate concern is to prevent dramatically
 10 skewed results from the ratio method in the current WNA formula, as was experienced in
 11 June 2022 based upon May 2022 usage. Since the likelihood of this phenomenon
 12 occurring is much greater in shoulder months whereby the variance of AHDDS from
 13 NHDDs is very large and AHDDs are very small, Atrium offers the following six
 14 alternatives for PGW's consideration:¹⁹

- 15 1) *Removal of May*. Considering whether May should remain in the weather
 16 normalization period.
- 17 2) *HDD Ratio Cap*. Implementing a billing system control that limits the
 18 amount of the ratio adjustment to consumption to a multiple factor percentage
 19 (for example, of +/- 60%) deviation from normal (resulting in 2.5x adjustment
 20 to HL). An alternative billing system control could use the class average
 21 heating coefficient at +/- 1 standard deviation as the limit to the HL

¹⁸ Exhibit RJA-1-Atrium Report at 1 (Executive Summary).

¹⁹ Exhibit RJA-1- Atrium Report at 32 (Section 6).

1 adjustment, as determined from the Company's weather normalized billing
2 determinant process.

3 3) *Heat Coefficient Factor*. Adjusting the WNA formula to use a heat
4 coefficient factor per HDD rather than applying a ratio of
5 NHDD/AHDD. This proposal would better align the heat coefficient from
6 how PGW sets rates on a weather normalized basis to the factors used in a
7 WNA mechanism.

8 4) *Heat Coefficient Factor Alternative*. An alternative way of calculating a heat
9 coefficient factor from recommendation #3. Instead of using a factor aligned
10 with forecasting purposes, the heat coefficient factor would be derived using
11 linear regression on a class average or customer-specific basis.

12 5) *NHDD Averaging*. Investigating the use of a shorter normal averaging period
13 – 15 years, 10 years – by use of a statistical analysis of degree days, a “root
14 mean squared error” analysis to establish the best estimate of “normal”
15 weather.

16 6) *Baseload Control*. Implementing a billing system control that limits the BL
17 calculation to the upper and lower bound of the 95 percent confidence interval
18 for the y intercept of a monthly regression of HDD against total usage for a
19 given customer, providing that the y intercept is statistically significant, as
20 indicated by a t-statistic greater than 2.0.

21 As explained by Atrium, "Recommendations 1, 2, 3, and 4 serve as reasonable
22 alternatives to each other. Any one of the first four recommendations would prevent the
23 anomalous charges that occurred in June 2022 billings from reoccurring. Furthermore,

1 Recommendations 5 and 6, though considered improvements to the current WNA
2 processes, are offered for PGW's consideration and are not necessary for the reasonable
3 operation of the WNA formula".²⁰

4 **Q. PLEASE SUMMARIZE PGW'S PROPOSALS CONCERNING THESE**
5 **ALTERNATIVES.**

6 A. As further described below, PGW recommends implementing the most immediate
7 alternative of the *Removal of May* from the weather normalization period used in the
8 WNA. In addition, PGW is currently more fully evaluating the option referred to above
9 as the *HDD Ratio Cap*, under which PGW would implement a billing system control that
10 limits the amount of the ratio adjustment to consumption. While this measure has
11 attractive features to PGW, the Company does not yet have the necessary data to fully
12 evaluate its financial impact. PGW does not support the implementation of the remaining
13 alternatives identified by Atrium.

14 **Q. PLEASE DISCUSS PGW'S PROPOSAL TO REMOVE MAY FROM THE**
15 **WEATHER NORMALIZATION PERIOD.**

16 A. Since PGW's primary focus is to prevent a recurrence of the large, unanticipated charges
17 that occurred in June 2022 based on May usage by some customers, the Company
18 recommends the removal of May from the weather normalization period used in the
19 WNA on an immediate, and possibly interim, basis. PGW agrees with the rationale set
20 forth by Atrium in its Report that – at least in the Philadelphia area – May weather is
21 highly unpredictable and could deviate significantly from normal, though NHDD for May
22 are relatively low compared to other months in the WNA period. As shown in Section
23 3.4 Weather Analysis on page 25 of the Report, May is outside the typical shoulder

²⁰ Exhibit RJA-1- Atrium Report at 32 (Section 6).

1 months of April and October for heat-related gas usage and has much more variable
2 weather than a typical shoulder month relative to normal weather. In addition, this
3 analysis shows that only May has the propensity to deviate from normal weather by
4 100%, which occurred twice since 2003; and has been 80% warmer than normal three
5 times since 2003. No other month has experienced warmer than normal weather to that
6 degree (i.e., 80% to 100% warmer than normal) during our study period 2003-2022.
7 PGW also recognizes that weather in the shoulder months, and May in particular, tend to
8 be more dispersed than during the winter months, leading to greater deviations from
9 normal weather. Of particular note, Atrium observes that Philadelphia is the warmest of
10 the major Pennsylvania cities. On average, over the previous 20 years, the months of
11 May, June, July, August, and September have little to no HDDs. While other PA utilities
12 use May as part of the WNA calculation, PGW notes that utilities in other states,
13 including Virginia, Maryland, and New Hampshire do not consider May in determining
14 normal weather.²¹ The proposed WNA tariff is attached as Exhibit DA-3.

15 **Q. PLEASE ADDRESS THE BILLING SYSTEM CONTROL THAT LIMITS THE**
16 **AMOUNT OF THE RATIO ADJUSTMENT TO CONSUMPTION.**

17 A. Under this option, which is referred to above as the *HDD Ratio Cap*, Atrium suggests
18 that as a guard against the re-occurrence of the severe WNA adjustments in the future,
19 PGW implement a formula control that limits the variance of actual degree days to +/-
20 60% deviation from normal.

21 **Q. WHAT IS PGW'S VIEW OF THIS OPTION?**

22 A. PGW favorably views this Atrium alternative due to the effect that this change would
23 have on ensuring that an anomaly does not occur in May or any other month that is part

²¹ Exhibit RJA-1 - Atrium Report, Appendix A at A-1 through A-4.

1 of the weather normalization period. However, PGW cannot commit to implementing
2 this change at this time due to the lack of available data allowing a full evaluation of the
3 impacts. Even if PGW is able during this proceeding to make a commitment to this
4 modification, it is important to note that implementation will take additional time and will
5 likely not be ready upon the conclusion of the rate case.

6 **Q. PLEASE DISCUSS ATRIUM'S OPTION TO ADJUST THE WNA FORMULA TO**
7 **USE A HEAT COEFFICIENT FACTOR PER HDD RATHER THAN APPLYING**
8 **A RATIO OF NHDD/AHDD.**

9 A. As described above as *Heat Coefficient Factor*, in recommendations #3 and #4, these
10 options are offered as alternatives to, not in addition to, the prior proposal to limit the
11 amount of the ratio adjustment to consumption to a certain percentage. These
12 alternatives would be very complex and time-consuming and likely expensive for PGW
13 to implement, and it is currently unknown what the potential impact to the WNA charges
14 would be. These options are also currently not in use in Pennsylvania, and could be
15 confusing for customers.

16 **Q. PLEASE DISCUSS ATRIUM'S ALTERNATIVE FOR PGW TO CONSIDER**
17 **REVISING THE NUMBER OF HISTORIC YEARS THAT ARE USED TO**
18 **DETERMINE NORMAL WEATHER.**

19 A. Atrium observes that Philadelphia weather is trending progressively warmer, and that it
20 may be beneficial to PGW to investigate use of a shorter normal averaging period – 15
21 years, 10 years – (as Atrium understands PGW has previously proposed in a rate case).
22 While that option, which is referred to above as *NHDD Averaging*, may initially have a
23 certain amount of appeal, a review of the data shows that this change would not have
24 prevented the occurrence in May-June 2022. The historical data that would be relied
25 upon, even using a shorter period of time, would suggest colder temperatures than are

1 currently considered in PGW's formula, based upon twenty years. Therefore, PGW does
2 not recommend implementing this alternative.

3 **Q. PLEASE ADDRESS THE OPTION ADVANCED BY ATRIUM TO MODIFY**
4 **PGW'S BASELOAD CALCULATION METHOD.**

5 A. In its *Baseload Control* option, Atrium suggests modifying PGW's BL calculation
6 method, which relies on July and August usage. While Atrium describes PGW's current
7 approach as reasonable, Atrium points to the unavailability of July and August usage data
8 for some customers. To ensure the reasonableness of the baseload calculation, Atrium
9 recommends implementing a billing system control that limits the BL calculation to the
10 upper and lower bound of the 95 percent confidence interval for the y intercept of a
11 monthly regression of HDD against total usage for a given customer, providing that the y
12 intercept is statistically significant, as indicated by a t-statistic greater than 2.0.

13 With the use of one or more other options, PGW does not believe it is necessary
14 to implement this alternative. The Company's current BL calculation method is a
15 reasonable option to use for determining this factor on a customer-by-customer basis.
16 Further, insufficient data is currently available to modify this method in accordance with
17 Atrium's *Baseload Control* option. In PGW's view, the complexities associated with
18 revising its BL calculation method are not worth any possible advantages, particularly
19 given PGW's recommended exclusion of May from the weather normalization period and
20 the Company's commitment to evaluate the data to determine the impact of limiting the
21 amount of the ratio adjustment to consumption to a certain percentage.

22 **VIII. CONCLUSION**

23 **Q. DOES THAT COMPLETE YOUR TESTIMONY?**

24 A. Yes. However, I reserve the right to offer further testimony. Thank you.

Exhibit DA-1

WEATHER NORMALIZATION ADJUSTMENT CLAUSE

Provision For Adjustment

The Weather Normalization Adjustment shall be applied to each Mcf (1,000 cubic feet) used for heating purposes under Rate Schedules GS, MS, and PHA (“heating” and “heating only” customers), except for Gas usage under the Special Provisions – Air Conditioning of those rates. The Weather Normalization Adjustment will be applied to customer usage during the period of October 1 through May 31 of each year for each billing cycle (except for the 2021-2022 heating season when the Weather Normalization Adjustment will exclude May 1 through May 31 to the extent that the application would produce a charge to the customer)).

(C)

Computation of Weather Normalization Adjustment

The Weather Normalization Adjustment surcharge or credit shall be computed to the nearest one-hundredth cent (0.01cent) in accordance with the formulas set forth below:

$$HL = TU - (BL * BC)$$

$$WNA = DC * [(HL * \frac{NHDD +/- (NHDD * 1\%)}{AHDD}) - HL]$$

Definitions

TU – Total Usage for the billing cycle. TU measured in Mcf.

BL – base load Mcf per billing day is the number of Mcf per Customer used per day for non-heating purposes based on usage by Customers to which this adjustment applies. It is determined separately for each individual customer and will be revised annually to reflect the non-temperature sensitive usage of Customers to which the adjustment applies reflected in the prior heating season’s sales. If an individual customer base load is not available, the base load for the related customer class will be applied.

BC – billing cycle is the actual number of days shown on the bill that the Customer receives for service.

DC – Delivery Charge.

NHDD – normal heating degree days for any given calendar day within a month are based on the normal weather determination applied in the Company’s most recent base rate case, currently twenty years, as approved at Docket No. R-2017-2586783. The NHDD provided for in the formula are the total number of NHDD for the billing cycle. The degree day data is provided by the National Weather Service and measured at the Philadelphia International Airport.

AHDD – actual experienced heating degree days for the billing cycle. The degree day data is provided by the National Weather Service and measured at the Philadelphia International Airport.

Operation of Weather Normalization Adjustment

The Weather Normalization Adjustment will be applied to a Customer’s bill on a cents per Mcf basis when actual heating degree days vary from normal heating degree days during the period for which the Customer is billed. The Weather Normalization Adjustment will be applied to the Customer’s space

(C) - Change

heating consumption except for air conditioning usage billed under the air conditioning rate. The Weather Normalization Adjustment for a billing cycle will apply only if the actual heating degree days (AHDD) for the billing cycle are lower than 99 percent or higher than 101 percent of the normal heating degree days (NHDD) for the billing cycle and will only apply to the extent that the variation is lower than 99 percent or higher than 101 percent of the normal heating degree days for that billing cycle. A new weather adjustment will be calculated for each billing cycle.

Under the formulas, the Weather Normalization Adjustment surcharge or credit is calculated by:

- 1) Normal HDD are calculated for each day of the fiscal year based upon the normal weather determination applied in the Company's most recent base rate case, currently twenty years as approved at Docket No. R-2017-2586783.
- 2) At the start of the fiscal year, an average daily base load (non-heating) usage is calculated for each individual customer based upon actual base load usage.
- 3) The average daily base load (non-heating) amount is multiplied by the number of days in the billing cycle.
- 4) The total billing cycle base load amount is subtracted from the actual cycle usage of the customer in order to derive the usage applicable to heating.
- 5) The WNA factor is multiplied times the heating usage in order to derive the normalized heating usage.
 - a) The WNA factor is calculated by first adjusting the Normal HDD (NHDD) for the billing cycle by the deadband percentage (1 %). The deadband percentage is multiplied by the NHDD and then added to NHDD for the billing period when the weather is colder than normal (i.e., AHDD > NHDD) or subtracted from NHDD for the billing period when the weather is warmer than normal (i.e., AHDD < NHDD).
 - b) The adjusted NHDD are then divided by the AHDD.
- 6) The actual heating usage is subtracted from the normalized heating usage and then multiplied by the delivery charge. The result is a surcharge or credit.

Reporting Requirements

The Company will file all Weather Normalization Adjustments with the Commission on an annual basis. On or about January 10 of each year beginning in 2018, the Company shall submit an annual report for the most recent fiscal year ending August 31 detailing the actual charges or credits that resulted from the application of this clause and the actual number of heating degree days (HDDs).

Exhibit DA-2

ORIGINAL

Wolf Block

213 Market Street, 9th Floor, P.O. Box 865, Harrisburg, PA 17108-0865
Tel: (717) 237-7160 ■ Fax: (717) 237-7161 ■ www.WolfBlock.com

Daniel Clearfield
Direct Dial: (717) 237-7173
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E-mail: dclearfield@wolfblock.com

DOCUMENT
FOLDER

May 4, 2006

James McNulty
Secretary
PA Public Utility Commission
Commonwealth Keystone Bldg.
2nd Fl., 400 North Street
P.O. Box 3265
Harrisburg, PA 17105-3265

RECEIVED
2006 MAY -4 PM 1:37
PA PUC
SECRETARY'S BUREAU

Re: Pa PUC v. Philadelphia Gas Works,
Docket No. R-00017034

Dear Secretary McNulty:

As part of the settlement of Philadelphia Gas Works' ("PGW" 2002 base rate proceeding (R-00017034), the Company was permitted to implement its proposed Weather Normalization Adjustment ("WNA") clause and, in addition, agreed to conduct a review of the costs and benefits of the WNA after three years. In addition, the Settlement stated that "[a] determination will be made at the end of the review as to whether the WNA will continue, with modifications." PGW conducted such a review at the conclusion of the three-year pilot period, the results of which are reflected in the attached Report on Weather Normalization Adjustment Clause (Appendix "A" to the Stipulation). The report incorporates the input and suggestions of the Office of Consumer Advocate ("OCA") and the Office of Trial Staff ("OTS") and contains data and analyses which, in PGW's view, support the continuation of the WNA for PGW. In addition, the OCA and the OTS have entered into a stipulation with PGW which accepts the continuation of the WNA clause for PGW on a permanent basis (with one contingency explained in the stipulation).

As the 2002 Rate Case Settlement did not specify how the WNA review was to occur, PGW, OCA and OTS have agreed that PGW shall submit the WNA Report to the Commission and request that the Commission review the report and issue a secretarial letter or other pronouncement of the Commission, as it determines to be most appropriate, which authorizes or acknowledges that the WNA will continue on a permanent basis. Accordingly,

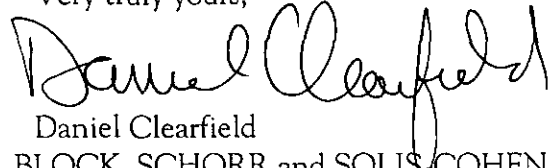
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5

James McNulty
May 4, 2006
Page 2

PGW is hereby submitting its WNA Report and Stipulation to the Commission for its review and any action it determines is appropriate.

Very truly yours,



Daniel Clearfield
For WOLF, BLOCK, SCHORR and SOLIS COHEN LLP

DC/lww

Attachments

cc: Robert Rosenthal, Director, FUS
Attached Service List

**BEFORE THE
PENNSYLVANIA PUBLIC UTILITY COMMISSION**

PENNSYLVANIA PUBLIC UTILITY
COMMISSION

v.

PHILADELPHIA GAS WORKS

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:
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:
:
:
:

Docket No. R-00017034

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PA PUC
SECRETARY'S BUREAU

STIPULATION

Philadelphia Gas Works ("PGW"), the Commission's Office of Trial Staff ("OTS") and the Office of Consumer Advocate ("OCA"), (collectively "the Stipulating Parties"), hereby stipulate and agree as follows:

WHEREAS, On February 25, 2002, PGW submitted Supplement No. 17 to Tariff Gas - Pa. P.U.C. No. 1 to become effective for service rendered on or after April 26, 2002, and proposed to increase PGW's base rates by \$60 million annually; and

WHEREAS, the proposed tariff contained a proposal to implement a weather normalization adjustment clause ("WNA") designed to adjust PGW's base rates on a monthly basis to account for colder or warmer than normal weather; and

WHEREAS, prior to completion of the public hearings on the base rate request, the parties were able to reach a Settlement which resolved all issues pertaining to PGW's base rate filing; and

WHEREAS, as part of that settlement, PGW was permitted to implement its proposed WNA as soon as necessary systems modifications were complete; and

WHEREAS, PGW actually began to implement the adjustment clause as of December 1, 2002; and

WHEREAS, the Settlement indicated that the WNA was being put in place for an initial three-year pilot period. At the conclusion of the three year period, the Company agreed to conduct a review of the costs and benefits of the WNA; and

WHEREAS, the Settlement stated that "[a] determination will be made at the end of the review as to whether the WNA will continue, continue with modifications;" and

WHEREAS, the Settlement was approved by the PUC in an order entered on August 2, 2002; and

WHEREAS, the three-year pilot period ended on August 9, 2005; and

WHEREAS, PGW has conducted the review of the costs and benefits of the WNA and has set forth its conclusions in the form of a Report, (hereinafter "the WNA Report") which is attached hereto as Appendix "A"; and

WHEREAS, the Report examined the performance of the WNA over the last three (3) years and its effect on reducing volatility of earnings and concluded that both the Company and its customers have benefited from the existence of the WNA over this period; and

WHEREAS, the Stipulating Parties were provided drafts of the WNA Report and made suggestions for inclusion, which were addressed in the body of the report.

NOW, THEREFORE, it is hereby stipulated and agreed as follows:

1. The other Stipulating Parties agree with PGW's conclusion that PGW's WNA tariff should continue on a permanent basis, subject to the conditions set forth in paragraphs 2 and 3 below.
2. PGW agrees that its internal audit department will annually audit the WNA by selecting a sample from invoices issued during the month in which the highest total monthly surcharge or credit was applied to customers' invoices. The surcharge or credit for the selected

invoices will be recalculated. All procedures will be documented and all data will be saved for a period of six months after the completion of the audit. The results of the annual audit will be provided to the Parties. The Parties will have the right to address any negative audit findings in the appropriate forum(s).

3. PGW agrees that if PGW is purchased by, or otherwise transferred to an investor owned utility, or should become an investor owned utility, PGW agrees that such successor entity may no longer utilize the WNA Clause unless the Commission upon petition by the purchasing IOU in the transfer application proceeding or otherwise authorizes the establishment of a WNA for the successor entity.

4. The Stipulating Parties agree to the following procedure to comply with the terms of the 2002 Rate Case Settlement:

a) PGW shall submit the WNA Report to the Commission and request that the Commission review the report and issue a secretarial letter or other pronouncement of the Commission, as it determines to be most appropriate, which authorizes or acknowledges that the WNA will continue on a permanent basis.

b) The Stipulating Parties, and any other interested person, may file comments to the Report and to PGW's conclusion that the WNA should continue on a permanent basis.

5. The Stipulating Parties specifically acknowledge and agree that PGW's WNA

shall continue unless and until the Commission issues a final order directing that it be terminated or modified.

Respectfully submitted,

Philadelphia Gas Works

By Daniel Clearfield
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Dated: May 3, 2006

Office of Trial Staff

By Johnnie E. Simms
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PA Public Utility Commission
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Date: May 4, 2006

Office of Consumer Advocate

By Tanya J. McCloskey
Tanya J. McCloskey
Stephen J. Keene, Senior Assistant
Consumer Advocates
Counsel for Office of Consumer
Advocate

Office of Consumer Advocate
555 Walnut Street, 5th Floor, Forum Place
Harrisburg, PA 17101-1923

Dated: May 3, 2006

PHILADELPHIA GAS WORKS

REPORT ON WEATHER NORMALIZATION ADJUSTMENT CLAUSE



RECEIVED
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PA PUC
SECRETARY'S BUREAU

Prepared in Compliance with
Joint Petition For Settlement
Pa PUC v. PGW, R-00017034

PHILADELPHIA GAS WORKS
800 West Montgomery Avenue
Philadelphia, PA 19122

November 2005

Table of Contents

TABLE OF CONTENTS

	Page
I. BACKGROUND	2
II. PERFORMANCE OF CLAUSE	5
III. ASSESSMENT OF CLAUSE PERFORMANCE.....	6
A. Affect on PGW Financial Position	6
B. Effect on Customers.....	8
C. WNA Billing.....	8
IV. WORKSHOPS.....	9
A. WNA Deadband.....	9
B. WNA Audit.....	10
C. Change in Ownership of PGW	10
V. PGW CONCLUSIONS REGARDING THE WNA.....	11

I. BACKGROUND

Traditionally, the base rates of natural gas distribution companies (NGDCs) are established on a "weather normalized" basis, i.e., rates are set to permit the Company to earn at levels determined to be reasonable assuming that sales and revenues are at the levels the utility would experience if the level of experienced "Heating Degree Days" ("HDD") were at "normal" levels. Accordingly, when a year is colder or warmer than some determined "normal" level the NGDC typically earns more or less than the normalized amount, all other things being equal.

One way in which to balance out the effects of "abnormal" weather is by implementing a Weather Normalization Adjustment ("WNA") mechanism. The typical WNA permits the NGDC to true-up its revenues when experienced HDDs in a given period are less than a determined "normal" level. Correspondingly, when experienced HDDs exceed normal levels the utility adjusts its charges to provide a credit to customers. Importantly, the WNA does not result in a utility being able to earn more or realizing an earnings short-fall; it merely permits the utility to recover its authorized level of earnings and, for a cash flow regulated utility, the company's authorized level of liquidity.

As a result of experiencing a number of winters in which abnormal weather caused severe shortfalls in earnings and liquidity, PGW determined that the establishment of a WNA was a crucial requirement if the Company was to return to financial health in the long term.

Accordingly, PGW included a request to establish a WNA clause as part of its 2002 general base rate proceeding. On February 25, 2002, PGW submitted Supplement No. 17 to Tariff Gas - Pa. P.U.C. No. 1 to become effective for service rendered on or after April 26, 2002. This base rate filing sought to increase PGW's base rates by \$60 million and to implement a weather normalization adjustment clause ("WNA"). Prior to completion of the public hearings on the base rate request, the parties were able to reach a Settlement which resolved all issues

pertaining to PGW's base rate filing. As part of that settlement, PGW was permitted to implement its proposed WNA as soon as necessary systems modifications were complete. PGW agreed that the WNA would be put in place after consulting with the settling parties. PGW actually began to implement the adjustment clause as of December 1, 2002. In compliance with its settlement agreement, PGW provided consumer education to its customers to assist them in understanding the workings of the WNA.

The Settlement indicated that the WNA was being put in place for an initial three-year pilot period. At the conclusion of the three year period, the Company agreed to conduct a review of the costs and benefits of the WNA. After that evaluation, a determination was to be made as to whether the WNA will continue, continue with modifications, or be eliminated.

The Settlement was approved by the PUC in an order entered on August 2, 2002.

In presenting its proposal for a WNA, PGW's Craig White explained that the establishment of the Clause would have a number of benefits:

- i. stabilizes cash flow from year-to-year
- ii. can reduce the need for short-term borrowing from year-to-year
- iii. positively affect PGW's credit rating
- iv. reduces the need for costly base rate proceedings¹

Mr. White also pointed out that a WNA-type clause was particularly appropriate for a municipally owned utility, such as PGW:

I believe that PGW's municipal status makes a WNA particularly appropriate. Under the cash flow method of ratemaking, ratepayers provide revenues to cover the entire costs of service -- but only the cost of service. Any revenue shortfalls or windfalls ultimately inure to the ratepayers. The WNA simply minimizes

¹ *Pa PUC v. PGW*, R-00017034, PGW BRP St. 2 at 3.

the degree to which such shortfalls or windfalls occur. For a municipal utility that utilizes a WNA, ratepayers are assigned the same responsibilities or obtain the same benefits that they would without a WNA.²

In response to the Company's presentation, the OTS agreed with the Company's WNA proposal in principle:

I cannot agree with the Company's proposed WNA as filed. ... However, I agree in concept that a WNA clause would be reasonable only because PGW's rates are established using the cash flow method of ratemaking.³

OTS's witness Mr. Metro recommended approval of the WNA clause if several conditions were adopted by the PUC.⁴

OCA witness Thomas Catlin also indicated that a WNA clause would make sense for the PUC to approve for a municipal utility such as PGW:

Generally, a WNA clause would not be appropriate for an investor-owned utility where the costs of capital, especially equity capital, embodies compensation for the very risk that a WNA clause would attenuate....PGW is unique among gas distribution companies in Pennsylvania. PGW is the only gas distribution utility in Pennsylvania regulated by the Commission that is a municipal utility. Moreover, PGW operates on a cash basis according to statute, and it has no source of equity financing in the sense of a traditional investor-owned utility. The Company represents that its ability to borrow short-term is largely exhausted and it has virtually no remaining flexibility to address short-term margin losses.⁵

² Id. at 3-4.

³ R-00017034, OTS St. 4 at 10.

⁴ The conditions Mr. Metro recommended were: 1) the WNA be approved for a 3 year "trial" basis; 2) the Company provide tariff language that describes how the individual customer charge and middle of the month monthly bills will be calculated; and 3) the Company will not file for a rate increase until after June 1, 2005. Id. at 10-12.

⁵ R-00017034, OCA St. 3 at 3-4. OCA witness Catlin also recommended several refinements to the Company's proposal, including the filing of periodic reports on the

Accordingly, in evaluating the performance of the clause three years after its initiation PGW has focused on whether the WNA has provided the benefits anticipated and whether PGW's implementation has been otherwise reasonable.

II. PERFORMANCE OF CLAUSE

In the three years in which the WNA clause has been in place, PGW has credited to customers, on net, approximately \$9.3 million.

Philadelphia Gas Works Weather Normalization Adjustment Clause

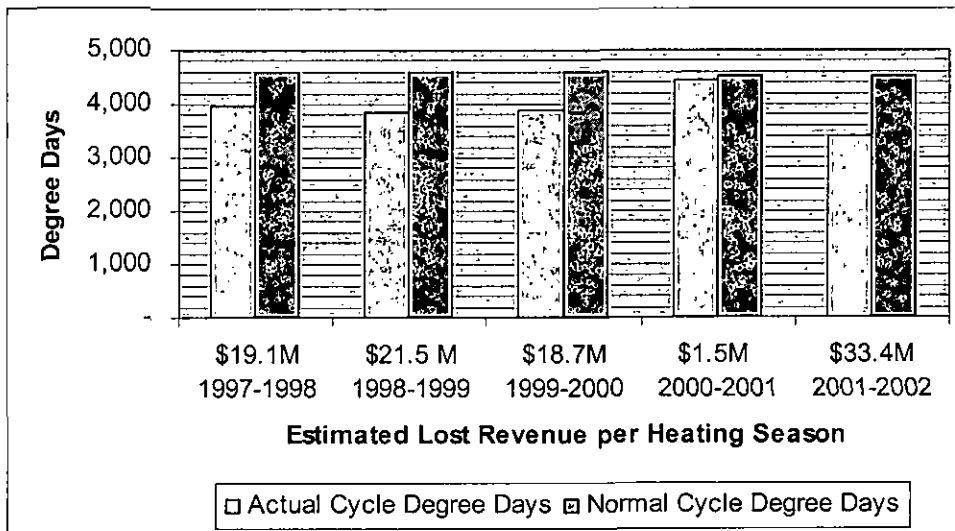
	<u>Fiscal Year</u> <u>2002-03</u>	<u>Fiscal Year</u> <u>2003-04</u>	<u>Fiscal Year</u> <u>2004-05</u>
SEP	-	\$ 5,837	\$ 1,093
OCT	-	(293,666)	(171,486)
NOV	-	1,744,403	(85,304)
DEC	(3,094,912)	249,694	1,456,550
JAN	183,378	(313,490)	2,349,557
FEB	(4,952,755)	(4,584,777)	(791,197)
MAR	(3,636,720)	2,384,882	(3,074,010)
APR	1,334,999	(111,428)	(9,860)
MAY	107,459	2,035,759	(462,910)
JUN	8,492	1,039,386	(568,422)
JUL	11,133	2,828	(11,583)
AUG	9,590	(50,881)	2,410
TOTAL	\$ (10,029,336)	\$ 2,108,547	\$ (1,365,162)

clause, the establishment of the clause on a 3 year pilot basis, consumer education on the clause and an evaluation of the appropriateness of the 1% plus or minus deadband after actual experience is obtained.

III. ASSESSMENT OF CLAUSE PERFORMANCE

A. Affect on PGW Financial Position

Notwithstanding the fact that, since its inception, the PGW has actually resulted in a net credit to customers, the existence of the WNA has had a very positive effect upon the way in which PGW has been viewed by the financial community. The principal reason for this is that the existence of the WNA has eliminated the effect of weather on earnings and cash flow. Prior to the establishment of PGW's WNA, the Company experienced substantial shortfalls in earnings and cash flow as a result of successive warmer than normal winters. The following chart illustrates PGW's historical experience:



These weather related reductions in earnings and cash flow decimated PGW's already precarious financial position and threatened the Company's ability successfully to issue additional long term debt, the firm's only available source of external capital. In fact, it is estimated that during the five fiscal years ending August 31, 2002, PGW experienced

approximately \$94 million in lost revenue due to higher than normal temperatures. As a result, PGW was downgraded to the lowest investment grade and was required to pay extremely high effective interest rates in order to obtain the long term financing on which it relies to maintain its capital improvement program. It was also forced to obtain a series of base rate increases (including a \$36 million emergency rate increase) in order to "weather" the storm.

With the implementation of the WNA, PGW has not filed any additional base rate cases and, while many other factors have continued to keep the Company in a challenging financial position, the investment community has recognized that PGW's earnings and cash flow are now uniquely insulated from the vagaries of weather. Both Standard & Poor's ("S & P") and Moody's continue to cite the WNA as a positive factor. In fact, both rating agencies have discussed the WNA in some of their most recently issued reports. In May 2005, S & P reiterated that "[a]nother indication of regulatory support involves the PUC's relatively recent approval of a weather normalization adjustment for PGW – the first such allowance to a gas utility in Pennsylvania. The WNA enables PGW to smooth out fluctuations in margin revenue due to abnormal weather in winter months."⁶ Again, on August 30, 2005, in a report in which S & P affirmed PGW's bond rating as the lowest investment grade rating and affirmed a negative outlook, S & P stated: "The current rating assumes that the company will continue to have access to its WNA. Although poor collections exacerbate liquidity problems in colder-than-normal years (as total customer bills increase), the WNA keeps distribution revenues from dropping precipitously in years with warmer-than-normal winters."⁷ Likewise, Moody's has clearly expressed that "[p]rior to the natural gas price spike in 2003 PGW has implemented several

⁶ Standard & Poor's Full Report (May 19, 2005).

⁷ Standard & Poor's Full Report (August 30, 2005).

changes that were to be key to improved financial performance. PGW ... was granted a Weather Normalization Adjustment, to normalize the impact of changes in weather on cash flow.”⁸ Additionally, Fitch Ratings favorably commented on the WNA after its approval. When discussing rating considerations, Fitch reported that the “rating considers management’s continued focus on cost control, steady albeit slow improvement in customer collections, and recent rate modifications that have provided some stability to cash flow...”⁹ The rate modifications were described later in the report as permanent base rate relief of \$70 million, as well as the ability to levy a WNA for warmer than normal years.”¹⁰

B. Effect on Customers

The WNA clause has been well accepted by PGW customers. Since its inception, PGW has had an extremely small number of complaints. The Clause has been calculated without any errors or revisions being necessary.

C. WNA Billing

PGW's WNA formula used to apply the clause works as it was intended. In order to demonstrate this, PGW sampled all rate classes to which the WNA was applied¹¹ for the month of March 2005. March 2005 was selected because it was the month during which the

⁸ Moody’s Report (September 28, 2004).

⁹ Fitch Ratings Report, p. 2 (December 18, 2002).

¹⁰ *Id.*

¹¹ GS, MS and PHA.

largest credit was issued during the 2004-2005 fiscal year. After selecting a sample size¹² from each rate class, the WNA applied to each selected invoice was recalculated and no exceptions were identified. PGW's conclusion is that algorithms and billing systems used to calculate the WNA are accurate and reliable.

IV. WORKSHOPS

PGW held two telephonic workshops with the Office of the Trial Staff (“OTS”), the Office of the Consumer Advocate (“OCA”), the Office of the Small Business Advocate (“OSBA”), and the Philadelphia Industrial and Commercial Users Group (“PICGUG”) (collectively the “Parties”) on August 30 and September 15, 2005 in order to discuss draft forms of this report and exchange information. PGW and the Parties discussed many issues, the more prominent of which follow.

A. WNA Deadband

At least one of the workshop participants asked that PGW provide an analysis of the pros and cons of modifying the existing deadband, currently set at 1%. Based upon total residential heating season sales (10/1 to 5/31) of 36 Bcf, each increase of the deadband by 1% shows a correlating decrease in the total heating season surcharge or credit of \$1.5M. For example, when 36 Bcf is used as baseline residential heating season sales which are then adjusted for 5% warmer or colder weather, the resulting surcharge/credit is \$6,050,000 using a 1% deadband. The increase of the deadband to 2%, 3%, 4% and 5% results in surcharges/credits of \$4,550,000, \$3,030,000, \$1,520,000 and \$0, respectively. The same incremental change of

¹² Three populations (i.e. March 2005 GS, MS and PHA invoices) were sampled based upon a 95% confidence level and a confidence interval of plus or minus 5%.

approximately \$1.5M per 1% occurs even if the temperature variance is less than 5% warmer/colder or greater than 5% warmer/colder.

The rating agencies have clearly indicated that they rely upon the WNA to be a risk mitigating tool, therefore, an increase of the deadband beyond 1% will diminish the effect of the WNA as a risk mitigating tool. After discussing PGW's analysis and the independent analyses prepared by another party, it was agreed that the deadband at 1% should be maintained.

B. WNA Audit

PGW and the parties agreed that it would be appropriate to conduct annual audits of the WNA. Accordingly, it was agreed that PGW's internal audit department will annually audit the WNA by selecting a sample from invoices issued during the month in which the highest total monthly surcharge or credit was applied to customers' invoices. The surcharge or credit for the selected invoices will be recalculated. All procedures will be documented and all data will be saved for a period of six months after the completion of the audit. The results of the annual audit will be provided to the Parties. The Parties will have the right to address any negative audit findings in the appropriate forum(s).

C. Change in Ownership of PGW

OTS wanted to address the question of the continuation of the clause in the event that PGW was sold to or transferred into an investor owned utility. Accordingly, it was agreed that if PGW is purchased by, or otherwise transferred to an investor owned utility or should become an investor owned utility, PGW agrees that such successor entity may no longer utilize the WNA Clause unless the Commission upon petition by the purchasing IOU in the transfer

application proceeding or otherwise authorizes the establishment of a WNA for the successor entity.

V. PGW CONCLUSIONS REGARDING THE WNA

While PGW continues to struggle under the weight of a variety of systemic (i.e. historically high natural gas prices) and idiosyncratic (high uncollectibles and low but improving cash receipts percentages) PGW's financial health would be far worse without the WNA Clause. There is no question that it can and must continue. PGW intends to continue the clause to obtain the needed benefits for the Company, its employees and, most importantly, its customers.

CERTIFICATE OF SERVICE

I hereby certify that I have this day served a true copy of the foregoing document upon the participants listed below in accordance with the requirements of § 1.54 (relating to service by a participant).

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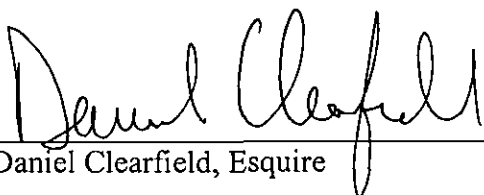
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Dated: May 4, 2006



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May 24, 2006

HAND DELIVERED

James J. McNulty, Secretary
Pennsylvania Public Utility Commission
Commonwealth Keystone Building
P. O. Box 3265
Harrisburg, PA 17105-3265

**Re: Pennsylvania Public Utility Commission v. Philadelphia Gas Works
Docket No. R-00017034**

Dear Secretary McNulty:

I am delivering for filing today the original plus three copies of the Answer of the Office of Small Business Advocate to Philadelphia Gas Works' Proposed Stipulation filed on May 4, 2006.

As evidenced by the enclosed Certificate of Service, two copies have been served on all parties in this proceeding.

Sincerely,

Steven C. Gray
Assistant Small Business Advocate
Attorney ID No. 77538

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Enclosures

cc: Parties of Record

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2006 MAY 24 PM 5:02
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BEFORE THE
PENNSYLVANIA PUBLIC UTILITY COMMISSION

PENNSYLVANIA PUBLIC UTILITY
COMMISSION

v.

PHILADELPHIA GAS WORKS

DOCKET NO. R-00017034

SECRETARY'S BUREAU

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CERTIFICATE OF SERVICE

I certify that I am serving two copies of the Answer to Philadelphia Gas Works' Proposed Stipulation, on behalf of the Office of Small Business Advocate, by e-mail and first class mail (unless otherwise noted) upon the persons addressed below:

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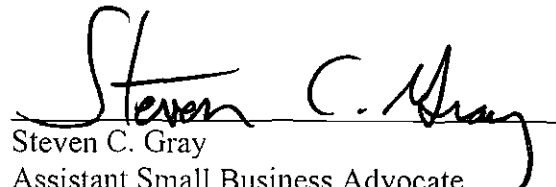
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Date: May 24, 2006

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PA. PUBLIC
UTILITY COMMISSION
SECRETARY'S BUREAU

BEFORE THE
PENNSYLVANIA PUBLIC UTILITY COMMISSION

ORIGINAL

PENNSYLVANIA PUBLIC UTILITY
COMMISSION

v.

DOCKET NO. R-00017034

PHILADELPHIA GAS WORKS

**OFFICE OF SMALL BUSINESS ADVOCATE'S
ANSWER TO PHILADELPHIA GAS WORKS'
PROPOSED STIPULATION**

SECRETARY'S OFFICE

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On May 2, 2006, Philadelphia Gas Works ("PGW" or the "Company") filed a Stipulation with the Pennsylvania Public Utility Commission ("Commission") that addresses the Company's weather normalization adjustment ("WNA") clause placed into operation as a "three-year pilot" by the Commission. See Docket No. R-00017034 (Order entered August 8, 2002), at Ordering Paragraph 5(c). The Stipulation proposes to place the WNA clause into permanent operation.

The Office of Small Business Advocate ("OSBA") submits this Answer in response to the Stipulation.

Responses to the Stipulation's Numbered Paragraphs

1. The averments of Paragraph 1 contain summaries of the Company's request for relief to which no response is required. By way of further response, the WNA clause went into effect on December 1, 2002. See *Stipulation*, at page 1. Consequently, the "three-year pilot" ended on November 30, 2005. The operation of the WNA clause should have terminated at that time. See also, *Statement in Support of the Office of Consumer Advocate*, Docket No. R-00017034 (Dated June 26, 2002), at page 3 ("The

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WNA is limited to a three year pilot period, at which time the Company will conduct a review of the costs and benefits of the WNA.”) Instead, the WNA clause continued to operate throughout the winter 2005-2006 season.¹

2. The averments of Paragraph 2 contain summaries of the Company’s request for relief to which no response is required. By way of further response, the OSBA respectfully requests that the Commission order PGW to provide the OSBA with a copy of the annual WNA audit, and grant the OSBA the opportunity to “address any negative audit findings in the appropriate forum(s).”

3. The averments of Paragraph 3 contain summaries of the Company’s request for relief to which no response is required.

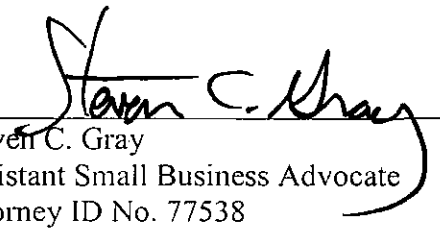
4a. The averments of Paragraph 4a contain summaries of the Company’s request for relief to which no response is required. By way of further response, the OSBA agrees that the Commission should review the Company’s *Report on Weather Normalization Adjustment Clause* once the Company has updated that *Report* for the winter 2005-2006 season. Specifically, the OSBA observes that Section II of the *Report* documents that the WNA clause has credited PGW’s customers two out of the three years of the WNA clause’s operation, and “since its inception, the [WNA] has actually resulted in a net credit to customers.” *Report*, at 6. If that trend continued in the winter 2005-2006 season, the OSBA is concerned that the WNA clause may not be properly designed for PGW’s purposes.

¹ The OSBA has not received any analysis of the operation of the WNA clause for the winter of 2005-2006 season from the Company. That analysis should be similar to what is set forth in Section II (entitled “Performance of the Clause”) of the Company’s *Report on Weather Normalization Adjustment Clause* that is attached to the Stipulation.

4b. The averments of Paragraph 4b contain summaries of the Company's request for relief to which no response is required. By way of further response, the OSBA respectfully submits that placing the WNA into permanent operation is not reasonable at this time. Instead, the OSBA recommends that the WNA clause be continued for an additional three-year trial period (which includes the winter 2005-2006 season), be subject to a full review by all interested parties at the conclusion of that additional three-year trial period, and be terminated at the end of that additional period unless there is a Commission Order continuing the operation of the WNA clause beyond the conclusion of the six-year trial period.

5. The averments of Paragraph 5 contain summaries of the Company's request for relief to which no response is required. By way of further response, the OSBA recommends that the WNA clause be continued for an additional three-year trial period (which includes the winter 2005-2006 season), be subject to a full review by all interested parties at the conclusion of that additional three-year trial period, and be terminated at the end of that additional period unless there is a Commission Order continuing the operation of the WNA clause beyond the conclusion of the six-year trial period. However, because the WNA clause should have ceased operation on November 30, 2005 (as required by the Commission's Order at Docket No. R-00017034), the OSBA respectfully requests that the Commission enter an Order granting a three-year extension for the operation of the WNA clause through the winter 2007-2008, at which time the WNA should be subject to a full review and further Commission Order.

Respectfully submitted,



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Date: May 24, 2006

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June 6, 2006

VIA FEDERAL EXPRESS

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JUN 06 2006

PA PUBLIC UTILITY COMMISSION
SECRETARY'S BUREAU

Re: PA PUC v. Philadelphia Gas Works,
Docket No. R-00017034

Dear Secretary McNulty:

On behalf of Philadelphia Gas Works, enclosed for filing please find an original and three copies of its Response to the Office of Small Business Advocate's Answer to the Joint Stipulation with regard to the above-referenced matter. A copy has been served in accordance with the attached Certificate of Service.

Very truly yours,

Daniel Clearfield
Daniel Clearfield

For WOLF, BLOCK, SCHORR and SOLIS-COHEN LLP

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Enclosure

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51

CERTIFICATE OF SERVICE

I hereby certify that I have this day served a true copy of the foregoing document upon the participants listed below in accordance with the requirements of § 1.54 (relating to service by a participant).

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Dated: June 6, 2006



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PENNSYLVANIA PUBLIC UTILITY COMMISSION

JUN 06 2006

PENNSYLVANIA PUBLIC UTILITY
COMMISSION

PA PUBLIC UTILITY COMMISSION
SECRETARY'S BUREAU

v.

Docket No. R-00017034

PHILADELPHIA GAS WORKS

**PHILADELPHIA GAS WORKS' RESPONSE TO OFFICE OF SMALL
BUSINESS ADVOCATE'S ANSWER TO PHILADELPHIA GAS WORKS'
JOINT STIPULATION**

Philadelphia Gas Works ("PGW") hereby provides this response to the document filed by the Office of Small Business Advocate ("OSBA") which it characterized as an "Answer to Philadelphia Gas Works' Proposed Stipulation." While OSBA presents its position on the Joint Stipulation filed by Office of Trial Staff ("OTS"), the Office of Consumer Advocate ("OCA"), and PGW regarding the continuation of PGW's WNA tariff, it also makes several factual statements which require correction or clarification.

The joint stipulation was filed in accordance with the requirements of the settlement of the Company's 2002 rate case in which the parties agreed to permit the WNA to be placed into effect, but to study it after three years and make a determination whether it should continue or be modified, in whole or in part. Based upon a report prepared by PGW, with the input from the public parties, the Joint Stipulation endorsed the Clause and agreed that the WNA should continue as it is structured today, as a permanent part of PGW's rate structure.

While the OSBA joins with the other parties in agreeing that the PGW WNA clause should continue, it, unnecessarily and unreasonably, suggests that the clause should only be approved for an additional three years after which it should terminate unless the Commission issues an order to the contrary before that. As the clause is universally viewed as beneficial to PGW and its customers, and its termination would have profoundly negative consequences for

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PGW's financial circumstances, OSBA's suggestions should be rejected and, as the Joint Stipulation requests, the Commission should acknowledge that the WNA will continue in place, just as its present tariff states.

1. Preliminarily, the OSBA's document characterizes the joint filing as "PGW's proposed stipulation;" this is wrong on two counts. First, the document was filed jointly by PGW, OCA and OTS; it is not "PGW's" Stipulation. Second, the stipulation is not "proposed;" the Stipulation reflects the position of the majority of the public parties that the WNA should continue because it is good for the Company and fair to the customers.

2. OSBA requests that the report prepared by PGW detailing the Company's experience with the clause be updated to include results for the 2005-06 winter season. Attached (Attachment "A") is an Updated WNA Report which includes this information. This version is modified only to add the 2005-06 results and to remove any general characterizations of the actual WNA experience which were based on pre-2005-06 data.

3. Most importantly, OSBA incorrectly states that the original, 2002 rate Settlement had agreed that the WNA would be in place for three years and then terminated.¹ In addition, OSBA stated that "the WNA clause should have ceased operation on November 30, 2005 (as required by the Commission's Order at Docket No. R-00017034)."² These statements are completely untrue. The 2002 rate case Settlement states only that the clause would be in place for an initial three year pilot period, after which PGW was required to conduct a review of the clause and prepare a report which would inform a decision as to whether the clause should continue or be terminated (the relevant portions of the Settlement Agreement are attached as

¹ OSBA "Answer" at 1.

² OSBA "Answer" at 3.

Attachment "B"). The actual language from the Commission's order approving the settlement restates the settlement term:

the WNA will have a three-year pilot period. At the conclusion of the three year period, the Company will conduct a review of the costs and benefits of the WNA. A determination will be made at the end of the review as to whether the WNA will continue, continue with modifications, or be eliminated.³

4. As can be plainly observed, there is nothing in the Settlement or the Commission's Order approving the Settlement, which states that the WNA is to "terminate" after the three-year pilot period. Such a suggestion is not only inconsistent with the plain language in the Settlement but it is also inconsistent with permanent nature of the tariff provision implementing the WNA which was approved by the Commission when the 2002 Settlement was approved. That tariff provision was filed as part of PGW's compliance filing implementing the Settlement and was served upon all parties to the proceeding including OSBA. Neither OSBA nor any other party raised an objection to the tariff provision implementing the WNA, as per the Settlement and the Commission's Order. The tariff language states, in part, as follows:

The Weather Normalization Adjustment shall be applied to each Mcf (1,000 cubic feet) used for heating purposes under Rate Schedules GS, MS, and PHA ("heating" and "heating only" customers), except for Gas usage under the Special Provisions – Air Conditioning of those rates. The Weather Normalization Adjustment will be applied to customer usage during the period of October 1 through May 31 of each year for each billing cycle (except for the 2002-2003 heating season when the Weather Normalization Adjustment will be applied to customer invoices rendered during the period of December 1 through May 31 of each year for each billing cycle).

The full text of the WNA tariff provisions are attached hereto as Attachment "C." This tariff provision is permanent in every respect and does not state that it "terminates" or ends after three

³ *Pa PUC v. PGW*, R-00017034 (August 8, 2002) Ordering ¶ 5(c).

years. This is conclusive proof that the Commission did not order the clause to terminate at the end of the initial "pilot" but only that a review should occur at that time. If the OSBA was *confused about the Settlement language or had a different interpretation than the Company*, the Commission (as evidenced by the PUC's approval of the Company's permanent tariff provision) or all of the other parties, none of which have endorsed the OSBA view, it should have raised it in 2002.

5. Ironically, OSBA's substantive position does not challenge the appropriateness of the WNA (which makes its initial position even harder to understand), but suggests that the WNA be continued as an additional "trial" for another three years and that at the end of that second three year period, the clause should terminate, unless there is a PUC order prior to the end of the second trial which authorizes its continuation.⁴

6. PGW is not opposed to a second review and evaluation of the WNA after three years if the Commission, in its discretion, believes such a review would be prudent, but strongly opposes OSBA's suggestion that the clause should terminate after the 2007-08 winter unless the PUC issues an order continuing it. The WNA has been – and will continue to be – enormously important to PGW in providing a certain amount of financial stability for the Company. Creating a risk that the clause might not continue merely because of inadvertence or administrative error could create unnecessary and harmful uncertainty for PGW and its ratepayers.

7. In PGW's WNA Evaluation Report (attached), PGW documented how the WNA has insulated PGW's financial results from the vagaries of the weather and has had a positive impact on the way in which PGW is viewed by the bond rating agencies.⁵ Clearly, the

⁴ OSBA "Answer" at ¶ 5.

⁵ See, WNA Report at 6-8.

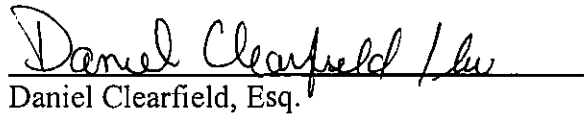
elimination of the WNA would have an extremely negative effect on the Company's bond rating and worsen its already precarious financial condition. Under the circumstances, putting in place a scheme in which the WNA clause would automatically go away unless the Commission took timely action is risky and inadvisable, especially since all parties, including OSBA endorse its continuation.

8. The OSBA does make a passing reference in its Answer to the fact that prior to the 2005-06 season, the WNA had resulted in a net credit to customers, and that "the OSBA is concerned that the WNA clause may not be properly designed for PGW's purposes."⁶ In light of the fact that the updated Report (including the 2005-06 data) shows that, over the last four years, the WNA has resulted in a small charge (\$3.9 million) to customers (which amounts to, on average, less than \$1 million a year), the OSBA should have no further concerns.

⁶ OSBA "Answer" at ¶ 4a.

WHEREFORE, PGW respectfully urges the Commission to reject both OSBA's incorrect factual assertions and its recommendations. PGW also requests that the Commission adopt the Joint Stipulation and indicate its approval of the continuation of the WNA for PGW. If the PUC believes that the WNA clause should be reviewed further, it should order such a review but make clear that the WNA clause will continue unless and until the Commission enters an order terminating or modifying the clause.

Respectfully submitted,



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Dated: June 6, 2006

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Attachment A

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PHILADELPHIA GAS WORKS

REPORT ON WEATHER NORMALIZATION ADJUSTMENT CLAUSE



Prepared in Compliance with
Joint Petition For Settlement
Pa PUC v. PGW, R-00017034

PHILADELPHIA GAS WORKS
800 West Montgomery Avenue
Philadelphia, PA 19122

November 2005

Updated June 2006

Table of Contents

TABLE OF CONTENTS

	Page
I. BACKGROUND	2
II. PERFORMANCE OF CLAUSE	5
III. ASSESSMENT OF CLAUSE PERFORMANCE.....	6
A. Affect on PGW Financial Position	6
B. Effect on Customers.....	8
C. WNA Billing.....	8
IV. WORKSHOPS.....	9
A. WNA Deadband.....	9
B. WNA Audit.....	10
C. Change in Ownership of PGW	10
V. PGW CONCLUSIONS REGARDING THE WNA.....	11

I. BACKGROUND

Traditionally, the base rates of natural gas distribution companies (NGDCs) are established on a "weather normalized" basis, i.e., rates are set to permit the Company to earn at levels determined to be reasonable assuming that sales and revenues are at the levels the utility would experience if the level of experienced "Heating Degree Days" ("HDD") were at "normal" levels. Accordingly, when a year is colder or warmer than some determined "normal" level the NGDC typically earns more or less than the normalized amount, all other things being equal.

One way in which to balance out the effects of "abnormal" weather is by implementing a Weather Normalization Adjustment ("WNA") mechanism. The typical WNA permits the NGDC to true-up its revenues when experienced HDDs in a given period are less than a determined "normal" level. Correspondingly, when experienced HDDs exceed normal levels the utility adjusts its charges to provide a credit to customers. Importantly, the WNA does not result in a utility being able to earn more or realizing an earnings short-fall; it merely permits the utility to recover its authorized level of earnings and, for a cash flow regulated utility, the company's authorized level of liquidity.

As a result of experiencing a number of winters in which abnormal weather caused severe shortfalls in earnings and liquidity, PGW determined that the establishment of a WNA was a crucial requirement if the Company was to return to financial health in the long term.

Accordingly, PGW included a request to establish a WNA clause as part of its 2002 general base rate proceeding. On February 25, 2002, PGW submitted Supplement No. 17 to Tariff Gas - Pa. P.U.C. No. 1 to become effective for service rendered on or after April 26, 2002. This base rate filing sought to increase PGW's base rates by \$60 million and to implement a weather normalization adjustment clause ("WNA"). Prior to completion of the public hearings on the base rate request, the parties were able to reach a Settlement which resolved all issues

pertaining to PGW's base rate filing. As part of that settlement, PGW was permitted to implement its proposed WNA as soon as necessary systems modifications were complete. PGW agreed that the WNA would be put in place after consulting with the settling parties. PGW actually began to implement the adjustment clause as of December 1, 2002. In compliance with its settlement agreement, PGW provided consumer education to its customers to assist them in understanding the workings of the WNA.

The Settlement indicated that the WNA was being put in place for an initial three-year pilot period. At the conclusion of the three year period, the Company agreed to conduct a review of the costs and benefits of the WNA. After that evaluation, a determination was to be made as to whether the WNA will continue, continue with modifications, or be eliminated.

The Settlement was approved by the PUC in an order entered on August 2, 2002.

In presenting its proposal for a WNA, PGW's Craig White explained that the establishment of the Clause would have a number of benefits:

- i. stabilizes cash flow from year-to-year
- ii. can reduce the need for short-term borrowing from year-to-year
- iii. positively affect PGW's credit rating
- iv. reduces the need for costly base rate proceedings¹

Mr. White also pointed out that a WNA-type clause was particularly appropriate for a municipally owned utility, such as PGW:

I believe that PGW's municipal status makes a WNA particularly appropriate. Under the cash flow method of ratemaking, ratepayers provide revenues to cover the entire costs of service -- but only the cost of service. Any revenue shortfalls or windfalls ultimately inure to the ratepayers. The WNA simply minimizes

¹ *Pa PUC v. PGW*, R-00017034, PGW BRP St. 2 at 3.

the degree to which such shortfalls or windfalls occur. For a municipal utility that utilizes a WNA, ratepayers are assigned the same responsibilities or obtain the same benefits that they would without a WNA.²

In response to the Company's presentation, the OTS agreed with the Company's WNA proposal in principle:

I cannot agree with the Company's proposed WNA as filed. ... However, I agree in concept that a WNA clause would be reasonable only because PGW's rates are established using the cash flow method of ratemaking.³

OTS's witness Mr. Metro recommended approval of the WNA clause if several conditions were adopted by the PUC.⁴

OCA witness Thomas Catlin also indicated that a WNA clause would make sense for the PUC to approve for a municipal utility such as PGW:

Generally, a WNA clause would not be appropriate for an investor-owned utility where the costs of capital, especially equity capital, embodies compensation for the very risk that a WNA clause would attenuate. ... PGW is unique among gas distribution companies in Pennsylvania. PGW is the only gas distribution utility in Pennsylvania regulated by the Commission that is a municipal utility. Moreover, PGW operates on a cash basis according to statute, and it has no source of equity financing in the sense of a traditional investor-owned utility. The Company represents that its ability to borrow short-term is largely exhausted and it has virtually no remaining flexibility to address short-term margin losses.⁵

² Id. at 3-4.

³ R-00017034, OTS St. 4 at 10.

⁴ The conditions Mr. Metro recommended were: 1) the WNA be approved for a 3 year "trial" basis; 2) the Company provide tariff language that describes how the individual customer charge and middle of the month monthly bills will be calculated; and 3) the Company will not file for a rate increase until after June 1, 2005. Id. at 10-12.

⁵ R-00017034, OCA St. 3 at 3-4. OCA witness Catlin also recommended several refinements to the Company's proposal, including the filing of periodic reports on the

Accordingly, in evaluating the performance of the clause three years after its initiation PGW has focused on whether the WNA has provided the benefits anticipated and whether PGW's implementation has been otherwise reasonable.

II. PERFORMANCE OF CLAUSE

In the three years in which the WNA clause has been in place, PGW customers have remitted to PGW on net, approximately \$3.9 million.

Philadelphia Gas Works
Weather Normalization Clause

	<u>Fiscal Year</u> <u>2002-03</u>	<u>Fiscal Year</u> <u>2003-04</u>	<u>Fiscal Year</u> <u>2004-05</u>	<u>Fiscal Year</u> <u>2005-06</u>	
SEP	-	\$ 5,837	\$ 1,093	2,492	
OCT	-	(293,666)	(171,486)	657,761	
NOV	-	1,744,403	(85,304)	799,667	
DEC	(3,094,912)	249,694	1,456,550	(1,991,219)	
JAN	183,378	(313,490)	2,349,557	4,778,258	
FEB	(4,952,755)	(4,584,777)	(791,197)	5,695,014	
MAR	(3,636,720)	2,384,882	(3,074,010)	(61,095)	
APR	1,334,999	(111,428)	(9,860)	2,342,224	
MAY	107,459	2,035,759	(462,910)	1,024,782	MAY 2006 = ESTIMATE
JUN	8,492	1,039,386	(568,422)		
JUL	11,133	2,828	(11,583)		
AUG	9,590	(50,881)	2,410		
TOTAL	\$ (10,029,336)	\$ 2,108,547	\$ (1,365,162)	\$ 13,247,883	\$ 3,961,932

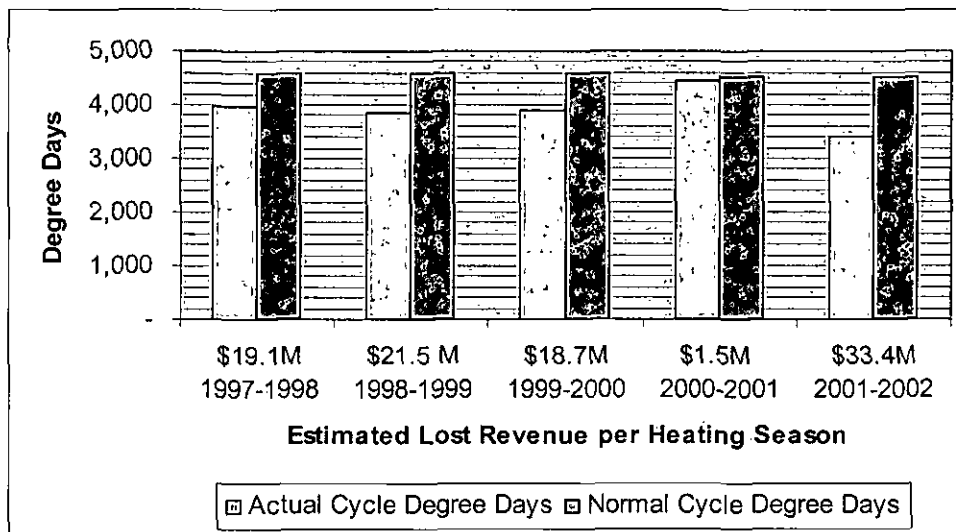
Updated June 2006

clause, the establishment of the clause on a 3 year pilot basis, consumer education on the clause and an evaluation of the appropriateness of the 1% plus or minus deadband after actual experience is obtained.

III. ASSESSMENT OF CLAUSE PERFORMANCE

A. Affect on PGW Financial Position

The WNA has had a very positive effect upon the way in which PGW has been viewed by the financial community. The principal reason for this is that the existence of the WNA has eliminated the effect of weather on earnings and cash flow. Prior to the establishment of PGW's WNA, the Company experienced substantial shortfalls in earnings and cash flow as a result of successive warmer than normal winters. The following chart illustrates PGW's historical experience:



These weather related reductions in earnings and cash flow decimated PGW's already precarious financial position and threatened the Company's ability successfully to issue additional long term debt, the firm's only available source of external capital. In fact, it is estimated that during the five fiscal years ending August 31, 2002, PGW experienced

approximately \$94 million in lost revenue due to higher than normal temperatures. As a result, PGW was downgraded to the lowest investment grade and was required to pay extremely high effective interest rates in order to obtain the long term financing on which it relies to maintain its capital improvement program. It was also forced to obtain a series of base rate increases (including a \$36 million emergency rate increase) in order to "weather" the storm.

With the implementation of the WNA, PGW has not filed any additional base rate cases and, while many other factors have continued to keep the Company in a challenging financial position, the investment community has recognized that PGW's earnings and cash flow are now uniquely insulated from the vagaries of weather. Both Standard & Poor's ("S & P") and Moody's continue to cite the WNA as a positive factor. In fact, both rating agencies have discussed the WNA in some of their most recently issued reports. In May 2005, S & P reiterated that "[a]nother indication of regulatory support involves the PUC's relatively recent approval of a weather normalization adjustment for PGW – the first such allowance to a gas utility in Pennsylvania. The WNA enables PGW to smooth out fluctuations in margin revenue due to abnormal weather in winter months."⁶ Again, on August 30, 2005, in a report in which S & P affirmed PGW's bond rating as the lowest investment grade rating and affirmed a negative outlook, S & P stated: "The current rating assumes that the company will continue to have access to its WNA. Although poor collections exacerbate liquidity problems in colder-than-normal years (as total customer bills increase), the WNA keeps distribution revenues from dropping precipitously in years with warmer-than-normal winters."⁷ Likewise, Moody's has clearly expressed that "[p]rior to the natural gas price spike in 2003 PGW has implemented several

⁶ Standard & Poor's Full Report (May 19, 2005).

⁷ Standard & Poor's Full Report (August 30, 2005).

changes that were to be key to improved financial performance. PGW ... was granted a Weather Normalization Adjustment, to normalize the impact of changes in weather on cash flow.”⁸

Additionally, Fitch Ratings favorably commented on the WNA after its approval. When discussing rating considerations, Fitch reported that the “rating considers management’s continued focus on cost control, steady albeit slow improvement in customer collections, and recent rate modifications that have provided some stability to cash flow...”⁹ The rate modifications were described later in the report as permanent base rate relief of \$70 million, as well as the ability to levy a WNA for warmer than normal years.”¹⁰

B. Effect on Customers

The WNA clause has been well accepted by PGW customers. Since its inception, PGW has had an extremely small number of complaints. The Clause has been calculated without any errors or revisions being necessary.

C. WNA Billing

PGW's WNA formula used to apply the clause works as it was intended. In order to demonstrate this, PGW sampled all rate classes to which the WNA was applied¹¹ for the month of March 2005. March 2005 was selected because it was the month during which the

⁸ Moody’s Report (September 28, 2004).

⁹ Fitch Ratings Report, p. 2 (December 18, 2002).

¹⁰ *Id.*

¹¹ GS, MS and PHA.

largest credit was issued during the 2004-2005 fiscal year. After selecting a sample size¹² from each rate class, the WNA applied to each selected invoice was recalculated and no exceptions were identified. PGW's conclusion is that algorithms and billing systems used to calculate the WNA are accurate and reliable.

IV. WORKSHOPS

PGW held two telephonic workshops with the Office of the Trial Staff (“OTS”), the Office of the Consumer Advocate (“OCA”), the Office of the Small Business Advocate (“OSBA”), and the Philadelphia Industrial and Commercial Users Group (“PICGUG”) (collectively the “Parties”) on August 30 and September 15, 2005 in order to discuss draft forms of this report and exchange information. PGW and the Parties discussed many issues, the more prominent of which follow.

A. WNA Deadband

At least one of the workshop participants asked that PGW provide an analysis of the pros and cons of modifying the existing deadband, currently set at 1%. Based upon total residential heating season sales (10/1 to 5/31) of 36 Bcf, each increase of the deadband by 1% shows a correlating decrease in the total heating season surcharge or credit of \$1.5M. For example, when 36 Bcf is used as baseline residential heating season sales which are then adjusted for 5% warmer or colder weather, the resulting surcharge/credit is \$6,050,000 using a 1% deadband. The increase of the deadband to 2%, 3%, 4% and 5% results in surcharges/credits of \$4,550,000, \$3,030,000, \$1,520,000 and \$0, respectively. The same incremental change of

¹² Three populations (i.e. March 2005 GS, MS and PHA invoices) were sampled based upon a 95% confidence level and a confidence interval of plus or minus 5%.

approximately \$1.5M per 1% occurs even if the temperature variance is less than 5% warmer/colder or greater than 5% warmer/colder.

The rating agencies have clearly indicated that they rely upon the WNA to be a risk mitigating tool, therefore, an increase of the deadband beyond 1% will diminish the effect of the WNA as a risk mitigating tool. After discussing PGW's analysis and the independent analyses prepared by another party, it was agreed that the deadband at 1% should be maintained.

B. WNA Audit

PGW and the parties agreed that it would be appropriate to conduct annual audits of the WNA. Accordingly, it was agreed that PGW's internal audit department will annually audit the WNA by selecting a sample from invoices issued during the month in which the highest total monthly surcharge or credit was applied to customers' invoices. The surcharge or credit for the selected invoices will be recalculated. All procedures will be documented and all data will be saved for a period of six months after the completion of the audit. The results of the annual audit will be provided to the Parties. The Parties will have the right to address any negative audit findings in the appropriate forum(s).

C. Change in Ownership of PGW

OTS wanted to address the question of the continuation of the clause in the event that PGW was sold to or transferred into an investor owned utility. Accordingly, it was agreed that if PGW is purchased by, or otherwise transferred to an investor owned utility or should become an investor owned utility, PGW agrees that such successor entity may no longer utilize the WNA Clause unless the Commission upon petition by the purchasing IOU in the transfer

application proceeding or otherwise authorizes the establishment of a WNA for the successor entity.

V. PGW CONCLUSIONS REGARDING THE WNA

While PGW continues to struggle under the weight of a variety of systemic (i.e. historically high natural gas prices) and idiosyncratic (high uncollectibles and low but improving cash receipts percentages) PGW's financial health would be far worse without the WNA Clause. There is no question that it can and must continue. PGW intends to continue the clause to obtain the needed benefits for the Company, its employees and, most importantly, its customers.

Attachment B

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PA PUBLIC UTILITY COMMISSION
SECRETARY'S BUREAU

BEFORE THE
PENNSYLVANIA PUBLIC UTILITY COMMISSION

PENNSYLVANIA PUBLIC UTILITY
COMMISSION

v.

PHILADELPHIA GAS WORKS

Docket No. R-00017034

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JOINT PETITION FOR SETTLEMENT OF
PHILADELPHIA GAS WORKS'
BASE RATE PROCEEDING

TO ADMINISTRATION LAW JUDGE CYNTHIA WILLIAMS FORDHAM:

I. INTRODUCTION

Philadelphia Gas Works ("PGW"), the Commission's Office of Trial Staff ("OTS"), the Office of Consumer Advocate ("OCA"), the Office of Small Business Advocate ("OSBA"), and the Philadelphia Industrial and Commercial Gas Users Group ("PICGUG") (collectively "the Joint Petitioners"),¹ hereby submit this Joint Petition for Settlement of Philadelphia Gas Works' Base Rate Proceeding as captioned above and respectfully request the following:

1. That Administrative Law Judge ("ALJ") Cynthia Williams Fordham recommend and the Commission approve this Settlement and all of its terms and conditions.²

¹ The Consumers Education and Protective Association ("CEPA"), the Association of Community Organizations for Reform Now ("ACORN"), the Tenants Action Group ("TAG") and Action Alliance of Senior Citizens of Greater Philadelphia ("Action Alliance") (collectively "CEPA, et al."), who have participated jointly in this proceeding, the Service Employees International Union, Local 686, and PECO Energy Company are not participating in this Settlement, but have reviewed the Settlement and have informed the Joint Petitioners that they do not oppose the Settlement. Attached as Appendices "A" and "B," respectively, are letters of non-opposition executed by CEPA, et al, and the Service Employees International Union, Local 686.

² Attached hereto as Appendix "C" are Statements in Support submitted by OTS, OCA and PGW.

1. Base Rates. PGW shall be permitted an increase in rates equal to its existing \$36 million extraordinary rate award placed into effect in accordance with the PUC's Extraordinary Rate Order (entered April 12, 2002) on April 16, 2002.

2. The \$36 million settlement award is the result of a compromise and does not reflect or constitute the recovery of any individual expense claim or revenue assumption contained in PGW's pro forma test year filing.

3. PGW is specifically permitted to request recovery of all of the incremental costs for meter change out, gas leak survey, and safety training in its restructuring proceeding. The Joint Petitioners retain the right to argue that these costs are not incremental or that rates in effect are sufficient to cover these costs. The Joint Petitioners will not argue that these costs were specifically included in the \$36 million awarded pursuant to this Settlement or that these costs are not restructuring costs.

4. Rate Structure. The existing distribution of the extraordinary rate increase approved by the Commission in its April 12, 2002, Order will remain in effect.

5. Weather Normalization Adjustment Clause. In consideration of the agreements in this Settlement, PGW will be permitted to implement its proposed Weather Normalization Adjustment Clause (WNA) as soon as systems modifications are available.

(a) PGW will hold workshops in which all interested parties can participate where PGW will provide detailed information about systems modifications and where implementation procedures and consumer education plans will be developed. The final product of the workshop will be submitted to the Commission for review and approval. Any issues that cannot be resolved in the workshop will be submitted to the Commission for disposition.

Notwithstanding the above, the parties agree that PGW will be permitted to implement the WNA

for the 2002-03 winter heating season if systems modifications are available. Absent completion of the workshop and Commission approval by August 15, 2002, PGW will be permitted to implement the WNA as proposed with an effective date no sooner than October 1, 2002 and no later than December 1, 2002. Any subsequent changes required by the Commission will be implemented as soon as practicable.

(b) PGW will provide all consumer education materials and information and billing formats to the OCA, OTS, OSBA, all other interested parties, and the appropriate Commission staff for review and comment. Materials should be provided no less than two weeks before the Company anticipates that the materials must be in final form.

(c) The WNA will be put in place for an initial three-year pilot period. At the conclusion of the three year period, the Company will conduct a review of the costs and benefits of the WNA. A determination will be made at the end of the review as to whether the WNA will continue, continue with modifications, or be eliminated.

(d) PGW and the interested parties to the workshops will address tariff issues regarding the treatment of customers whose billing cycle falls outside of the October 1 to May 31 time frame as well the base load calculation for new customers.

6. Short Term Debt Paydowns. PGW will project the amount of annual short term debt pay down (commercial paper) that the agreed to revenue requirement will permit, will provide the basis for its projections, and will agree to meet those projections or explain why it cannot in a yearly report to the Joint Petitioners.

7. Withdrawal of Appeals. PGW will limit its appeal of the Commission's October 4, 2001 and December 6, 2001 Orders to the rate structure issue of PGW being required by the Commission to allocate a portion of its rate award to the municipal rate class, MUN/MS.

Attachment C

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WEATHER NORMALIZATION ADJUSTMENT CLAUSEProvision For Adjustment

The Weather Normalization Adjustment shall be applied to each Mcf (1,000 cubic feet) used for heating purposes under Rate Schedules GS, MS, and PHA ("heating" and "heating only" customers), except for Gas usage under the Special Provisions – Air Conditioning of those rates. The Weather Normalization Adjustment will be applied to customer usage during the period of October 1 through May 31 of each year for each billing cycle (except for the 2002-2003 heating season when the Weather Normalization Adjustment will be applied to customer invoices rendered during the period of December 1 through May 31 of each year for each billing cycle).

Computation of Weather Normalization Adjustment

The Weather Normalization Adjustment surcharge or credit shall be computed to the nearest one-hundredth cent (0.01cent) in accordance with the formulas set forth below:

$$HL = TU - (BL * BC)$$

$$WNA = DC * [(HL * \frac{NHDD +/- (NHDD * 1\%)}{AHDD}) - HL]$$

Definitions

TU – Total Usage for the billing cycle. TU measured in Mcf.

BL – base load Mcf per billing day is the number of Mcf per Customer used per day for non-heating purposes based on usage by Customers to which this adjustment applies. It is determined separately for each individual customer and will be revised annually to reflect the non-temperature sensitive usage of Customers to which the adjustment applies reflected in the prior heating season's sales. If an individual customer base load is not available, the base load for the related customer class will be applied.

BC – billing cycle is the actual number of days shown on the bill that the Customer receives for service.

DC – Delivery Charge.

NHDD – normal heating degree days for any given calendar day within a month are based on the thirty year average for the given calendar day based on the thirty year period ended August 31, 2001. The NHDD provided for in the formula are the total number of NHDD for the billing cycle. The degree day data is provided by the National Weather Service and measured at the Philadelphia International Airport.

AHDD – actual experienced heating degree days for the billing cycle. The degree day data is provided by the National Weather Service and measured at the Philadelphia International Airport.

Operation of Weather Normalization Adjustment

The Weather Normalization Adjustment will be applied to a Customer's bill on a cents per Mcf basis when actual heating degree days vary from normal heating degree days during the period for which the Customer is billed. The Weather Normalization Adjustment will be applied to the Customer's space heating consumption except for air conditioning usage billed under the air conditioning rate. The Weather

Normalization Adjustment for a billing cycle will apply only if the actual heating degree days (AHDD) for the billing cycle are lower than 99 percent or higher than 101 percent of the normal heating degree days (NHDD) for the billing cycle and will only apply to the extent that the variation is lower than 99 percent or higher than 101 percent of the normal heating degree days for that billing cycle. A new weather adjustment will be calculated for each billing cycle.

Under the formulas, the Weather Normalization Adjustment surcharge or credit is calculated by:

- 1) Normal HDD are calculated for each day of the fiscal year based upon the thirty year average for the thirty year period ended August 31, 2001.
- 2) At the start of the fiscal year, an average daily base load (non-heating) usage is calculated for each individual customer based upon actual base load usage.
- 3) The average daily base load (non-heating) amount is multiplied by the number of days in the billing cycle.
- 4) The total billing cycle base load amount is subtracted from the actual cycle usage of the customer in order to derive the usage applicable to heating.
- 5) The WNA factor is multiplied times the heating usage in order to derive the normalized heating usage.
 - a) The WNA factor is calculated by first adjusting the Normal HDD (NHDD) for the billing cycle by the deadband percentage (1 %). The deadband percentage is multiplied by the NHDD and then added to NHDD for the billing period when the weather is colder than normal (i.e., AHDD > NHDD) or subtracted from NHDD for the billing period when the weather is warmer than normal (i.e., AHDD < NHDD).
 - b) The adjusted NHDD are then divided by the AHDD.
- 6) The actual heating usage is subtracted from the normalized heating usage and then multiplied by the delivery charge. The result is a surcharge or credit.

Reporting Requirements

The Company will file all Weather Normalization Adjustments with the Commission on an annual basis.

Exhibit DA-3

PGW
Gas Service Tariff
Pa. P.U.C. No. 2

Supplement No. 161

PHILADELPHIA GAS WORKS

GAS SERVICE TARIFF



Issued by: Seth Shapiro
President and CEO

PHILADELPHIA GAS WORKS
800 West Montgomery Avenue
Philadelphia, PA 19122

List of Changes Made by this Tariff Supplement

TABLE OF CONTENTS (PAGE Nos. 6-7)

Updated to reflect revised page numbers for each of the changes listed below on this page

WEATHER NORMALIZATION ADJUSTMENT CLAUSE (PAGE Nos. 149-150)

The Weather Normalization Adjustment is updated to remove the month of May from the applicable period when the adjustment is applied to customer usage.

TABLE OF CONTENTS

	<u>Page Number</u>
List of Changes Made By This Tariff _____	One Hundred Fifty Second ^{First} Revised 2
Description of Territory Served _____	5
Table of Contents _____	One Hundred Fifty First th Revised 6
Definitions _____	Second Revised 10
<u>RULES and REGULATIONS:</u>	
1. The Gas Service Tariff _____	First Revised 15
2. Application and Contract for Gas Service _____	Sixth Revised 17
3. Credit and Deposit _____	Third Revised 21
4. Billing and Payment _____	Second Revised 26
5. Termination and/or Discontinuance of Gas Service _____	Second Revised 30
6. Termination of Service for Safety Reasons and Curtailment of Service/ Service Continuity _____	First Revised 38
7. Inquiry, Review, Dispute, and Appeals Process _____	First Revised 41
8. Customer’s Responsibility for Company’s Property _____	First Revised 44
9. Conditions of Service, Point of Delivery, and Application of Rates _____	Third Revised 47
10. Extensions and Rights-Of-Way _____	First Revised 50
11. Meters: Measurements, Readings, Errors, and Tests _____	First Revised 53
12. Service Charges and Miscellaneous Fees and Provisions _____	Second Revised 57
13. Universal Service And Energy Conservation Programs _____	Second Revised 59
14. Gas Choice Enrollment and Switching _____	First Revised 63
15. Supplier of Last Resort _____	First Revised 63

	<u>Page Number</u>
RATES (Cover Page)_____	66
Gas Cost Rate_____	Ninety Fifth Revised 67
Revenue Reconciliation Adjustment (RAA) Rider_____	70
Senior Citizen Discount_____	First Revised 72
Exit Fee Rider_____	77
Merchant Function & Gas Procurement Charges; Price to Compare_____	Fifty Third Revised 78
Efficiency Cost Recovery Mechanism_____	Sixty Third Revised 80
Universal Services Surcharge_____	Ninety Eighth Revised 81
Other Post Employment Benefit Surcharge_____	Twenty First Revised 82
General Service – Rate GS_____	One Hundred Eleventh Revised 83
Municipal Service – Rate MS_____	One Hundred Eleventh Revised 87
Philadelphia Housing Authority Service – Rate PHA_____	One Hundred Eleventh Revised 90
Daily Balancing Service – Rate DB_____	101
Interruptible Transportation Service – Rate IT_____	111
Gas Transportation Service – Rate GTS – Firm Service_____	First Revised 118
Gas Transportation Service – Rate GTS – Interruptible_____	124
Cogeneration Service – Rate CG_____	Fifth Revised 131
Developmental Natural Gas Vehicle Service – Rate NGVS Firm Service_____	Seventy Ninth Revised 135
Developmental Natural Gas Vehicle Service – Rate NGVS Interruptible Service_____	139
SPECIAL PROVISION – Air Conditioning Rider_____	143
SPECIAL PROVISION – Compressed Natural Gas Rider_____	145
SPECIAL PROVISION – Emergency/Unauthorized Use Gas Rider_____	147
Weather Normalization Adjustment Clause_____	Seventh ^{Sixth} Revised 149
Distribution System Improvement Charge_____	Twenty Fourth Revised 151
Backup Service – Rate BUS_____	First Revised 154
Technology and Economic Development Rider and Micro-Combined Heat and Power Incentives_____	First Revised 155
Negotiated Liquefied Natural Gas Service – Rate LNG-N_____	First Revised 156

WEATHER NORMALIZATION ADJUSTMENT CLAUSE

Provision For Adjustment

The Weather Normalization Adjustment shall be applied to each Mcf (1,000 cubic feet) used for heating purposes under Rate Schedules GS, MS, and PHA (“heating” and “heating only” customers), except for Gas usage under the Special Provisions – Air Conditioning of those rates. The Weather Normalization Adjustment will be applied to customer usage during the period of October 1 through ~~April 30~~ May 31 of each year for each billing cycle ~~(except for the 2021-2022 heating season when the Weather Normalization Adjustment will exclude May 1 through May 31 to the extent that the application would produce a charge to the customer)).~~

(C)

Computation of Weather Normalization Adjustment

The Weather Normalization Adjustment surcharge or credit shall be computed to the nearest one-hundredth cent (0.01cent) in accordance with the formulas set forth below:

$$HL = TU - (BL * BC)$$

$$WNA = DC * [(HL * \frac{NHDD +/- (NHDD * 1\%)}{AHDD}) - HL]$$

Definitions

TU – Total Usage for the billing cycle. TU measured in Mcf.

BL – base load Mcf per billing day is the number of Mcf per Customer used per day for non-heating purposes based on usage by Customers to which this adjustment applies. It is determined separately for each individual customer and will be revised annually to reflect the non-temperature sensitive usage of Customers to which the adjustment applies reflected in the prior heating season’s sales. If an individual customer base load is not available, the base load for the related customer class will be applied.

BC – billing cycle is the actual number of days shown on the bill that the Customer receives for service.

DC – Delivery Charge.

NHDD – normal heating degree days for any given calendar day within a month are based on the normal weather determination applied in the Company’s most recent base rate case, currently twenty years, as approved at Docket No. R-2017-2586783. The NHDD provided for in the formula are the total number of NHDD for the billing cycle. The degree day data is provided by the National Weather Service and measured at the Philadelphia International Airport.

AHDD – actual experienced heating degree days for the billing cycle. The degree day data is provided by the National Weather Service and measured at the Philadelphia International Airport.

Operation of Weather Normalization Adjustment

The Weather Normalization Adjustment will be applied to a Customer’s bill on a cents per Mcf basis when actual heating degree days vary from normal heating degree days during the period for which the Customer is billed. The Weather Normalization Adjustment will be applied to the Customer’s space

(C) - Change

PHILADELPHIA GAS WORKS

heating consumption except for air conditioning usage billed under the air conditioning rate. The Weather Normalization Adjustment for a billing cycle will apply only if the actual heating degree days (AHDD) for the billing cycle are lower than 99 percent or higher than 101 percent of the normal heating degree days (NHDD) for the billing cycle and will only apply to the extent that the variation is lower than 99 percent or higher than 101 percent of the normal heating degree days for that billing cycle. A new weather adjustment will be calculated for each billing cycle.

Under the formulas, the Weather Normalization Adjustment surcharge or credit is calculated by:

- 1) Normal HDD are calculated for each day of the fiscal year based upon the normal weather determination applied in the Company's most recent base rate case, currently twenty years as approved at Docket No. R-2017-2586783.
- 2) At the start of the fiscal year, an average daily base load (non-heating) usage is calculated for each individual customer based upon actual base load usage.
- 3) The average daily base load (non-heating) amount is multiplied by the number of days in the billing cycle.
- 4) The total billing cycle base load amount is subtracted from the actual cycle usage of the customer in order to derive the usage applicable to heating.
- 5) The WNA factor is multiplied times the heating usage in order to derive the normalized heating usage.
 - a) The WNA factor is calculated by first adjusting the Normal HDD (NHDD) for the billing cycle by the deadband percentage (1 %). The deadband percentage is multiplied by the NHDD and then added to NHDD for the billing period when the weather is colder than normal (i.e., AHDD > NHDD) or subtracted from NHDD for the billing period when the weather is warmer than normal (i.e., AHDD < NHDD).
 - b) The adjusted NHDD are then divided by the AHDD.
- 6) The actual heating usage is subtracted from the normalized heating usage and then multiplied by the delivery charge. The result is a surcharge or credit.


Reporting Requirements

The Company will file all Weather Normalization Adjustments with the Commission on an annual basis. On or about January 10 of each year beginning in 2018, the Company shall submit an annual report for the most recent fiscal year ending August 31 detailing the actual charges or credits that resulted from the application of this clause and the actual number of heating degree days (HDDs).

VERIFICATION

I, Denise Adamucci, hereby state that: (1) I am the Senior Vice President for Customer & Regulatory Affairs for Philadelphia Gas Works (“PGW”); (2) the facts set forth in my testimony are true and correct (or are true and correct to the best of my knowledge, information and belief); and (3) 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 18 Pa. C.S. § 4904 (relating to unsworn falsification to authorities).

Date: April 3, 2023



Denise Adamucci
Senior Vice President for Customer & Regulatory Affairs
Philadelphia Gas Works

BEFORE THE
PENNSYLVANIA PUBLIC UTILITY COMMISSION

SUPPLEMENTAL DIRECT TESTIMONY OF

RONALD J. AMEN

ON BEHALF OF
PHILADELPHIA GAS WORKS

Docket No. R-2023-3037933

Philadelphia Gas Works

General Rate Increase Request

TOPICS:

Weather Normalization Adjustment

April 3, 2023

TABLE OF CONTENTS

I. INTRODUCTION.....1
II. STATEMENT OF QUALIFICATIONS.....1
III. PURPOSE OF TESTIMONY2
IV. PROJECT BACKGROUND.....3
V. ANALYSIS.....5
VI. SUMMARY OF RECOMMENDATIONS12

TABLE OF EXHIBITS

RJA-1	Professional Background and Experience
RJA-2	Philadelphia Gas Works: Weather Normalization Adjustment Review

I. INTRODUCTION

1 **Q. Please state your name and business address.**

2 A. My name is Ronald J. Amen and my business address is 10 Hospital Center
3 Commons, Suite 400, Hilton Head Island, SC 29926.

4 **Q. By whom are you employed and in what capacity?**

5 A. I am employed by Atrium Economics, LLC (“Atrium”) as a Managing Partner.

6 **Q. On whose behalf are you testifying?**

7 A. I am testifying on behalf of Philadelphia Gas Works (“PGW” or the “Company”).

II. STATEMENT OF QUALIFICATIONS

8 **Q. What has been the nature of your work in the energy utility consulting field?**

9 A. I have over 40 years of experience in the utility industry, the last 25 years of which
10 have been in the field of utility management and economic consulting. I have
11 advised and assisted utility management, industry trade organizations, and large
12 energy users in matters pertaining to regulatory policy, strategy, and analysis; cost
13 of service studies (embedded and marginal cost analyses); rate design and pricing
14 issues including time-of-use rates, revenue decoupling, weather normalization, and
15 other cost tracking and alternative ratemaking mechanisms. I have provided expert
16 testimony in numerous state and provincial regulatory agencies, and the Federal
17 Energy Regulatory Commission.

18 I have advised numerous energy utilities with respect to developing an
19 appropriate Weather Normalization Adjustment (“WNA”) mechanism to correct
20 for the over- and under-collection of revenues due to weather related fluctuations
21 throughout the year on their respective distribution systems. Such over- or under-

1 recoveries can produce erratic financial results for natural gas utilities such as
2 PGW, as their rates are designed on the basis of the expected volume of gas to be
3 sold under normal weather conditions. This means that the utility will recover its
4 annual fixed costs of providing gas distribution service only if the level of sales
5 volumes upon which the rates are predicated is achieved. That sales level is based
6 upon the utility's weather-normalized gas volumes.

7 My experience working with utilities to determine the specific components
8 and operation of an appropriate WNA mechanism for application to temperature
9 sensitive rate classes has provided me with the tools to conduct a review and audit
10 of the operation PGW's WNA, which has informed the basis for the
11 recommendations in Atrium's accompanying report.

12 Further background information summarizing my work experience,
13 presentation of expert testimony, and other industry-related activities is included as
14 Exhibit RJA-1 to my testimony.

15 **Q. Have you previously testified before the Pennsylvania Public Utilities**
16 **Commission?**

17 A. Yes. I filed Direct, Supplemental, and Rebuttal Testimony in Docket No. R-
18 00061365 on behalf of Southern Union – PG Energy Division.

III. PURPOSE OF TESTIMONY

19 **Q. Please summarize your testimony.**

20 A. The purpose of my testimony is to introduce and summarize Atrium Economics'
21 Report, Philadelphia Gas Works: Weather Normalization Adjustment Review,
22 dated April 3, 2023, which is appended as Exhibit RJA-2 to this testimony. I served

1 served as the responsible officer for Atrium on the engagement. First, I will present
2 Atrium’s scope of work on the engagement and will summarize our findings.

3 **Q. Are you sponsoring any exhibits to your direct testimony?**

4 A. Yes. I am sponsoring the following 2 Exhibits, all of which were prepared by me
5 or under my supervision and direction.:

6 Exhibit RJA-1 – Resume of Ronald J. Amen

7 Exhibit RJA-2 – Atrium Economics, Philadelphia Gas Works: Weather

8 Normalization Adjustment Review (April 2023), or the “Report”.

IV. PROJECT BACKGROUND

9 **Q. Please describe the nature of your engagement with PGW.**

10 A. Atrium was engaged by PGW to review the mechanics, input data, billing controls,
11 and weather trends surrounding PGW’s Weather Normalization Adjustment
12 (“WNA”) formula to understand the factors that contributed to the abnormally high
13 WNA charges in June 2022. I am the responsible officer on the engagement.
14 Atrium’s review identified structural factors inherent in PGW’s WNA mechanism
15 that may have contributed to the anomalous WNA amounts billed to customers in
16 June 2022. Atrium’s primary recommendations are summarized below. The full
17 report is attached as Direct Exhibit 2 to this testimony.

18 **Q. Please explain what transpired in June 2022 that led PGW to seek your
19 services.**

20 A. In June 2022, PGW experienced a significant anomaly in the application of its June
21 WNA charge, which produced unusually large and unanticipated charges to
22 customers in several billing cycles with May usage. The unusual charges resulted

1 from actual heating degree days (“HDD”) that were significantly lower than
2 “normal” for the month of May, particularly in billing cycles beginning in the mid
3 to latter part of the billing month. As a result, PGW determined that the June
4 charges should be reversed until it had conducted an internal investigation into the
5 WNA formula. PGW conducted an internal investigation of the matter and
6 produced a report for the Commission’s review. PGW’s internal investigation
7 prompted it to request a 25 percent cap on WNA charges, via Tariff Supplement
8 No. 152, so that no customer would be billed in excess of 25 percent of its total
9 delivery charge excluding the WNA. The Commission suspended the
10 implementation of Supplement No. 152 and called for an investigation to determine
11 the lawfulness, justness, and reasonableness of the rates, rules and regulations
12 proposed in Supplement No. 152, in regard to the proposed cap. In addition to
13 proposing the cap, PGW decided to engage Atrium Economics to perform a review
14 of the mechanics, input data, billing controls, and weather trends surrounding
15 PGW’s WNA formula in order to avoid future WNA billings similar to June 2022.

16 **Q. Please describe Atrium’s scope of work for PGW.**

17 A. Atrium was engaged to perform a formal investigation of PGW’s WNA
18 mechanisms, including the following key tasks:

- 19 • A review of WNA processes, inputs, and controls through interviews with
20 key personnel and data requests.
- 21 • A thorough analysis of the causes of the anomalous charges in June 2022
22 and consideration of whether additional billing controls or alternative inputs
23 could have prevented the unusually high bills.

- 1 • An independent evaluation of whether the WNA, as currently structured,
2 provides appropriate revenue requirement recovery under all circumstances,
3 including a review of the underlying data, structure of the WNA,
4 calculations, and weather trends (with a particular focus on Philadelphia’s
5 weather trends).
- 6 • A review and analysis of the current level of billing controls surrounding
7 the WNA to assess whether controls are sufficient to ensure that
8 inappropriately high bills could not be distributed without detection.
- 9 • A survey of relevant WNA mechanisms, identifying structural differences;
10 and where available, information on billing controls surrounding the WNA.
- 11 • A detailed report including Atrium’s findings and recommendations to
12 PGW.

V. ANALYSIS

13 **Q. Please describe the analysis you performed to determine the cause of the**
14 **anomalous charges in June 2022.**

15 A. First, in order to verify that PGW’s WNA calculations were made in accordance
16 with its Tariff and that calculation errors did not contribute to the abnormally high
17 bills in June 2022, Atrium evaluated PGW’s calculations by recalculating a broad
18 selection of 2022 WNA charges and compared its calculations to those by PGW.
19 Atrium began with four years of monthly billing data from PGW, by customer, for
20 all bills sent during the month. From these data sets, Atrium removed all non-
21 heating rate classes, all fictitious accounts (premises that are currently under the
22 control of PGW, where there is no customer), all non-WNA eligible rate classes,

1 all bills for which the number of cycle days were less than 25 or greater than 35,
2 and all bills where the start date was more than two months prior to the first day of
3 the billing month. Atrium recalculated the WNA charges for residential,
4 commercial, and industrial customers, noting that in most instances, calculation
5 differences within \pm \$1 dollar.

6 **Q. What were the cause of the calculation differences?**

7 A. This is still being explored by Atrium with PGW. To date, Atrium has identified
8 that some differences were due to the migration of customers to PGW's "Choice"
9 shopping program, where those customers received a new service agreement when
10 switching. The base loads were transferred in PGW's billing data set from the old
11 Service Agreement ("SA") to the new SA., but Atrium did not have access to the
12 new SAs and base loads. Atrium has also identified a number of differences that
13 were caused by back billings for a given customer that were initially screened out
14 of the testing sample. So far, PGW has been able to produce support for its
15 calculations and all differences to date were of the type of differences noted above.
16 However, Atrium is continuing to pursue an understanding of the remaining
17 differences with PGW.

18 **Q. Were there other observations as a result of this substantive testing of**
19 **PGW's WNA Calculations?**

20 A. Yes. It is PGW's practice to calculate base load from the average use per day for
21 the preceding July and August for each customer, and relies on the class default
22 base load when data for either July or August (or both months) are missing for the
23 customer. Atrium notes for the June 2022 billing month, approximately 24%

1 (5,502/23,388) of the residential WNA charges over \$100 utilized the default class
2 base load calculation; 9% (174/2045) of the commercial customers with WNA
3 charges over \$100 utilized the default class base load calculation; and 2% (1/61) of
4 industrial customers with charges over \$100 utilized the default base load
5 calculation. Given the significantly warmer than normal weather included in the
6 June billings, Atrium's analysis suggests that the use of average class default base
7 loads may have been a contributing factor to the high bills in June 2022 for some
8 customers. Further it is possible that July and August usage may not accurately
9 reflect the base load usage for a number of reasons (vacation, customer relocation,
10 etc.). Inaccuracies in the calculation of base load, will directly impact estimates of
11 heat load and could cause the WNA formula to produce incorrect results,
12 particularly when weather is significantly warmer than normal and the ratio
13 between NHDD and AHDD is high.

14 **Q. Did you analyze the sensitivity of PGW's WNA formula to its inputs?**

15 A. Yes. To better understand the sensitivity of PGW's WNA mechanism to its various
16 inputs and to help identify potential drivers for the abnormally high June 2022
17 bills, Atrium performed a sensitivity analysis on PGW's WNA. Atrium analyzed
18 the sensitivity of the WNA formula's inputs by independently
19 increasing/decreasing each input by 30% relative to an average for the input,
20 holding the other inputs constant. The analysis was based on January 2022
21 AHDD, NHDD, average usage, average base load, average distribution rate and
22 average number of days in the billing cycle. Holding each input constant in the
23 equation, Atrium increased/decreased the targeted input by 30%. For each

1 scenario (i.e., Average, + 30%, -30%), Atrium calculated the WNA charge and
2 recorded the positive or negative difference in the WNA result from the status quo
3 (or average).

4 **Q. What information did you derive from this sensitivity analysis?**

5 A. As expected, Atrium learned that the WNA formula as currently structured, is
6 highly sensitive to normal and actual HDDs. A 30% shift in Rate, Heating Load
7 (“HL”), Base Load (“BL”), or Total Usage (“TU”) has much less impact on the
8 WNA result than does a 30 percent shift in AHDD or NHDD. This helped us to
9 understand the drivers that will make the greatest impact on PGW’s WNA
10 calculation result and provides some information as to which factors would most
11 likely have been the greatest contributors to the abnormally high bills in June
12 2022.

13 **Q. Did you perform stress tests on PGW’s WNA formula?**

14 A. Yes. In order to observe the performance of the WNA formula under a range of
15 conditions, and to identify the conditions that are required to produce abnormally
16 high bills, such as occurred in June 2022, Atrium stress tested the PGW WNA
17 formula. Specifically, Atrium analyzed performance of the WNA mechanism for
18 January and June 2022 billing months for the residential class under various
19 weather scenarios ranging from 100% increase in AHDD over normal to 100%
20 decrease in AHDD from normal, i.e., the lowest possible HDD that can be used as
21 a factor in the formula or (1 HDD). To provide a base line from which to measure
22 PGW’s WNA formula, Atrium used linear regression to estimate the
23 responsiveness of heat load to AHDD, and compared the performance of PGW’s

1 WNA under the stress test range to what would be predicted by linear regression
2 under the same range. Atrium also reviewed and incorporated the WNA
3 mechanisms of PGW's peers in the mid-Atlantic and New England region under
4 the same assumptions. Atrium reviewed three separate scenarios: 1) when heat
5 load used in PGW's WNA formula exactly corresponds to what Atrium's
6 regression would predict; 2) when heat load is less responsive to HDD than
7 regression would predict; and 3) when heat load is held constant regardless of
8 HDD, such that heat load would be overstated when temperatures are warmer
9 than normal and would be understated when temperatures were colder than
10 normal.

11 **Q. Please describe the regression analysis you performed to develop the baseline**
12 **for the stress tests.**

13 A. Atrium's regression analysis measured the relationship between customer heat
14 load (as calculated by PGW, i.e., total consumption – base load) and HDD across
15 all residential customers for the given month e.g., all residential customers that
16 met Atrium's screening criteria for the months of January and June, where HDD
17 was the independent variable and heat load was the dependent variable. The
18 regressions were set at zero intercept, as theoretically the base load, already
19 incorporated into the derivation of heat load, should be equivalent to the y-
20 intercept in a regression equation. Putting aside any customer behavioral
21 differences depending on the season, heat load should be entirely responsive to
22 changes in HDD.

1 **Q. What did you learn from the stress test analyses?**

2 A. First, Atrium learned that WNA formulas based on an NHDD/AHDD ratio and
3 those based on a heat coefficient applied to the delta between normal and actual
4 HDDs performed the same when weather and consumption are in line with the
5 historic linear relationship, e.g., when heat load falls on the regression line for
6 sensitivity of heat load to HDD. However, when heat load does not fall on the
7 regression line WNA methodologies using a heat coefficient will diverge from
8 those using an NHDD/AHDD ratio. When heat load is abnormally large in relation
9 to what the historical linear relationship would predict, due either to the incorrect
10 derivation of HL or BL, or due to unexplained customer usage above their BL, the
11 NHDD/AHDD factor in the formula will overestimate the impact of HDD when
12 NHDD is significantly above AHDD (warmer than normal), and when heat load is
13 unusually small the NHDD/AHDD factor will underestimate the impact of HDD
14 when temperatures are colder than normal. However, the impact is much more
15 dramatic when weather is warmer than normal given the multiplier effect of the
16 ratio once weather becomes more than 50% warmer than normal.

17 **Q. Did you analyze weather trends in Philadelphia?**

18 A. Yes. Atrium reviewed weather trends by month for the period 2003-2022 to assess
19 to what degree those months experienced significant deviations from normal. We
20 also reviewed monthly weather for major Pennsylvania cities, based on the 20-
21 year average from 2003-2022. Lastly, we reviewed Philadelphia's HDD trends
22 over the last 20 years; and how various derivations of normal weather (20-year,
23 15-year, and 10-year) compared to 2022 actual Philadelphia HDDs.

1 **Q. What did you observe from the weather analyses?**

2 A. Atrium observed that weather in the shoulder months (April, May, and October),
3 and May in particular, tend to be more dispersed than during the winter months,
4 leading to greater deviations from normal weather. The winter months were more
5 tightly clustered around normal weather leading to lesser deviations from normal
6 weather. We also observed that Philadelphia is the warmest of the major
7 Pennsylvania cities. On average, over the previous 20 years, the months of May,
8 June, July, August, and September have little to no HDD; and that Philadelphia
9 HDDs have experienced a pronounced downward trajectory over the past twenty
10 years.

11 **Q. Did you review PGW's billing controls and forecasting processes?**

12 A. Yes. Atrium summarized PGW's billing controls and chronicled its forecasting
13 processes in Section 4, of the Report. Atrium has proposed additional controls for
14 PGW's consideration. Those controls are listed below in the Summary of
15 Recommendations.

16 **Q. Did Atrium perform a best practices analysis of WNA mechanisms in the U.S.?**

17 A. Yes. Atrium performed a high-level survey of WNA mechanisms across the U.S.
18 and conducted in-depth research on WNA mechanisms for 17 gas utilities located
19 across the mid-Atlantic region where WNA's are prevalent. The survey captured
20 which months were included in the WNA rate period, derivations of normal
21 weather, WNA formula and structure, and whether the WNA employed a deadband.
22 That survey is summarized in Section 5 of the Report, and the supporting detail is
23 included in Appendix A.

1 **Q. What were the primary observations from the in-depth WNA research for the**
2 **mid-Atlantic gas utilities?**

3 A. Atrium made the following overall observations related to this survey:

- 4 • 15 of the 17 gas utilities in the mid-Atlantic region limit the WNA rate
5 period to heating season months ranging between 5-8 months, 2 utilities in
6 VA have a year-round WNA rate period.
- 7 • Most Gas Utilities utilize a 30-Year Average for normal heating degrees
8 days, whereas utilities in PA utilize a 20- or 15-year average.
- 9 • Utilities across NY, NJ, and VA apply a coefficient x variance between
10 AHDD and NHDD to their WNA formula.
- 11 • A ratio or proportion of NHDD and AHDD is applied in the WNA formula
12 for all Pennsylvania utilities as well as Columbia Gas of Maryland and
13 Liberty Utilities, NH.
- 14 • Dead-bands were only applied in PA Utilities at 1% or 3%, except for
15 National Fuel Gas Distribution which does not include a dead-band.

VI. SUMMARY OF RECOMMENDATIONS

16 **Q. Please summarize your recommendations.**

17 A. The most immediate concern is to prevent dramatically skewed results from the
18 ratio method in the current WNA formula, when extreme warmer than normal
19 weather occurs, as was experienced in May 2022. The likelihood of this
20 phenomenon occurring is much greater in the shoulder months, and May in
21 particular, whereby the variance of AHDDS from NHDDs is exceptionally large.
22 Recommendations 1, 2, 3, and 4 (below) serve as reasonable alternatives to each

1 other. Any one of the first four recommendations would prevent the anomalous
2 charges that occurred in June 2022 billings from reoccurring. Furthermore,
3 Recommendations 5 and 6, though considered improvements to the current WNA
4 processes, are offered for PGW's consideration and are not necessary for the
5 reasonable operation of the WNA formula. Atrium has not examined the cost and
6 time required to implement its recommendations, or the financial impact on PGW.

7 **Recommendation 1:** May weather is highly unpredictable and could deviate
8 significantly from normal, though NHDD for May are relatively low compared to
9 other months in the WNA period. As Atrium's analyses show, the only occurrences
10 where actual monthly HDDs deviated from normal by greater than 60%, occurred
11 in May over the last two decades. Though Atrium believes the billing control it
12 proposes in Recommendation 2, or the structural changes proposed in
13 Recommendations 3 and 4 would address the structural factors of PGW's WNA
14 formula when weather is significantly warmer than normal such that the anomalous
15 charges that occurred in June 2022 could not be repeated, the removal of May from
16 the weather normalization period would also provide an immediate and simplistic
17 solution to avoid the potential for extreme warmer than normal weather conditions
18 such as that which led to the anomalously high bills in June 2022.

19 **Recommendation 2:** As a guard against the re-occurrence of the severe WNA
20 adjustments in the future, Atrium recommends implementing a billing system
21 control that limits the amount of the NHDD/AHDD ratio adjustment in PGW's
22 WNA formula to a multiple factor of 60% warmer than normal, resulting in 2.5x
23 adjustment to HL in the formula. An alternative billing system control could use

1 the class average heating coefficient at +/- 1 standard deviation as the limit to the
2 HL adjustment, as determined from the Company's weather normalized billing
3 determinant process. Per Atrium's analysis, over the past two years, the 2.5x ratio
4 cap would only have been triggered in one month for usage in May 2022.

5 **Recommendation 3:** A closer tie between the WNA structure and the forecast
6 methodology for setting rates would be desirable to better align the revenue
7 recovered through the WNA with that contemplated in rates. PGW derives a heat
8 coefficient per Mcf, by dividing the class average heat load by HDD as part of its
9 normal forecasting process. PGW could move to this methodology for its WNA
10 formula, by making adjustments based on the per-customer class average, i.e.,
11 apply the class heat coefficient to the delta between NHDD and AHDD for the
12 month, and then apply the distribution rate (if this is to be a volumetric charge, the
13 WNA adjustment would be divided by actual units consumed for the month for
14 each customer). This modification may simplify PGW's WNA process and would
15 ensure that any WNA recoveries would be better aligned with PGW's rate-setting
16 methodology as the class heat coefficient are calculated for each rate case. In
17 Atrium's view, moving to a class average heat coefficient for the WNA would fit
18 better with PGW's urban residential customer base that includes long term
19 residents, renters and/or customers moving residences, and would eliminate the
20 need to derive a base load for each customer and the difficulties associated with
21 that when the customer base is often changing. This approach would alleviate the
22 issues noted with the ratio approach and would more closely link methods for
23 developing the Company's normalized billing determinants by customer class used

1 to develop rates, with the WNA mechanism.

2 **Recommendation 4:** Deriving the heat coefficient through linear regression
3 provides a second variation of a heat-coefficient based WNA alternative. Linear
4 regression can be used to derive the base load (through the y-intercept) and the heat
5 coefficient (or slope coefficient that measures the responsiveness of load to HDD),
6 by regressing load over a period of at least 36 months by HDD. This regression
7 could be performed on a class average basis or on a per-customer basis. This would
8 also alleviate the issues noted with the ratio approach and would provide a
9 statistically sound basis for determining a customer's (or customer class's) response
10 to HDD. It also provides greater alignment to PGW's methods for developing the
11 Company's rates than the existing WNA approach. However, this approach may be
12 difficult to implement and would require a more complicated explanation to
13 customers.

14 **Recommendation 5:** Philadelphia weather is trending progressively warmer, and
15 it may be beneficial to PGW to investigate use of a shorter normal averaging period
16 – 15 years, or 10 years – by use of a statistical analysis of degree days, a “root mean
17 squared error” analysis to establish the best estimate of “normal weather. A “root
18 mean squared error,” or “RMSE,” compares the predictive capabilities of the
19 various selected averages. The RMSE is a number representing the degree to which
20 the forecasted values fail to correspond to the actual data. It is a widely used
21 measure to assess the accuracy of point forecasts. While there are other statistical
22 measures used to convey information about a forecast's performance, such as the
23 mean error or mean absolute error, these measures tend to de-emphasize the

1 consistency of the forecasting technique, while the RMSE tends to emphasize this
2 element of the forecast's predictive capabilities.

3 **Recommendation 6:** PGW should consider implementing controls to check the
4 reasonableness of its per-customer base load calculations and to minimize the
5 number of customers that rely on the default base load calculation due to incomplete
6 usage data. In some cases, unusually high heat loads (or unusually small base loads)
7 could have been contributing factors to the anomalously high bills in June 2022.

8 There are a number of approaches that PGW could take to check the reasonableness
9 of its base load calculation. This could be performed by aggregating all of its
10 customer specific base loads for each class and comparing to the actual class base
11 load sendout, adjusting the class default base load such that the aggregated
12 calculated base load agrees to actual sendout. A second alternative control could
13 calculate the standard deviation of the average historic base load calculation (for
14 three to five years) and verify that the current year's calculated base load is within
15 +/- 1 standard deviation from the average base load calculation. Under a third
16 alternative control, PGW could implement a regression-based billing control that
17 would limit the base load calculation to the upper and lower bounds of the
18 confidence interval for the y-intercept of a monthly regression of HDD against total
19 usage for a given customer over a two to five-year period. If PGW were to move to
20 a class average methodology as described in recommendation 3 above, a process
21 control already exists to ensure the reasonableness of the base load at the class level,
22 and the issue of using default base loads in customer specific WNA calculations is
23 resolved. Alternatively, PGW could adopt a two- or three-year average of July and

1 August usage for determining base load, which also may reduce the number of
2 customers that receive default base loads in their WNA calculations.

3 **Q. Does this conclude your direct testimony?**

4 **A. Yes.**

EXHIBIT RJA-1

RESUME OF RONALD J. AMEN

ON BEHALF OF
PHILADELPHIA GAS WORKS

RE: PGW's Weather Normalization Adjustment Mechanism

April 3, 2023



ATRIUM ECONOMICS

CENTERED ON ENERGY

Ronald J. Amen

Managing Partner

Mr. Amen has over 40 years of combined experience in utility management and consulting in the areas of regulatory support, resource planning, organizational development, distribution operations and customer service, marketing, and systems administration.

He has advised gas, electric and water utility clients in the following areas: regulatory policy, strategy and analysis; cost of service studies (embedded and marginal cost analyses); rate design and pricing issues including time-of-use rates, revenue decoupling, weather normalization and other cost tracking mechanisms; resource strategy, planning and financial analysis; and business process design, evaluation and organizational structures. Mr. Amen has provided expert testimony in numerous state and provincial regulatory agencies, and the Federal Energy Regulatory Commission. Prior to establishing Atrium Economics in 2020, Mr. Amen's consulting experience included Director Advisory & Planning at Black & Veatch Management Consulting, LLC, Vice President of Concentric Energy Advisors, Inc. and Director with Navigant Consulting, Inc. His prior utility experience includes leadership of State and Federal Regulatory Affairs at two electric and gas utilities, and management positions in Regulatory Affairs, Information Systems and Distribution Operations.

EDUCATION

University of Nebraska,
Bachelor of Science with
Distinction, Business
Administration, Finance
and Economics

YEARS EXPERIENCE

42

PROFESSIONAL ASSOCIATIONS

American Gas Association
Southern Gas Association

RELEVANT EXPERTISE

Financial Analysis; Litigation
Support; Regulatory Support;
Strategy; Utility Operations

REPRESENTATIVE PROJECT EXPERIENCE

Regulatory Policy, Strategy and Analysis

Western Export Group (2019)

In a Nova Gas Transmission, LTD. (NGTL) Rate Design and Service Application before the Canada Energy Regulator (CER), Mr. Amen led a consulting team supporting the interests of the Western Export Group, a group of nine utility companies located in the Western U.S. and British Columbia who are export shippers on the NGTL system. The case resulted in a settlement with all parties.

Regulatory Commission of Alaska (2019 – 2020)

Part of a multi-functional team that assisted the Regulatory Commission of Alaska (RCA) in its evaluation of the Chugach Electric Association, Inc's acquisition of the Municipal of Anchorage



d/b/a Municipal Light & Power Department. Assisted the RCA with its evaluation of the long-term benefits of the transaction to ML&P and Chugach customers, the implication of terms and assumptions in various agreements, and the careful balance of the fiscal and regulatory implications for the customers of the combined entity.

CPS Energy (2017 – 2018)

Provided an overall review of the client's Strategic Roadmap to prioritize its multi-year regulatory initiatives. (e.g., changes in product and service offerings, restructuring of current rate classes, introduction of new rate structures, rate levels, and tariff provisions). Current pricing processes and platforms assessed to identify recommended enhancements to enable the development and implementation of dynamic pricing concepts. Assisted client with preparation of next rate case (e.g., costing and pricing analyses, load forecasting, internal communications, and stakeholder engagement).

FortisBC Energy, Inc. (2016 – 2018, 2021)

Performed an overall review of the client's Transportation Service Model. Analyzed the client's various midstream transportation and storage capacity resources used in providing balancing of transportation customers' loads. Review included the physical diversity, functionality and flexibility provided by the various capacity resources, and the cost impact caused by transportation customers' imbalance levels. Conducted an industry-wide benchmarking study of current industry-wide best practices, by regulatory jurisdiction, related to transportation balancing tariff provisions. Participated in stakeholder workshops and testified before the BCUC. Retained in 2021 to update quantitative analysis of the operation of the transportation balancing rules for reporting requirements of the BCUC in 2022.

McDowell Rackner & Gibson Law Firm (2015 – 2016)

Provided due diligence services to the law firm in connection with a state utility commission investigation into the law firm client's gas storage and optimization activities. Provided an independent opinion as to the likely outcome of the Commission's ongoing investigation.

Gulfport Energy Corporation (2016)

Provided regulatory analysis and support to Gulfport Energy Corporation in the ANR Pipeline Company Natural Gas Act §4 rate proceeding before the Federal Energy Regulatory Commission (FERC). Analyzed as-filed cost of service and rate design to identify key cost of service, cost allocation, rate design and service related/tariff issues. Developed an integrated cost of service and rate design model to prepare studies on client issues. Prepared best/worst case litigation outcomes, discovery and evaluations of discovery of other parties. Analyzed FERC staff top sheets and settlement offers; and assisted in the preparation of settlement positions.

Confidential Financial / Energy Partners (2015)

Provided regulatory due diligence support for client related to a proposed merger with a multijurisdictional gas/electric company including an evaluation of the regulatory landscape in the various applicable state jurisdictions, recent regulatory decisions, and current regulatory issues.



Confidential International Energy Company (2014)

Provided regulatory due diligence support for client related to a proposed merger with a multijurisdictional gas company including an evaluation of the regulatory landscape in the various applicable state jurisdictions, recent regulatory decisions, and current regulatory issues.

Pacific Gas & Electric Company (2014)

Developed an extensive industrywide benchmarking study to determine the cost allocation and ratemaking treatment utilized by Local Distribution Companies (LDCs) in the United States for recovery of gas transmission costs. Benchmarked cost allocation and rate design utilized by Interstate/Intrastate Pipelines. Benchmarked how Industrial & Electric Generation customers are served with natural gas.

Public Service Company of New Mexico (2009-2010)

Provided case management, revenue requirement, cost of service and rate design support for general rate cases in the utility's two state regulatory jurisdictions. Issue management and policy development included an electric fuel and purchased power cost mechanism, recovery of environmental remediation costs for a coal fired power plant, and the valuation of renewable energy credits related to a wind power facility.

Confidential International Energy Company (2009)

Provided due diligence on behalf of client related to the purchase of a gas/electric utility, including a review of the regulatory and market-related assumptions underlying the client's valuation model, resulting in the validation of the model and identification of key business risks and opportunities.

Resource Planning, Strategy and Financial Analysis

Confidential Multi-Jurisdiction Gas Utility (2021-2022)

Retained by the multi-jurisdiction interstate transmission pipeline and local distribution utility ("client") to assist it in identifying and supporting a natural gas supply solution to satisfy additional deliverability requirements with the goals of minimizing costs, enhancing system resiliency, and introducing renewable fuels into its system. Reviewed the process and analyses that had been conducted to-date (including all underlying assumptions) and provided insight on the best path forward. The goal of the effort was to help prepare client for internal approval of the process and recommended path forward, and ultimately the development and approval of the necessary regulatory filings at the federal, state, and local levels. Atrium evaluated a broad spectrum of regulatory, economic, market-related, and logistical considerations in order to advise the client on the best path forward in utilizing LNG to meet its future deliverability requirements. Specific components of Atrium's analysis included regulatory approvability, rate design and cost recovery risk, site location (including siting LNG in multiple locations in multiple states), ownership structure, and ability to incorporate RNG and hydrogen into Utility's system to decarbonize the pipeline system.



Great Plains Natural Gas (2021-2022)

Retained to review the gas supply procurement practices and objectives of Great Plains, the interstate pipeline, storage and supply contracts, and other information available to Great Plains leading up to and throughout the severe weather event that occurred from February 13-17, 2021, and the actions by Great Plains personnel in response to the weather event, as part of a state-wide investigation by the Minnesota Public Utilities Commission. Expert testimony filed on behalf of Great Plains.

Fortis BC Energy, Inc. (2011, 2021)

Retained to help develop a gas supply incentive mechanism in cooperation with the British Columbia Utilities Commission staff and the company's other stakeholders. Provided an independent analysis of the utility's management of pipeline and storage capacity and supply. Part of this work entailed a review of the major markets in which the utility transacted, reviewing the size of trading activity at the major market hubs and reviewing the price indices for these markets. In 2021, retained to refresh all quantitative analysis of the operation of the GSMIP for reporting requirements of the BCUC in 2022.

Black Hills Colorado Electric Utility (2009)

Engaged as a member of a consultant team that served as the independent evaluator in a competitive solicitation for non-intermittent generation resources. Jointly recommended by the utility client, the staff of the utility commission and the state attorney general, the consulting team acted as an agent of the public utility commission monitoring and overseeing the solicitation, which included reviewing the request for proposals and solicitation process, including provisions of the power purchase agreement, preliminary review (economic and contractual) of bids received from the request for proposals, initial modeling of bids for screening, selection of bidders with whom to conduct negotiations and oversight of the negotiation process, and the ultimate selection of the winning bid. Provided due diligence review of all input data, preliminary and final model output, and output summaries. The team produced biweekly confidential reports to the commission regarding the process and its results.

NW Natural (2007-2008)

Assisted with the development of its long-term Integrated Resource Plan (IRP) for its Oregon and Washington service territories. The IRP included the evaluation of incremental inter- and intra-state pipeline capacity, underground storage, and two proposed LNG plants under development in the region.

Puget Sound Energy (2007)

Engaged to assist the client with the development of a natural gas resource efficiency and direct end-use strategy, an interdepartmental initiative focused on preparing a natural gas resource efficiency plan that optimizes customers' end-use energy consumption while furthering corporate customer, financial, environmental, and social responsibilities.



Puget Sound Energy (2002 – 2003)

Provided resource planning strategy and analysis for the company's Least Cost Plan, including a review of the company's underlying 20-year electric and gas demand forecasts. As a member of a consulting team, served as the client's financial advisor for the acquisition of new electric power supply resources. Conducted a multitrack solicitation process for evaluation of generation assets and purchase power agreements. Provided regulatory support for the acquisition.

Cost Allocation, Pricing Issues and Rate Design

Summit Natural Gas of Maine, Inc. (2022)

Mr. Amen provided revenue requirement, allocated cost of service, class revenue apportionment, rate design, and expert witness support for the utility's gas general rate case before the Maine Public Utilities Commission. The case is currently pending before the Maine PUC.

Black Hills Energy Arkansas (2021-2022)

Mr. Amen provided allocated cost of service, class revenue apportionment, rate design for natural gas infrastructure mechanisms, and expert witness support for the utility's gas general rate case before the Arkansas Public Service Commission. The case resulted in a settlement before the Arkansas PSC.

Until Electric System and Northern Utilities, Inc. (2021)

Mr. Amen provided allocated cost of service, marginal cost of service, class revenue apportionment, rate design, and expert witness support for the utility's separate electric and gas general rate cases before the New Hampshire Public Utilities Commission, including expert witness testimony. The cases resulted in settlements before the NHPUC.

Manitoba Hydro – Centra Gas Manitoba (2021-2022)

Retained to provide an independent review of the cost of service methodologies employed for Centra Gas Manitoba Inc.'s natural gas operations. Atrium prepared a report filed with the Manitoba Public Utility Board documenting and supporting our assessment of Centra's existing COSS methods in conformance with the regulatory requirements of the MPUB. Focusing on the trends of Canadian gas distribution utilities, the COSS method utilized in the current COSS was reviewed against the: (1) cost causative factors identified for each plant and expense element of Centra's total cost of service; and (2) the current range of regulatory practices observed in the North American gas utility market. Centra's 2022 rate application based on the recommendations in our report was approved by the MPUB.

Montana-Dakota Utilities and Great Plains Natural Gas (2020 – 2021, 2022)

Mr. Amen provided cost of service, class revenue apportionment, rate design, and expert witness support for the gas utilities' general rate cases before the Montana Public Service Commission and North Dakota Public Service Commission. Testimony included theoretical principals and practical application of cost allocation, and rate design principles or objectives that have broad acceptance in utility regulatory and policy literature. Supported the Straight Fixed-Variable Rate Design (SFV) in North Dakota with analysis showing low-income residential customers would experience



lower annual bills under the SFV rate design than a volumetric weighted rate design. Provided a presentation at a public input hearing and oral testimony at Commission hearings in both jurisdictions. SFV rate design was approved by the North Dakota PSC. Mr. Amen provided electric cost of service, class revenue apportionment, rate design, and expert witness support in Montana-Dakota's 2022 general rate case before the North Dakota PSC. The case is pending.

Chesapeake Utilities Corporation (2020 – 2021)

Reviewed and evaluated Chesapeake's Swing Service Rider (SSR), which recovers intrastate pipeline capacity costs directly from all transportation customers, and the application of the current cost allocation methodology underlying the service for its Florida gas utilities, Central Florida Gas and Florida Public Utilities. Supported Chesapeake through three primary tasks; (1) Assessment of the factors influencing the current cost allocation method, its impact on various customer groups, and data collection, (2) Assessment of the appropriateness of alternative cost allocation methods and model the application to and impact on the SSR charges, and (3) Provided a report of the evaluation, modelling results and recommendations in a report and conducted a review session with Chesapeake management personnel.

Kansas City, KS Board of Public Utilities (2019 – 2020)

Provided expert witness testimony supporting the basis for a Green Energy Program, its objectives and overall benefits. Provide an assessment of how the program is aligned with best practices in design of Green Energy tariff programs nationally. Testimony also provided an assessment of how the program mitigates potential risks to the Board of Public Utilities and protects against subsidization of other rate classes.

NW Natural (2018 – 2019)

Provided cost of service, class revenue apportionment, rate design, and expert witness support for the gas utility's general rate case before the Washington Utility and Transportation Commission (WUTC), filed in December 2018. Testimony included theoretical principals and practical application of cost allocation, and rate design principles or objectives that have broad acceptance in utility regulatory and policy literature.

Chesapeake Utilities Corporation (2018 – 2019)

Developed a Weather Normalization Adjustment (WNA) mechanism applicable to the monthly billings of Chesapeake's residential and general service customers. Sponsored the WNA mechanism through expert testimony filed with the Delaware Public Service Commission in January 2019. The testimony included a description of the WNA calculations; back-casting performance analyses, with bill impacts; a WNA tariff; and conceptual and evidentiary support for this ratemaking mechanism.

Louisville Gas & Electric Company and Kentucky Utilities Company (2018)

Engaged by LG&E and KU to conduct a study in support of a joint utility and stakeholder collaborative concerning economical deployment of electric bus infrastructure by the transit authorities in the Louisville and Lexington KY areas, as well as possible cost-based rate structures related to charging stations and other infrastructure needed for electric buses.



Summit Utilities – Colorado Natural Gas, Inc. (2018)

Engaged by Summit Utilities to develop and support with expert testimony an appropriate normal weather period for the client’s five Colorado temperature zones, resulting normalized billing determinants, and a Weather Normalization Adjustment (“WNA”) proposal in conjunction with the filing of a general rate case for its Colorado Natural Gas , Inc. subsidiary.

Westar Energy (2018)

Provided cost of service and expert witness support for the electric utility’s general rate case filing before the Kansas Corporation Commission (KCC). The cost of service study determined the cost components for a new Residential Distributed Generation (DG) customer class that provided the basis for recommendations for establishing components of a sound, modern three-part rate design for this new Residential DG (roof-top solar) service, which was approved by the KCC.

Florida Public Utilities (Chesapeake Utilities) (2017 – 2018)

Provided a rate stratification study of the utility’s commercial and industrial customer classes to facilitate the reconfiguration of the classes by size of service facilities, annual volume, and load factor. Reviewed the cost allocation bases and recommended alternatives for recovery of capital investments related to the utility’s Gas Reliability Investment Program (GRIP).

Tacoma Power (2016 – 2018, 2022)

Provided cost of service and rate design support for the electric utility’s general rate case filings, including support for recovery of fixed costs through fixed charges and impacts on low income customers. Provided recommendations as to specifications in the client’s cost of service analysis (COSA) model for deriving Open Access Transmission Tariff rates, using FERC approved standards to guide the evaluation. Conducted an electric utility costing and pricing workshop for the PUB in October 2017; and participated with Tacoma Utilities staff in a comprehensive electric and water Rates and Financial Planning workshop in February 2018. Engagement was extended for the 2019 – 2020 rate filing, which incorporated the Black & Veatch municipal COSA model for costing and ratemaking purposes. Currently providing cost of service and rate design for the 2023 – 2024 rate filing. Future project work involves innovative rate programs.

Tacoma Power (2017)

Engaged to review and assess current rates for 3rd Party Pole Attachments (PA), and more specifically, to determine and recommend if any rate adjustments were needed. Performed several tasks:

- Performed a market survey of rates charged by comparable utilities
- Reviewed current regulations on rate setting and practice for 3rd Party Pole Attachments as set forth by the Federal Communications Commission (FCC) and the State of Washington (WA), and the interpretation of such regulations in court decisions
- Reviewed industry best practices under the FCC, WA, and the American Public Power Association (APPA)
- Collected and reviewed data for cost-based fees including:



- Application Fees
- Non-Compliance Fees
- Reviewed cost data supplied by the City of Tacoma as relates to determining pole costs, and
- Performed modeling of rates under the FCC Model, the APPA model and the State of Washington shared model (50 % FCC Rate/ 50% APPA Rate).

BC Hydro (2016)

Provided research and analysis of the line extension policies of a select group of peer utilities in Canada with similar regulatory regimes as well as U.S. utilities based on their geographic relationship to the client. Conducted interviews with peer utilities to gather comparative information regarding their line extension policies and related internal procedures. Performed a comparative analysis of the various line extension policies from the selected peer group.

Cascade Natural Gas Corporation (2015 – 2019)

Provided cost of service and rate design support for several of the company's general rate case filings in its two state jurisdictions, 3 in Oregon and 2 in Washington. Conducted Long-run Incremental Cost Studies in the Oregon jurisdiction and embedded class allocated cost of service studies in the Washington jurisdiction. Performed benchmark analyses to compare each of the client's administrative and general (A&G) and operations and management (O&M) expenses, on a per-customer basis, to various peer groups. Analyses were performed for natural gas utilities and combination utilities with both electric and gas operations. Various iterations of the analyses were prepared to make the peer group of utilities more comparable to the characteristics of the client's utility operations. Represented the client's interests in a Washington generic rulemaking proceeding on the subject of electric and gas cost of service methodologies and minimum filing requirements.

Chesapeake Utilities (2015 – 2016)

For its Delaware jurisdiction, provided cost of service and rate design support in the client's general rate case proceeding, including expert witness testimony in support of the utility's proposed gas revenue decoupling mechanism.

Homer Electric Association / Alaska Electric and Energy Cooperatives (2015)

Represented clients in an ENSTAR gas general rate proceeding. Testimony discussed accepted industry principles of revenue allocation and rate design, including the applicability to and alignment with ENSTAR's revenue allocation and rate design proposals for large power and industrial customers. Provided a critique of certain methodological aspects of ENSTAR's Cost of Service study, proposed revenue allocation, and rate design relating to the various large power and industrial customers.

Arkansas Oklahoma Gas Corporation (2002, 2003, 2004, 2007, 2012, 2013)

Provided cost of service and rate design support for several of the company's general rate case filings in its two state jurisdictions and in support of Section 311 transportation filings (2007,



2010) before the Federal Energy Regulatory Commission. Provided related research, design and expert witness testimony in support of a Revenue Decoupling mechanism in one jurisdiction and a Weather Normalization Adjustment mechanism in the other jurisdiction, along with a significant increase in fixed charges and the introduction of demand charges for the company's largest customer classes. Conducted a pre-filing "decoupling" workshop for the utility commission staff.

Northern Indiana Public Service Company (NiSource) (2009 – 2010, 2013, 2017, 2021)

Conducted class allocated cost of service studies for the client's natural gas (including two other affiliate gas utilities) and electric operations. Work included reconfiguring the Company's commercial and industrial customer classes according to size of load and customer-related facilities. Rate design was modernized to recover a greater portion of fixed costs via fixed monthly customer and demand-based charges, a transition to a "Straight-Fixed Variable" form of rate design. Industry research was provided on alternative rate designs for the electric service, including Time-of-Use rates and Critical Peak Pricing. Served as an expert witness on behalf of the client in five general rate cases before the Indiana Utility Regulatory Commission. The 2021 rate case is currently pending before the IURC.

Southwestern Public Service Company (Xcel) (2012)

Retained to conduct a study to estimate the conservation effect of replacing its existing electric residential rate design with an alternative rate design such as an inverted block rate design. Reviewed inclining block rate structures that have actively been employed in other jurisdictions and also reviewed technical and academic literature to assess the elasticity of electricity demand for residential customers in the southwestern U.S. Analyzed 2009-2011 residential data to determine what sort of conservation effect the company may expect by implementing an inclining block rate structure. Provided an overview of alternative rate structures which may also promote conservation effects, such as seasonal rates, three-part rates and time-of-use (TOU) rates, and considered the competing incentives of promoting conservation and cost recovery, without specific rate mechanisms to address this conflict.

Atlantic Wallboard LP and Flakeboard Company Limited (JD Irving) (2012)

Represented clients in an Enbridge Gas New Brunswick Limited Partnership ("EGNB") general rate proceeding. Testimony responded to the 2012 allocated cost of service study and rate design that was submitted to the New Brunswick Energy and Utilities Board by EGNB. Testimony also provided benchmark information regarding EGNB's distribution pipeline infrastructure in New Brunswick, CA.

Western Massachusetts Electric Company (Northeast Utilities) (2010 – 2011)

Supported utility in its decoupling proposal for the company's general rate case. Work included: 1) research on the financial implications of decoupling; 2) identification of decoupling mechanism details to address company and regulatory requirements and objectives; 3) identification of rate adjustment mechanisms that would work together with the company's proposed decoupling mechanism; and 4) preparing pre-filed testimony and testifying at hearings in support of the company's decoupling and rate adjustment proposals. The proposed rate adjustment mechanisms included an inflation adjustment mechanism based on a statistical analysis, and a capital spending



mechanism to recover the costs associated with capital plant investment targeted to improving service reliability.

Interstate Power & Light (Alliant Energy) (2010 – 2011)

Conducted class allocated cost of service studies for a Midwestern electric utility's Minnesota electric system. Work included reconfiguring the company's customer classes for cost of service purposes to collapse end-use based classes with the classes to which they would be eligible. Cost of service studies were performed on a before-and-after basis for the existing and proposed classes. The cost of service studies included a fixed/variable study for production costs, and a primary/secondary study for poles, transformers and conductors. Performed a TOU analysis to determine the appropriate rate differentials for its peak and off-peak rates. Served as an expert witness on behalf of the client in a general rate case before the Minnesota Public Service Commission.

National Grid (2010)

Conducted class allocated cost of service studies for the client's Massachusetts natural gas operations. This task included combined gas cost of service studies for the consolidation of four gas service territories into two gas utility subsidiaries. During interrogatories, performed four separate allocated cost of service studies for each gas service territory. Work included reconfiguring the company's commercial and industrial customer classes according to size of load and customer-related facilities. Served as an expert witness on behalf of the client in consolidated general rate cases before the Massachusetts Department of Public Utilities.

Puget Sound Energy (2001 – 2002, 2006 – 2007, 2019 – 2020)

In three Washington general rate proceedings, provided cost of service and rate design support, including expert witness testimony in support of the utility's proposed revenue decoupling mechanism. Conducted research on accelerated cost recovery mechanisms for infrastructure replacement, and electric power cost adjustment mechanisms. In the latest general rate case, Mr. Amen sponsored expert testimony on a proposed revenue attrition adjustment to the client's revenue requirement in the 2020 general rate case.

Utility System Operations and Organizational Development

Philadelphia Gas Works (2017, 2020)

Engaged to provide an independent consulting engineer's report to be included as an appendix to the official statement prepared in connection with the issuance of the City of Philadelphia, Pennsylvania Gas Works Revenue Bonds. The evaluation of the PGW system included a discussion of organization, management, and staffing; system service area; supply facilities; distribution facilities; and the utility's Capital Improvement Plan (CIP). Our report also contained: (a) financial feasibility information, including analyses of gas rates and rate methodology; (b) projection of future operation and maintenance expenses; (c) CIP financing plans; (d) projection of revenue requirements as a determinant of future revenues; (e) an assessment of PGW's ability to satisfy the covenants in the General Gas Works Revenue Bond



Ordinance of 1998 authorizing the issuance of the Bonds; and (f) information regarding potential liquefied natural gas (“LNG”) expansion opportunities.

Puget Sound Energy (2013 – 2014)

Engaged to perform a review of its project management and capital spending authorization processes (CSA). The overall project objectives were to educate project management (PM) staff as to the importance and relevance of regulatory prudence standards, evaluate existing PM processes along with newly introduced corporate CSA processes, and propose PM and corporate process and documentation efficiencies. This task was accomplished through 1) a situational assessment and risk review; 2) analysis of project management practices; and 3) development of common documentation for the CSA and PM processes.

Puget Sound Energy (2012 – 2013)

Engaged to perform a review of how the company compares to similarly-situated utilities in the areas of the underlying capitalized costs related to new customer additions (“new business investment”) and the management policies and practices that influence the new business capital investment. Examined the interrelationships of our client’s management policies and practices in the functional areas related to new business investment and developed an understanding of the nature of the costs captured by the new business investment process. Benchmarked those costs relative to peers’ cost factors and management capital expenditure practices and performed targeted peer group interviews on our client’s behalf. The review identified certain trends and/or interrelationships between management policies and practices, as well as other exogenous factors, and the resulting impact on new business investment.

Puget Sound Energy (2011 – 2012)

Engaged to perform a review of its electric transmission planning and project prioritization process. The emphasis of the review was to determine if the process implemented by the client could be expected to meet the regulatory standard of prudence, as adopted by the state regulatory commission. Reviewed the prudence standard adopted by the commission in several recent regulatory proceedings, supplemented by our knowledge of the prudence standard adopted at a national level and in other states. The engagement included two phases: 1) an initial situation assessment of the existing process employed by the client, and 2) a review of the historic implementation of that process by reviewing a sampling of transmission projects. Compiled and provided examples of capital planning documents and procedures, viewed as “best practices,” from other electric utilities and other relevant transmission entities.

Alliant Energy (2011 – 2012)

Provided audit support for one of the company’s gas and electric utilities, Interstate Power & Light, during a management audit ordered by one of its two regulatory jurisdictions. Conducted a pre-audit of distribution operations and resource planning processes to provide the client with potential audit issues. Assisted the client throughout the audit process in responding to information requests, preparing company executives and management personnel for audit interviews, and management of preliminary audit issues and findings by the independent audit firm.



Ameren Illinois Utilities (2009 – 2010)

Performed a number of benchmark analyses to compare each of the client's A&G and O&M expenses, on a per-customer basis, to various peer groups conducted for the client's natural gas and electric operations. Analyses were performed for natural gas, electric and combination utilities with both electric and gas operations. Various iterations of the analyses were prepared to make the peer group of utilities more comparable to the characteristics of the client's utility operations. Served as an expert witness on behalf of the client in a consolidated general rate case proceeding of its three utility subsidiaries before the Illinois Commerce Commission.

EXPERT WITNESS TESTIMONY PRESENTATION

- Alaska Regulatory Commission
- Arkansas Public Service Commission
- British Columbia Utility Commission (Canada)
- Colorado Public Utility Commission
- Connecticut Department of Public Utility Control
- Delaware Public Service Commission
- Illinois Commerce Commission
- Indiana Utility Regulatory Commission
- Kansas Corporation Commission
- Maine Public Utilities Commission
- Manitoba Public Utilities Board (Canada)
- Massachusetts Department of Utilities
- Minnesota Public Utilities Commission
- Missouri Public Service Commission
- Montana Public Service Commission
- New Brunswick Energy and Utilities Board (Canada)
- New Hampshire Public Utilities Commission
- North Dakota Public Service Commission
- Oklahoma Corporation Commission
- Oregon Public Utility Commission
- Pennsylvania Public Utility Commission
- Washington Utilities and Transportation Commission
- Federal Energy Regulatory Commission



SELECTED PUBLICATIONS / PRESENTATIONS

“Enhancing the Profitability of Growth,” American Gas Association, Rate and Regulatory Issues Seminar, April 4 - 7, 2004

“Regulatory Treatment of New Generation Resource Acquisition: Key Aspects of Resource Policy, Procurement and New Resource Acquisition,” Law Seminars International, Managing the Modern Utility Rate Case, February 17 - 18, 2005

“Managing Regulatory Risk – The Risk Associated with Uncertain Regulatory Outcomes,” Western Energy Institute, Spring Energy Management Meeting, May 18 - 20, 2005

“Capital Asset Optimization – An Integrated Approach to Optimizing Utilization and Return on Utility Assets,” Southern Gas Association, July 18 - 20, 2005

“Resource Planning as a Cost Recovery Tool,” Law Seminars International, Utility Rate Case Issues & Strategies, February 22 - 23, 2007

“Natural Gas Infrastructure Development and Regulatory Challenges,” Southeastern Association of Regulatory Utility Commissioners, Annual Conference, June 4 – 6, 2007

“Resource Planning in a Changing Regulatory Environment,” Law Seminars International, Utility Rate Cases – Current Issues & Strategies, February 7 - 8, 2008

“Natural Gas Distribution Infrastructure Replacement,” American Gas Association, Rate Committee Meeting and Regulatory Issues Seminar, April 11 – 13, 2010

“Building a T&D Investment Program to Satisfy Customers, Regulators and Shareholders,” SNL Webinar, March 27, 2014

“Utility Infrastructure Replacement; Trends in Aging Infrastructure, Replacement Programs and Rate Treatment,” Large Public Power Council, Rates Committee Meeting, August 14, 2014

“Natural Gas in the Decarbonization Era, Gas Resource Planning for Electric Generation,” EUCI, January 22-23, 2020



EXHIBIT RJA-2

ATRIUM ECONOMICS

**PHILADELPHIA GAS WORKS: WEATHER
NORMALIZATION ADJUSTMENT REVIEW**

(APRIL 2023)

ON BEHALF OF
PHILADELPHIA GAS WORKS

RE: PGW's Weather Normalization Adjustment Mechanism

April 3, 2023



**ATRIUM
ECONOMICS**
CENTERED ON ENERGY

Philadelphia Gas Works:

Weather Normalization Adjustment Review

April 3, 2023



Table of Contents

Executive Summary.....	1
1 Project Background.....	5
1.1 Atrium’s Scope of Work	6
1.2 The WNA Formula.....	7
2 Anomalous Charges in June 2022 Billings.....	9
2.1 Circumstances Leading to Anomalous June Bills	9
2.2 Atrium’s Review of May 2022 WNA Calculations billed in June 2022	11
3 Analysis and Testing of PGW’s WNA Mechanism.....	11
3.1 Substantive Testing of WNA Calculations.....	12
3.2 Sensitivity of WNA to Inputs	15
3.3 Stress Testing of WNA Performance.....	18
3.4 Weather Analysis	26
4 Internal Processes and Controls around WNA Mechanism.....	29
4.1 Forecasting Process.....	29
4.2 Billing Controls	30
5 Survey of WNA Mechanisms Across the U.S.....	31
5.1 WNA Mechanisms across the Mid-Atlantic and Eastern U.S.	32
6 Findings and Recommendations.....	33

List of Figures

Figure 1: PGW’s WNA Formula	7
Figure 2: PGW WNA Sensitivity Analysis.....	17
Figure 3: WNA Model Results January 2022 - Actual Usage Aligned with Regression	20
Figure 4: WNA Model Results for June 2022 - Actual Usage Aligned with Regression.....	22
Figure 5: WNA Model Results for January 2022 - Actual Mean and Median HL/AHDD used to project HL vs. Regression.....	23
Figure 6: WNA Model Results for June 2022 (which included May usage) - Actual Mean and Median HL/AHDD used to project HL vs. Regression.....	24
Figure 7: WNA Model Results for January 2022 – HL Held Constant at Average Residential HL of 129 Ccf vs. Regression.....	25
Figure 8: WNA Model Results for June 2022 Billing – HL Held Constant at Average Residential HL of 3 Ccf vs. Regression.....	25
Figure 9: Historical Variances from Normal Weather in Shoulder Months (2003 – 2022).....	26



Figure 10: Historical Variances from Normal Weather in Winter Months (2003 – 2022) 27
Figure 11: 20 Year Average HDD/Day for Major Pennsylvania Cities 28
Figure 12: Philadelphia Weather Trends..... 28
Figure 13: Normal Weather under Varying Averaging Scenarios for Philadelphia 29
Figure 14: Weather Normalization and Full Decoupling Across the U.S..... 32

List of Tables

Table 1: May 2022 NHDD vs. AHDD 10
Table 2: May 2022 Residential Customer Impact by HDD Period..... 11
Table 3: Residential WNA Recalculation Results 13
Table 4: Commercial WNA Recalculation Results 14
Table 5: Industrial WNA Recalculation Results 14
Table 6: Sensitivity Analysis Inputs 17
Table 7: Residential Regression Results for the month of January (2019-2022) 19
Table 8: Residential Regression Results for the billing month of June (2019-2022) 21

Appendices

Appendix A: Eastern Utilities with Approved Weather Normalization Adjustments A-1



Acronyms and Key Terms

AHDD – Actual experienced heating degree days for the billing cycle. The degree day data is provided by the National Weather Service and measured at the Philadelphia International Airport.

BC – Billing cycle (“BC”) is the actual number of days shown on the bill that the Customer receives for service.

BL – Base load (“BL”) per billing day is the number of Mcf per Customer used per day for non-heating purposes based on usage by Customers to which this adjustment applies. It is determined separately for each individual customer and will be revised annually to reflect the non-temperature sensitive usage of Customers to which the adjustment applies reflected in the prior heating season’s sales. If an individual customer base load is not available, the average base load for the related customer class will be applied.

DC – Delivery Charge.

Dead-band – The deadband percentage is set as 1%, this represents the margin whereby the heating degree days may vary and there would be no WNA charge or credit. When the weather is colder than normal, the deadband is added to NHDD. And when the weather is warmer than normal, the dead-band is subtracted from NHDD.

DOM – A domestic factor, or base load calculation, developed by classes of customers for summer months usage in July, August and September and utilized for purposes of developing sendout forecasts.

Fictitious Rate Class – A rate class designed to account for a premises where a customer has moved from the premises and PGW has continued gas service in anticipation of a new customer.

HDD - The positive difference between 65 degrees and the actual temperature. If the temperature were 65 degrees or higher, the AHDD would be zero.

HL – Normalized amount of gas used for heating purposes or Heating Load (“HL”). HL is the Customer’s total usage (“TU”) minus the normal gas usage for non-heating purposes derived by multiplying each customer’s base load (“BL”) by the number of days in the billing cycle (“BC”).

NHDD – Normal heating degree days for any given calendar day within a month are based on the normal weather determination applied in the Company’s most recent base rate case, currently twenty years, as approved at Docket No. R-2017-2586783. The NHDD provided for in the formula are the total number of NHDD for the billing cycle. The degree day data is provided by the National Weather Service and measured at the Philadelphia International Airport.

SA – Service Agreement



TU – Total usage for the billing cycle. TU is measured in Mcf.

WNA – Weather Normalization Adjustment mechanism



Executive Summary

Atrium Economics, LLC (“Atrium”) was engaged by Philadelphia Gas Works (“PGW” or “the Company”) to review the mechanics, input data, billing controls, and weather trends surrounding PGW’s Weather Normalization Adjustment (“WNA”) formula to understand the factors that contributed to the abnormally high WNA charges in June 2022. Atrium’s review has identified structural factors inherent in PGW’s WNA mechanism that may have contributed to the anomalous WNA amounts billed to customers in June 2022 and later refunded. Atrium is providing its recommendations herein to address these identified structural factors associated with PGW’s WNA.

Atrium finds that the mathematical formula for PGW’s WNA, in certain circumstances, can result in abnormally high charges when weather is significantly warmer than normal, and when AHDD for the month are very low. The WNA did operate as it was designed since its inception in 2002 and the cause of the abnormally high charges in June 2022 was not due to calculation errors by PGW. As discussed in more detail in Section 2 of this Report, the anomaly that PGW experienced in June 2022 with the calculation of high WNA bills for its May 2022 usage was due to three primary factors occurring at the same time: 1) Weather was significantly warmer than normal causing the NHDD/AHDD factor in the WNA formula to become a large multiplier (in some cases 47 x) such that applying the factor to heat load would produce an extremely large adjustment; 2) AHDD were very low, in some cases, AHDD was 1, creating the opportunity for the NHDD/AHDD factor to become very large; and 3) the calculation of heat load, by subtracting non-heat related base load from total usage in many cases yielded a heat load that was much greater than one might expect in May given the low level of HDD. These three factors together were the cause of the anomalous overbillings that occurred in June 2022 for May usage.

Through our review, we have made the following observations with respect to the WNA used by PGW to normalize its billings for changes in weather heating degree days:

- The WNA mechanism, as originally designed and currently structured since 2002, is highly sensitive to HDD.
- As discussed in more detail in Section 3.3, and illustrated in Figures 3 through 8, PGW’s WNA performs well when total usage follows expected trajectories based on historical relationships between heat load and HDD. But, when the calculated heat load is unusually large or small compared to normal, i.e., the heat load one would expect by reference to the linear relationship between HDD and usage for the customer, the NHDD/AHDD factor in the formula will overestimate the impact of HDD when NHDD is significantly above AHDD (warmer than normal) and the calculated heat load is greater than expected, and will underestimate the impact of HDD when the calculated heat load is unusually small and when temperatures are colder than normal.
- The linkage between PGW’s forecasting process to establish its rates and revenue requirement under normal weather and that which it estimates to be the heating response to an increase/(decrease) in HDD in its WNA could be improved.
- PGW’s determination of base load (“BL”), which relies on July and August usage, though reasonable, can be an imperfect measure for deriving heat load (“HL”) (by subtracting BL from total usage (“TU”)). Atrium found that many customers lacked either July or August (or both



months) usage data. As a result, it is PGW's process to apply a class default base load, which could result in a less accurate determination of heat load when applied to a specific customer's usage. Per Atrium's review for the 2022/2023 WNA period, approximately 16% of Residential customers, 16% of Commercial customers, and 21% of Industrial customers relied on default base loads for their WNA calculations.

- Philadelphia weather is trending progressively warmer, and it may be beneficial to PGW to use a shorter normal averaging period – 15 years, or 10 years.
- May weather is highly unpredictable and could deviate significantly from normal. It is outside the typical shoulder months of April and October for heat-related gas usage and recently has had distinctly different weather patterns than a typical shoulder month relative to normal weather. As illustrated in Section 3.4.1, Figure 9, only May has the propensity to deviate from normal weather by 100%, which occurred twice since 2003; and has been 80% warmer than normal three times since 2003. No other month has experienced warmer than normal weather to that degree (i.e., 80% to 100% warmer than normal) during our study period 2003-2022. PGW might consider whether May should remain in the weather normalization period.

PGW's most immediate concern is to prevent dramatically skewed results from the ratio method in the current WNA formula, as was experienced in May 2022. The likelihood of this phenomenon occurring is much greater in a shoulder month whereby the variance of AHDDS from NHDDs can be very large and AHDDs are very small. As such, Atrium makes the following recommendations. Recommendations 1, 2, 3, and 4 may be considered alternatives to each other. The first proposes an immediate and simplistic remedy to protect the PGW customers from warmer than normal weather circumstances that have only occurred in May in the last twenty years – the removal of May from the weather normalization period. The second recommendation adds a supplemental billing control around PGW's existing WNA structure that would ensure that anomalous charges as were incurred in June 2022 could not re-occur.

Recommendations 3 and 4 offer more extensive changes to the WNA structure and are each a variation of a heat-coefficient methodology, where a heat coefficient is applied to the delta between NHDD and AHDD and then applied to the distribution rate to derive the WNA adjustment.

In Atrium's opinion, any one of the four recommendations could be adopted to prevent the occurrence of abnormally high bills when weather is significantly warmer than normal, as occurred in June 2022. However, Atrium has not examined the cost and time required to implement its recommendations, or the financial impact on PGW. Recommendations 5 and 6 are considered potential enhancements to the WNA, but Atrium does not consider them necessary for the reliable operation of the WNA.

Recommendation 1: May weather is highly unpredictable and could deviate significantly from normal, though NHDD for May are relatively low compared to other months in the WNA period. As Atrium's analyses show in Section 3.4, the only occurrences where actual monthly HDDs deviated from normal by greater than 60%, occurred in May over the last two decades. Though Atrium believes the billing control it proposes in Recommendation 2, or the structural changes proposed in Recommendations 3 and 4 will address the structural factors of PGW's WNA formula when weather is significantly warmer than normal such that the anomalous charges that occurred in June 2022 could not be repeated, the removal of May from the

weather normalization period would also provide an immediate and simplistic solution to avoid the potential for extreme warmer than normal weather conditions such as that which led to the anomalously high bills in June 2022.

Recommendation 2: As a guard against the re-occurrence of the severe WNA adjustments in the future, Atrium recommends implementing a billing system control that limits the amount of the NHDD/AHDD ratio adjustment in PGW's WNA formula to a multiple factor of 60% warmer than normal, resulting in 2.5x adjustment to HL in the formula. An alternative billing system control could use the class average heating coefficient at +/- 1 standard deviation as the limit to the HL adjustment, as determined from the Company's weather normalized billing determinant process. Per Atrium's analysis, over the past two years, the 2.5x ratio cap would only have been triggered in one month for usage in May 2022.

Recommendation 3: A closer tie between the WNA structure and the forecast methodology for setting rates would be desirable to better align the revenue recovered through the WNA with that contemplated in rates. As discussed in more detail later in this Report, as part of PGW's normal forecasting process, PGW derives a heat coefficient per Mcf, by dividing the class average heat load by HDD. PGW could move to this methodology for its WNA formula, by making adjustments based on the per-customer class average, i.e., apply the class heat coefficient to the delta between NHDD and AHDD for the month, and then apply the distribution rate (if this is to be a volumetric charge, the WNA adjustment would be divided by actual units consumed for the month for each customer). This modification may simplify PGW's WNA process and would ensure that any WNA recoveries would be better aligned with PGW's rate-setting methodology as the class heat coefficient are calculated for each rate case. In Atrium's view, moving to a class average heat coefficient for the WNA would fit better with PGW's urban residential customer base that includes long term residents, renters and/or customers moving residences, and would eliminate the need to derive a base load for each customer and the difficulties associated with that when the customer base is often changing. This approach would alleviate the issues noted with the ratio approach and would more closely link methods for developing the Company's normalized billing determinants by customer class used to develop base rates, with the WNA mechanism.

Recommendation 4: Deriving the heat coefficient through linear regression provides a second variation of a heat-coefficient based WNA alternative. Linear regression can be used to derive the base load (through the y-intercept) and the heat coefficient (or slope coefficient that measures the responsiveness of load to HDD), by regressing load over a period of at least 36 months by HDD. This regression could be performed on a class average basis or on a per-customer basis. This would also alleviate the issues noted with the ratio approach and would provide a statistically sound basis for determining a customer's (or customer class's) response to HDD. It also provides greater alignment to PGW's methods for developing the Company's

rates than the existing WNA approach. However, this approach may be difficult to implement and would require a more complicated explanation to customers.

Recommendation 5: Philadelphia weather is trending progressively warmer, and it may be beneficial to PGW to investigate use of a shorter normal averaging period – 15 years, or 10 years – by use of a statistical analysis of degree days, a “root mean squared error” analysis to establish the best estimate of “normal weather. A “root mean squared error,” or “RMSE,” compares the predictive capabilities of the various selected averages. The RMSE is a number representing the degree to which the forecasted values fail to correspond to the actual data. It is a widely used measure to assess the accuracy of point forecasts. While there are other statistical measures used to convey information about a forecast’s performance, such as the mean error or mean absolute error, these measures tend to de-emphasize the consistency of the forecasting technique, while the RMSE tends to emphasize this element of the forecast’s predictive capabilities.

Recommendation 6: PGW should consider implementing controls to check the reasonableness of its per-customer base load calculations and to minimize the number of customers that rely on the default base load calculation due to incomplete usage data. In some cases, unusually high heat loads (or unusually small base loads) could have been contributing factors to the anomalously high bills in June 2022. There are a number of approaches that PGW could take to check the reasonableness of its base load calculation. This could be performed by aggregating all of its customer specific base loads for each class and comparing to the actual class base load sendout, adjusting the class default base load such that the aggregated calculated base load agrees to actual sendout. A second alternative control could calculate the standard deviation of the average historic base load calculation (for three to five years) and verify that the current year’s calculated base load is within +/- 1 standard deviation from the average base load calculation. Under a third alternative control, PGW could implement a regression-based billing control that would limit the base load calculation to the upper and lower bounds of the confidence interval for the y-intercept of a monthly regression of HDD against total usage for a given customer over a two to five-year period. If PGW were to move to a class average methodology as described in recommendation 3 above, a process control already exists to ensure the reasonableness of the base load at the class level, and the issue of using default base loads in customer specific WNA calculations is resolved. Alternatively, PGW could adopt a two- or three-year average of July and August usage for determining base load, which also may reduce the number of customers that receive default base loads in their WNA calculations.

1 Project Background

Philadelphia Gas Works' ("PGW" or "the Company") Weather Normalization Adjustment mechanism ("WNA") was proposed and approved in 2002 to neutralize the effects of weather on the Company's revenues. In four of the five years prior to 2002, PGW had experienced significantly warmer than normal winters, and as a result experienced significant financial strain.¹ PGW cited the following primary benefits of the WNA: i) stabilizes cash flow from year to year; ii) can reduce the need for short-term borrowing from year to year; iii) positively affects PGW's credit rating; and iv) reduce the need for costly base rate proceedings.²

It was PGW's belief that the WNA mechanism would neither harm nor benefit ratepayers, but would allow the Company cash flow stability and the ability to recover its revenue requirement.³ The WNA was established to apply to firm rate classes for customers classified as Schedules GS, MS, and PHA ("heating" and "heating only" customers), except for Gas usage under the Special Provisions – Air Conditioning of those rates.⁴ The mechanism applies to usage from October 1 through May 31st, with the adjustment occurring contemporaneously in the same billing month the customer's invoice is produced. Note that when bills include days that fall outside the WNA period, the WNA charge is prorated. The Company incorporated a 1 percent deadband on the WNA, which avoids adjustment for relatively minor degree day variations.⁵

PGW's WNA was the first in Pennsylvania PGW's WNA is customer-specific and applies the WNA factor to the actual heating usage of a given customer, which modifies the customer's usage to what it would have been for warmer or colder weather.⁶ The WNA was approved for a three-year pilot, after which the Company was to conduct a review of the costs and benefits of the WNA.⁷ The WNA was reviewed by PGW and interveners at the end of the three-year pilot and was stipulated by the parties to continue permanently.⁸

PGW's WNA has operated without significant issue since it was approved in 2002 and affirmed in 2006. The only modification to the structure of the WNA occurred in 2017, when the Commission allowed

¹ Direct Testimony Bogdonavage, o/b/o Philadelphia Gas Works, Docket No. R-00017034 (February 2002) at 3.

² Direct Testimony of Craig E. White, o/b/o Philadelphia Gas Works, Docket No. R-00017034 (February 2002) at 4 (of the pdf).

³ Id. at 5.

⁴ See PGW Tariff Sheet 149, where it states, "The Weather Normalization Adjustment shall be applied to each Mcf (1,000 cubic feet) used for heating purposes under Rate Schedules GS, MS, and PHA ("heating" and "heating only" customers), except for Gas usage under the Special Provisions – Air Conditioning of those rates. The Weather Normalization Adjustment will be applied to customer usage during the period of October 1 through May 31 of each year for each billing cycle (except for the 2021-2022 heating season when the Weather Normalization Adjustment will exclude May 1 through May 31 to the extent that the application would produce a charge to the customer))"

⁵ Id. at 5 -9.

⁶ Id. at 9.

⁷ Pennsylvania Public Utility Commission Order, R-00017034 (July 29, 2002) at P. 5.

⁸ Stipulation of PGW, OCA and OTS, Docket No. R-00017034 (May 4, 2006)



PGW to shorten the averaging period it used for the determination of normal weather from 30 years to 20 years pursuant to a rate case settlement.⁹

In June 2022, however, PGW experienced a significant anomaly in the application of its June WNA charge, which produced unusually large and unanticipated charges to customers in several billing cycles with May usage. The unusual charges resulted from actual heating degree days (“HDD”) that were significantly lower than “normal” for the month of May, particularly in billing cycles beginning in the mid to latter part of the billing month. As a result, PGW determined that the June charges should be reversed until it had conducted an internal investigation into the WNA formula.¹⁰ PGW conducted an internal investigation of the matter and produced a report¹¹ for the Commission’s review. PGW’s internal investigation prompted it to request an interim 25 percent cap on WNA charges, via Tariff Supplement No. 152, so that no customer would be billed in excess of 25 percent of its total delivery charge excluding the WNA. The Commission suspended the implementation of Supplement No. 152 and called for an investigation to determine the lawfulness, justness, and reasonableness of the rates, rules and regulations proposed in Supplement No. 152, in regards to the proposed cap.¹² In addition to proposing the cap, PGW decided to engage Atrium Economics to perform a review of the mechanics, input data, billing controls, and weather trends surrounding PGW’s WNA formula in order to avoid WNA billings similar to June 2022. Atrium’s review (herein) identifies a number of factors in the structure of the WNA formula and PGW’s processes that may have contributed to the abnormally high bills in June 2022 and makes recommendations to address those factors as warranted.

1.1 Atrium’s Scope of Work

Atrium Economics is engaged to perform a formal investigation of PGW’s WNA mechanisms, including the following key tasks:

- A review of WNA processes, inputs, and controls through interviews with key personnel and data requests.
- A thorough analysis of the causes of the anomalous charges in June 2022 and consideration of whether additional billing controls or alternative inputs could have prevented the unusually high bills.
- An independent evaluation of whether the WNA, as currently structured, provides appropriate revenue requirement recovery under all circumstances, including a review of the underlying data, structure of the WNA, calculations, and weather trends (with a particular focus on Philadelphia’s weather trends).

⁹ Pennsylvania Public Utility Commission Opinion and Order, Docket No. R-2017-2586783 (November 8, 2017) at P.16.

¹⁰ Petition of PGW for Emergency Order, Docket No. P-2022-3033477 (June 30, 2022) and Pennsylvania Public Utility Commission Emergency Order Granted (July 1, 2022).

¹¹ PGW, Weather Normalization Adjustment Report to the Pennsylvania Public Utility Commission, Docket No. P-2022-3033477 (August 12, 2022).

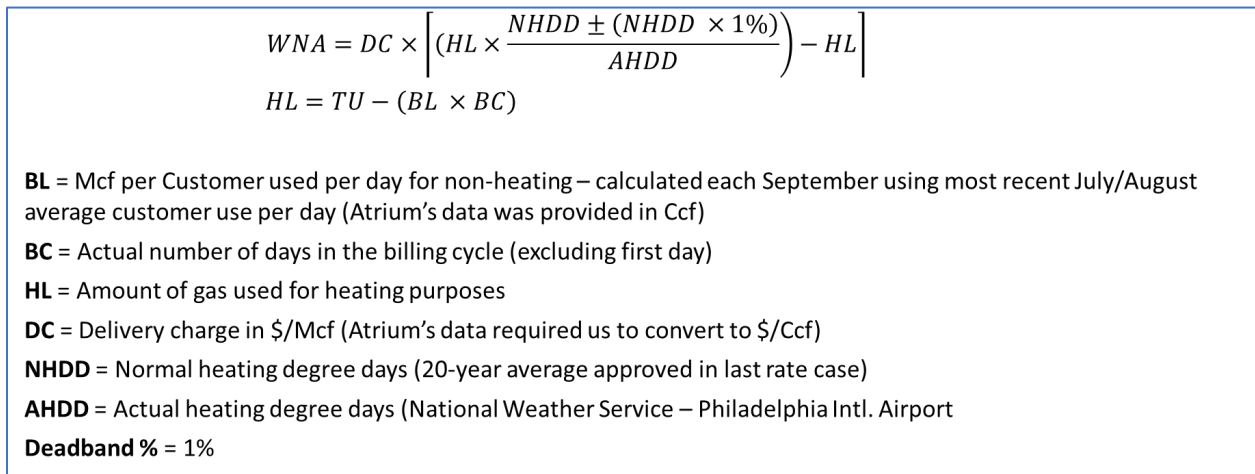
¹² Pennsylvania Public Utility Commission Order, Docket Nos. R-2022-3034229 and P-2022-3034264 (September 15, 2022)

- A review and analysis of the current level of billing controls surrounding the WNA to assess whether controls are sufficient to ensure that inappropriately high bills could not be distributed without detection.
- A survey of relevant WNA mechanisms, identifying structural differences; and where available, information on billing controls surrounding the WNA.
- Atrium presents its findings and recommendations to PGW herein.

1.2 The WNA Formula

PGW’s Tariffed Weather Normalization Adjustment (“WNA”) is a charge or credit applied to a customer’s bill that adjusts for warmer or colder than normal weather during a billing cycle. As a general summary, if the weather is warmer than normal, the WNA is a charge on the bill. When the weather is colder than normal, the WNA is a credit on the bill. There is no WNA charge or credit on a customer’s bill if the weather is within 1.0% warmer or colder than normal. The WNA is applied to customer usage from October 1 through May 31. PGW asserts that it has been instrumental in helping it to become a financially stable and strong company, with weather related charges to customers that were designed to be fair and reasonable. PGW’s WNA formula is as defined below. The adjustment is made “real time” or concurrent with the delivery bill covering the same period.

Figure 1: PGW’s WNA Formula



The inputs to the WNA are more fully explained below:

- TU – total usage (“TU”) for the Customer-specific billing cycle, measured in Mcf.
- BL – base load (“BL”) Mcf is the Mcf per Customer used per day for non-heating purposes. BL is determined separately for each individual Customer and is revised annually based on non-heating month usage (average daily usage for the preceding July and August). BL represents the gas usage per day for non-heating purposes. If an

- individual Customer's BL is not available, the BL for the related customer class is applied.
- BC – billing cycle (“BC”) is the actual number of days shown on the bill that the Customer receives for service.
 - HL – normalized amount of gas used for heating purposes (“HL”). HL is the Customer's TU minus the normal gas usage for non-heating purposes derived by multiplying BL and BC.
 - DC – delivery charge in \$/Mcf (“DC”).
 - NHDD – Normal heating degree days for any given calendar day within a month are based on the normal weather determination applied in the Company's most recent base rate case, currently twenty years. The NHDD provided for in the formula are the total number of NHDD for the billing cycle. The degree day data is provided by the National Weather Service and measured at the Philadelphia International Airport.
 - AHDD – actual experienced heating degree days (“AHDD”) for the billing cycle. The degree day data is provided by the National Weather Service and measured at the Philadelphia International Airport.
 - Dead-band Percentage – Set as 1%, this represents the margin whereby the heating degree days vary and there would be no WNA. When the weather is colder than normal, the deadband is added to NHDD. And when the weather is warmer than normal, the dead-band is subtracted from NHDD.

The BL is multiplied by the number of days in the BC to calculate the normal gas usage for non-heating purposes. The non-heating gas usage calculated above, BL, is subtracted from TU to derive the normalized amount of gas used for HL. NHDD are divided by AHDD to derive how much the weather has varied from the normal weather. The normalized amount of gas used for heating purposes, HL, is multiplied by the ratio of NHDD to AHDD to calculate the weather normalized gas usage. HL is then subtracted from this to derive the difference between actual and normalized gas usage. This amount is then multiplied by the base rate DC to calculate the WNA. The resulting WNA charge may be prorated for billing cycles that include days that are not subject to the WNA by dividing the total number of WNA-applicable days by the total days in the billing cycle.¹³

¹³ PGW, Weather Normalization Adjustment Report to the Pennsylvania Public Utility Commission, Docket No. P-2022-3033477, (August 12, 2022) at 5-6.

PGW's WNA is applied to all firm residential, commercial, and industrial customers that are either classified as "heat only" or "heat and domestic", as well as Residential PHA Tenant and Philadelphia Housing Authority heat-related classes.

2 Anomalous Charges in June 2022 Billings

An anomaly occurred with the WNA related to mid to late May 2022 weather, which produced unusually large charges to some customers. PGW determined that its customers should not bear these unprecedented and unusually large charges, and therefore, PGW filed a Petition for Emergency Order on June 30, 2022, at Docket No. P-2022-3033477 seeking Commission approval to immediately revise its Tariff to reverse the WNA charges that were applied to May 2022 usage billings. PGW voluntarily refunded to customers all WNA charges for May usage in the amount of approximately \$12.6 million, though the charges were properly calculated and billed in accordance with its Tariff.

2.1 Circumstances Leading to Anomalous June Bills

As shown below, a warm weather pattern occurred in mid to late May 2022 that resulted in large WNA charges for many customers. These increased charges were due to mid to late May warm weather's percent variance of NHDD versus AHDD, as detailed below. Table 1, below, shows May AHDD and NHDD used in the Company's May 2022 WNA calculations; and the May 2021 AHDD and NHDD for comparison. In May 2022, the AHDD dropped dramatically mid-month compared to NHDD. After May 11th, 2022, there was 1 AHDD in bills whereas NHDD in bills for same period was 47 HDD. In comparison, FY21 had 55 AHDD for that same period.



Table 1: May 2022 NHDD vs. AHDD¹⁴

May Day	NHDD	AHDD	
		FY 2021	FY 2022
1	4	9	6
2	3	0	0
3	5	0	1
4	5	0	5
5	5	0	0
6	5	7	9
7	4	6	15
8	3	11	13
9	3	13	4
10	3	7	1
11	3	7	1
12	3	7	0
13	5	5	0
14	4	2	0
15	2	1	0
16	2	3	0
17	3	1	0
18	4	0	0
19	4	0	0
20	3	0	0
21	4	0	0
22	3	0	0
23	2	0	0
24	1	0	0
25	2	0	0
26	1	0	1
27	1	0	0
28	1	4	0
29	1	14	0
30	1	15	0
31	0	3	0
Total	90	115	56

As shown above, a warm weather pattern occurred in mid to late May 2022, with nominal HDD from the 10th through the 31st of May, that resulted in large WNA charges for many customers. These increased charges resulted from mid to late May warm weather's percent variance of NHDD versus AHDD, as detailed below. Table 2, details 7 billing periods' NHDD, AHDD, total residential WNA charges and average residential WNA charge/service agreement.

¹⁴ PGW, Weather Normalization Adjustment Report to the Pennsylvania Public Utility Commission, Docket No. P-2022-3033477, (August 12, 2022) at 10.

Table 2: May 2022 Residential Customer Impact by HDD Period¹⁵

Heating Degree Day Period	NHDD	AHDD	Total WNA Charges	Average WNA Charge
5/6/22 – 6/6/22	68	44	\$53,386.72	\$2.19
5/7/22 – 6/7/22	63	35	\$83,765.64	\$3.95
5/10/22 – 6/8/22	53	3	\$860,550.81	\$50.05
5/11/22 – 6/9/22	50	2	\$1,020,933.48	\$53.86
5/12/22 – 6/10/22	47	1	\$1,924,011.72	\$87.28
5/24/22 – 6/22/22	8	1	\$102,765.92	\$4.71
5/25/22 – 6/23/22	7	1	\$80,589.03	\$3.38

Bolded in Table 2, above are three usage periods where the AHDD denominator was very low and varied greatly from the NHDD, resulting in large WNA charges.

2.2 Atrium’s Review of May 2022 WNA Calculations billed in June 2022

Atrium performed a thorough analysis of the causes of the anomalous charges in June 2022 by performing a recalculation of the WNA charges for the majority of customers subject to the WNA, noting that PGW’s calculation of the May 2022 charges in June billings were properly calculated in accordance with the WNA formula in the Company’s Tariff. The cause of the extremely large bills was due in part to the significantly warmer than normal weather causing the NHDD/AHDD factor in the formula to become a multiplier (in some cases 47x HL) in conjunction with higher-than-expected heat load for certain customers. Recall that heat load is calculated as the difference between total usage and base load; and base load is calculated by multiplying the average daily use for the preceding July and August by the billing cycle days. It follows that either a low calculation of base load or higher total usage could result in a higher heat load than the normal and expected relationship between HDD and customer usage would suggest. The product of the higher-than-might-be-expected heat load in the spring and the very high ratio of NHDD/AHDD resulted in the abnormally and inappropriately high charges on the June 2022 gas bills.

3 Analysis and Testing of PGW’s WNA Mechanism

Atrium performed an independent evaluation of whether the WNA, as currently designed, provides appropriate revenue requirement recovery under all circumstances, including a review

¹⁵ Id. at 11. The WNA charge was prorated for all billing cycles that include days that are not subject to the WNA, by dividing the total number of WNA-applicable days by the total days in the billing cycle.

of the underlying data, structure of the WNA, calculations, and weather trends (with a particular focus on Philadelphia's weather trends).

3.1 Substantive Testing of WNA Calculations

In order to verify that PGW's WNA calculations were made in accordance with its Tariff and that calculation errors did not contribute to the abnormally high bills in June 2022, Atrium tested PGW's calculations by recalculating a broad selection of 2022 WNA charges, and compared its calculations to those by PGW. To perform this test, Atrium began with four years of monthly billing data from PGW, by customer, for all bills sent during the month. The billing data included the following fields: revenue month/year, rate class description, billing cycle start date, billing cycle end date, rate class, usage quantity (in Ccf), number of days in the billing cycle, base load calculation, the WNA charge on the customer's bill, and the service agreement ("SA") ID (or customer ID).

From these data sets, Atrium removed all non-heating rate classes, all fictitious accounts (premises that are currently under the control of PGW, where there is no customer), all non-WNA eligible rate classes, all bills for which the number of cycle days were less than 25 or greater than 35, and all bills where the start date was more than two months prior to the first day of the billing month.

For this broad selection of bills, Atrium recalculated the base load data in accordance with PGW's practice, based on the preceding July and August's average daily usage. For customers that did not have usage in both the preceding July and August, or had no usage for either month, Atrium used the class default base load provided by PGW to mirror PGW's practice. Atrium calculated the AHDD and NHDD by summing the HDD for all days in the billing cycle (excluding the first day of the billing cycle and including the last day), using weather data for the Philadelphia International Airport. Normal HDD was based on a 20-year average through May 2019, as was filed by PGW in its last rate case. Atrium also pulled the applicable distribution rate from a table provided by PGW and recalculated the WNA charges with the following results.

3.1.1 Recalculation Results

Table 3: Residential WNA Recalculation Results

Billing Month /Year	Total Residential Customers	No difference %	Within ± \$0.01 %	Within ± \$1 %	Differences > \$1 %	Largest/ (Smallest) Difference	Sum of all differences PGW – Atrium calc
Jan 2022	463,510	59%	89%	100%	0%	\$32.22/ (\$22.50)	(\$1,128.60)
Feb 2022	464,165	68%	89%	99%	1%	\$11.49/ (\$13.95)	\$14,593.55
Mar 2022	466,095	64%	89%	100%	0%	\$30.75/ (\$30.56)	(\$1,853.96)
Apr 2022	464,417	65%	93%	100%	0%	\$29.15/ (\$22.33)	\$20.71
May 2022	464,837	68%	95%	100%	0%	\$11.34/ (\$35.77)	(\$316.70)
Jun 2022	460,127	89%	97%	100%	0%	\$24.36/ (\$387.15)	(\$5,238.95)
Oct 2022	459,289	79%	96%	99%	1%	\$13.10 / (\$2.31)	(\$6,113.30)
Nov 2022	459,613	63%	88%	99%	1%	\$5.96 / (\$17.66)	\$14,249.44
Dec 2022	462,358	67%	93%	100%	0%	\$4.40 / (\$0.87)	\$1,371.41

Though Atrium is still exploring the cause of these minor differences with PGW, one known source of difference is due to customers who were involved in PGW’s “Choice” shopping program, where those customers received a new service agreement when switching. The base loads were transferred in PGW’s billing data set from the old SA to the new SA., but Atrium did not have access to the new SAs and base loads. Time did not allow Atrium to update its dataset for the new SA base loads and recalculate the WNA, but this could reasonably explain the low level of differences month to month in excess of \$1. Though Atrium’s primary focus was on recalculating the residential WNA charges, it did perform the same exercise for commercial and industrial customer classes. Differences were mostly minor, but Atrium is investigating the cause of differences with PGW. Atrium notes that, to date, any specific differences between Atrium’s recalculation of WNA charges and those charged to customers by PGW, were determined to be correctly calculated by PGW and were due to unknown limitations on the dataset that was provided to Atrium for testing by PGW.

Table 4: Commercial WNA Recalculation Results

Billing Month /Year	Total Commercial Customers	No difference %	Within ± \$0.01 %	Within ± \$1 %	Differences > \$1 %	Largest/ (Smallest) Difference	Sum of all differences PGW - Atrium calc
Jan 2022	20,733	68%	90%	100%	0%	\$219.04 / (\$181.13)	\$35.49
Feb 2022	20,771	78%	92%	98%	2%	\$47.97 / (\$547.18)	\$305.36
Mar 2022	20,854	75%	92%	100%	0%	\$51.08 / (\$1,325.41)	(\$2,407.78)
Apr 2022	20,751	78%	95%	100%	0%	\$202.87 / (\$13.11)	\$553.05
May 2022	20,803	80%	96%	100%	0%	\$30.58 / (\$1,090.24)	(\$2,211.89)
Jun 2022	20,594	93%	98%	100%	0%	\$0.01 / (\$4,693.01)	(\$6,144.46)
Oct 2022	20,607	80%	91%	97%	3%	\$712.7 / (\$20.70)	(\$2,540.29)
Nov 2022	20,632	71%	84%	94%	6%	\$46.62 / (\$1,021.98)	\$10,836.74
Dec 2022	20,762	72%	87%	94%	6%	\$319.56 / (\$5.41)	\$589.35

Table 5: Industrial WNA Recalculation Results

Billing Month /Year	Total Industrial Customers	No difference %	Within ± \$0.01 %	Within ± \$1 %	Differences > \$1 %	Largest/ (Smallest) Difference	Sum of all differences PGW - Atrium calc
Jan 2022	442	63%	87%	100%	0%	\$47.29 / (\$0.23)	\$46.21
Feb 2022	445	79%	91%	98%	2%	\$5.77 / (\$12.90)	\$2.37
Mar 2022	439	74%	92%	100%	0%	\$41.57 / (\$0.72)	\$39.89
Apr 2022	439	78%	92%	100%	0%	\$19.33 / (\$0.01)	\$19.49
May 2022	441	81%	95%	100%	0%	\$0.01 / (\$4.14)	(\$4.19)
Jun 2022	434	92%	98%	100%	0%	\$0.01 / (\$0.01)	(\$0.20)
Oct 2022	435	77%	87%	94%	6%	\$0.01 / (\$57.07)	(\$441.89)
Nov 2022	428	67%	78%	90%	10%	\$138.98 / (\$2.66)	\$1,171.29
Dec 2022	435	69%	82%	91%	9%	\$26.38 / (\$15.47)	(\$170.11)

3.1.2 Findings and Observations

Atrium finds that though there are calculation differences, nearly all differences were less than or equal to \$1.00. Though Atrium is still exploring the cause of these minor differences, one known source of difference is likely explained by the migration of customers to the “Choice” program. Atrium finds the differences greater than ± \$1.00 represent a relatively small



percentage of total bills (in most cases 1% or less) and the total sum of recalculation differences were immaterial. From this, Atrium concludes that PGW's WNA calculations were made in accordance with its WNA tariff with only immaterial differences noted, and that calculation errors did not contribute to the abnormally high bills in June 2022.

In addition, Atrium notes that it is PGW's practice to calculate base load from the average use per day for the preceding July and August for each customer; and relies on the class default base load when data for either July or August (or both months) are missing for the customer. Atrium notes for the June billing month, approximately 24% (5,502/23,388) of the residential WNA charges over \$100 utilized the default class base load calculation; 9% (174/2045) of the commercial customers with WNA charges over \$100 utilized the default class base load calculation; and 2% (1/61) of industrial customers with charges over \$100 utilized the default base load calculation. Given the significantly warmer than normal weather included in the June billings, Atrium's analysis suggests that the use of average class default base loads may have been a contributing factor to the high bills in June 2022 for some customers. Recall that the WNA formula applies the ratio of NHDD/AHDD to the estimated heat load, and heat load is calculated by subtracting base load from total usage. Further it is possible that July and August usage may not accurately reflect the base load usage for a number of reasons (vacation, customer relocation, etc.). Inaccuracies in the calculation of base load, will directly impact estimates of heat load and could cause the WNA formula to produce incorrect results, particularly when weather is significantly warmer than normal and the ratio between NHDD and AHDD grows.

3.2 Sensitivity of WNA to Inputs

To better understand the sensitivity of PGW's WNA mechanism to its various inputs and to help identify potential drivers for the abnormally high June 2022 bills, Atrium performed a sensitivity analysis on PGW's WNA. Atrium analyzed the sensitivity of the WNA formula's inputs by independently increasing/decreasing each input by 30% relative to an average for the input, holding the other inputs constant. The analysis was based on January 2022 AHDD, NHDD, average usage, average base load, average distribution rate and average number of days in the billing cycle. Each of the input values used for the analysis are shown in

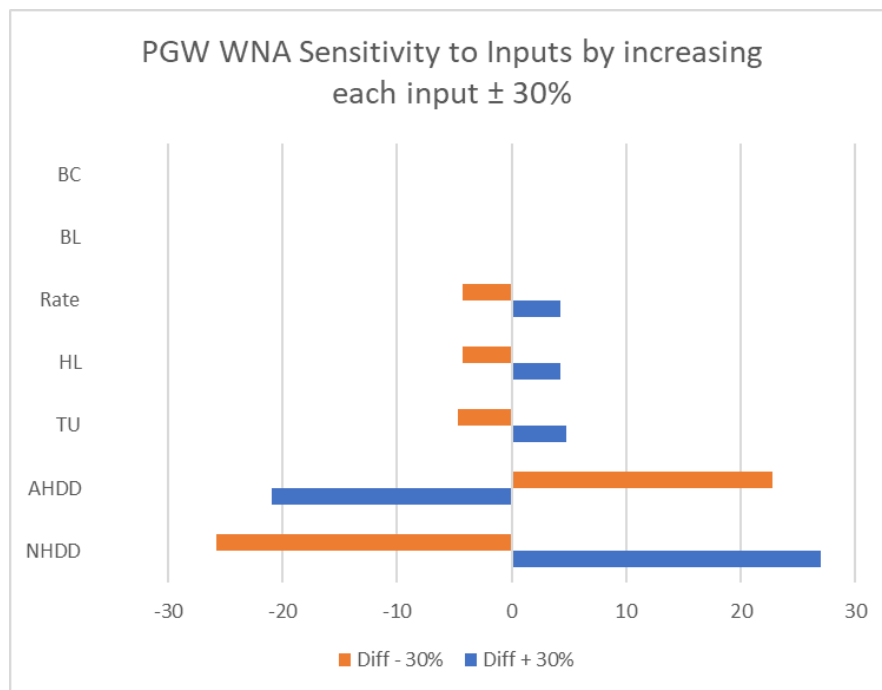
Table 6, at their average value, and the resulting value when the input was increased/decreased by 30%. Since heat load (“HL”) is derived from total usage (“TU”) and (“BL”), the 30% shift in head load was applied to the calculated heat load given TU and BL.

Table 6: Sensitivity Analysis Inputs

Input	Average	+ 30%	-30%
AHDD	800	1,040	560
NHDD	959	1,247	671
TU	126	169	86
HL	113	147	79
Rate	.6697	.8706	.4688
BL	.42	.55	.29
BC	30	39	21

Holding each input constant in the equation, Atrium increased/decreased the targeted input by 30%. For each scenario (*i.e.*, Average, + 30%, -30%), Atrium calculated the WNA charge and recorded the positive or negative difference in the WNA result from the status quo (or average). Figure 2 below shows the dollar impact on the WNA charge of varying each element of the WNA formula by plus or minus 30%.

Figure 2: PGW WNA Sensitivity Analysis



3.2.1 Findings and Observations

As shown in Figure 2, a 30% shift in Rate, HL, BL or TU has much less impact on the WNA result than does a 30 percent shift in AHDD or NHDD. The WNA formula as currently structured, is



highly sensitive to normal and actual HDDs, as one would expect with a weather normalization adjustment. This helps us to understand the drivers that will make the greatest impact on PGW's WNA calculation result and provides some information as to which factors would most likely have been the greatest contributors to the abnormally high bills in June 2022.

3.3 Stress Testing of WNA Performance

In order to observe the performance of the WNA formula under a range of conditions, and to identify the conditions that are required to produce abnormally high bills, such as occurred in June 2022, Atrium stress tested the PGW WNA formula. Specifically, Atrium analyzed performance of the WNA mechanism for January and June 2022 billing months for the residential class under various weather scenarios ranging from 100% increase in AHDD over normal to 100% decrease in AHDD from normal, i.e., the lowest possible HDD that can be used as a factor in the formula or (1 HDD). To provide a base line from which to measure PGW's WNA formula, Atrium used linear regression to estimate the responsiveness of heat load to AHDD, and compared the performance of PGW's WNA under the stress test range to what would be predicted by linear regression under the same range.

Atrium's regression analysis measured the relationship between customer heat load (as calculated by PGW) and HDD across all residential customers for the given month e.g., all residential customers that met Atrium's screening criteria (identified in Section 3.1 above) for the months of January and June, where HDD was the independent variable and heat load was the dependent variable. The regressions were set at zero intercept, as theoretically the base load, already incorporated into the derivation of heat load, should be equivalent to the y-intercept in a regression equation. Putting aside any customer behavioral differences depending on the season, heat load should be entirely responsive to changes in HDD.

Atrium also reviewed and incorporated the WNA mechanisms of PGW's peers in the mid-Atlantic and New England region under the same assumptions. Atrium reviewed three separate scenarios: 1) when heat load used in PGW's WNA formula exactly corresponds to what Atrium's regression would predict; 2) when heat load is less responsive to HDD than regression would predict; and 3) when heat load is held constant regardless of HDD, such that heat load would be overstated when temperatures are warmer than normal and would be understated when temperatures were colder than normal.

3.3.1 When Weather Aligns Closely with Historic Linear Relationships between Customer Consumption and HDD – a Review of January 2022 and June 2022 Residential Performance

For each of the four years of billing data provided to Atrium, Atrium regressed actual HDD against the heat load calculated for each customer in the January billing data. The regressions

were performed with zero intercept as discussed above. The results of the January regressions for each year are shown in Table 7.

Table 7: Residential Regression Results for the month of January (2019-2022)

Jan Billing Month	HDD Coef	t Stat	R Square	Lower 95%	Upper 95%
2022	0.1446	912.7212	0.6425	0.1443	0.1449
2021	0.1378	906.2148	0.6399	0.1375	0.1381
2020	0.1380	892.9704	0.6494	0.1377	0.1383
2019	0.1460	878.5220	0.6553	0.1456	0.1463
Total	0.1416	897.6071	0.6468	0.1413	0.1419

As Table 7 shows, residential regression results for January tend to be relatively stable across years, with the HDD coefficient ranging from 0.1375 to 0.1463 with 95% confidence. Atrium used the average HDD regression coefficient for the four years of 0.1416 to estimate the heat load under the range of HDD we analyzed. Atrium then used the heat load calculated by its regression to model the performance of PGW's WNA mechanism, by using the heat load produced by regression as "HL" in PGW's WNA formula. Atrium also used the heat load derived by regression to model the performance of the WNAs of peer companies (Columbia Gas MD, Energy North NH, Con Ed NY, Key Span (BUG), NIMO, O&R, RG&E, and Columbia Gas PA) to compare the differing WNA structures.

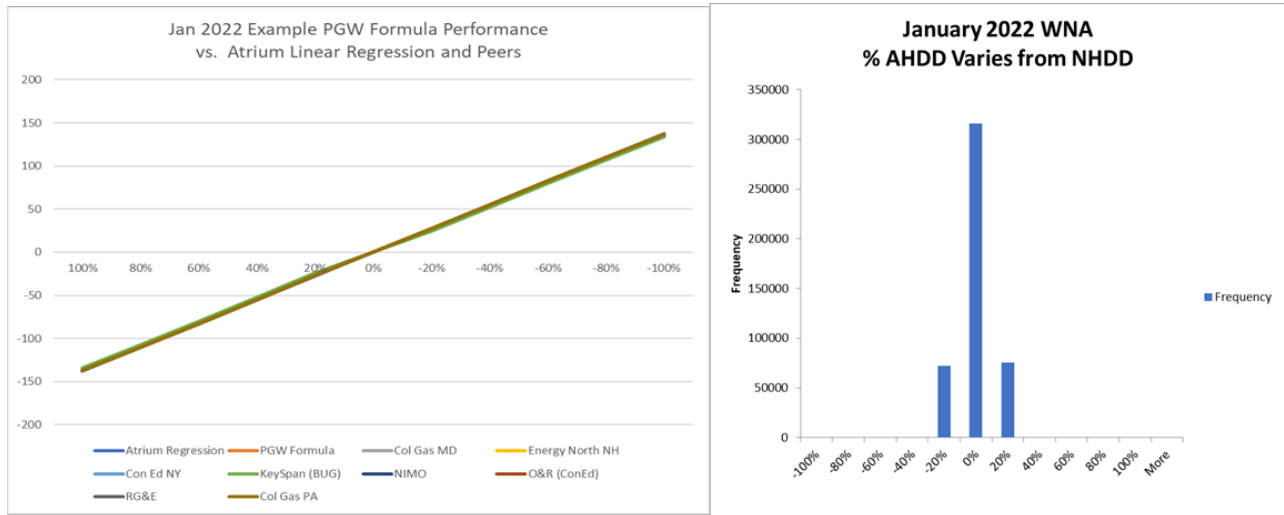
As discussed later in this Report, there are two primary forms of WNA mechanism - one that uses a heat coefficient (usually derived by linear regression as the HDD coefficient), applied to the difference between normal and actual degree days; and the other applies the ratio of normal to actual HDD to the non-base load (or heat-related) usage. The PGW WNA formula, and all the other Pennsylvania gas utilities' WNA formulas, fall into the second group, with formulas that apply a ratio of NHDD/AHDD to non-base load usage. Of the formulas reviewed below, Columbia Gas MD, Columbia Gas PA and Energy North NH all use a similar ratio approach to PGW; the remainder of the utilities reviewed (Con Ed NY, Key Span (BUG), NIMO, O&R, and RG&E) use a heat coefficient applied to the difference in HDD.

The latter heat coefficient methodology uses the HDD coefficient, (which measures the responsiveness of HL to HDD), applied to the delta between NHDD and AHDD. The heat coefficient may be determined by either linear regression's determination of the HDD coefficient by regressing HDD against HL, or more simplistically, some companies obtain the heat coefficient by dividing HL by AHDD.

As the charts in Figure 3 illustrate, the % variance each customer experienced during its billing cycle compared to normal HDD in January 2022 was tightly distributed around zero, indicating that January was a normal month for all customers. All customers experienced weather that was within the range of 20% warmer than normal and 20% colder than normal, while the vast majority of customer bills reflected zero variance from normal weather.

The leftmost chart in Figure 3 shows the Ccf adjustment that would result under the methods analyzed when weather is colder than normal (shown as a positive variance from normal on the x axis of the chart) and when weather is warmer than normal (shown as a negative variance from normal on the x axis of the chart). The chart shows that all WNA formulas modeled performed the same, despite their different structures, when heat load follows the same expected patterns with respect to changes in HDD.

Figure 3: WNA Model Results January 2022 - Actual Usage Aligned with Regression



Atrium performed the same analysis for the billing month of June 2022, which included the anomalous bills for May 2022. As Table 8 shows, the June regressions show a weaker (but still strong) relationship between heat load usage and HDD, as evidenced by lower t Stats¹⁶ than those from the January 2022 regressions. The June regressions also have less predictive power, as evidenced by a lower R Square, which averaged 0.2229 for the last four years of June billings, compared to the January average R Square of 0.6468. As such, June billings are less predictable than January billings and consumption in June varies rather significantly (0.1125 to 0.1814 with 95% confidence) from year to year in response to HDD. May is the outermost shoulder month and consumption does not necessarily closely follow its historical relationship to HDD.

¹⁶ A t-test is an inferential statistic used to determine if there is a statistically significant difference between the means of two variables. The t-test is a test used for hypothesis testing in statistics. If the computed t-score equals or exceeds the threshold value of t for a given sample size, then the researcher can conclude that there is a statistically significant probability that the relationship between the two variables exists and is not due to chance and reject the null hypothesis. A t-statistic > 2.0 typically is the lower bound for statistical significance for sample sizes of 40 or more at 95% confidence.

Table 8: Residential Regression Results for the billing month of June (2019-2022)

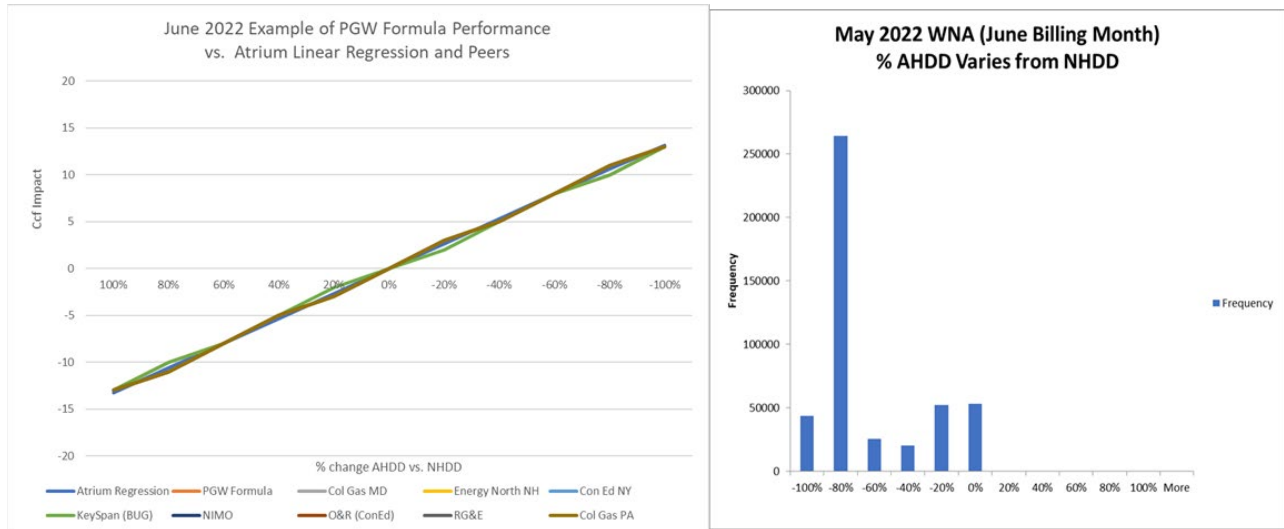
June Billing Month	HDD Coef	t Stat	R Square	Lower 95%	Upper 95%
2022	0.1687	276.3285	0.1423	0.1675	0.1698
2021	0.1133	291.7357	0.1553	0.1125	0.1140
2020	0.1250	488.7440	0.3509	0.1245	0.1255
2019	0.1804	363.2805	0.2429	0.1795	0.1814
Total	0.1468	355.0222	0.2229	0.1460	0.1477

As the histogram in Figure 4 (below) shows, the majority of customers billed in June experienced weather that was 80% to 100% warmer than normal - clearly showing that May 2022 was not a normal month. Only a very small percentage of customers billed in June 2022 experienced normal weather.

Nonetheless, the left-most chart in Figure 4 shows that each of the WNA formulas modeled performed the same as linear regression when usage is aligned with historical patterns relative to changes in HDD. Even when the ratio of NHDD/AHDD = 47/1, the HL becomes so small (predicted by regression) for 1 HDD, at 0.1687 Ccf/HDD (see 2022 HDD coefficient in Table 8 above), that multiplying (47 x 0.1687 Ccf) – 0.1687 yields an anticipated adjustment of 7.7602 Ccf using PGW’s ratio. The same result is achieved using a heat-coefficient type WNA formula that applies the heat coefficient applied to the change in HDD, i.e., 47 HDD – 1 HDD) x 0.1687 = 7.7602 Ccf. When the response of heat load to HDD is equal under both formulas (or 0.1687/HDD), the heat coefficient-based WNA formula and the NHDD/AHDD ratio type WNA formula will yield the same result. So, even when weather is significantly warmer than normal such that the NHDD/AHDD ratio becomes very large, it will not distort the WNA result, unless heat related usage does not follow a normal relationship between heat load and HDD.

Atrium acknowledges that customer behavior with respect to heating may differ in spring, from winter or fall; therefore, it is unlikely that customer usage will fall perfectly on the regression line in all seasons as is modeled in this scenario. However, even noting that there may be differences between customer behavior in January (when the heat is on and is responding continuously to HDD) versus May, where customers may turn heat entirely off in warm weather and leave it off even when there is a cool day resulting in HDD, the regression results shown in Table 7 and Table 8, suggest that differences may not be as great as intuition would surmise. The 4-year average residential HDD coefficient for January billing month was 0.1416 and for June was 0.1468, though the June coefficients varied widely during the period from 0.1133 to 0.1804, likely due to these seasonal customer behavioral differences.

Figure 4: WNA Model Results for June 2022 - Actual Usage Aligned with Regression



Findings and Observations

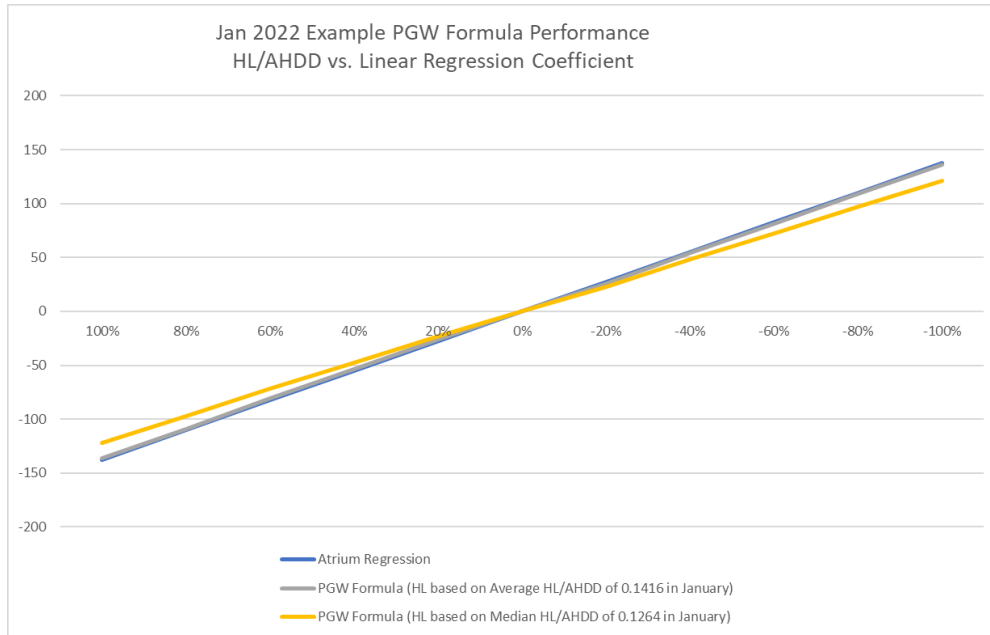
There are no significant differences between WNA structures that use a ratio of NHDD/AHDD or heat coefficient applied to the change in HDD when weather and consumption are in line with the historic linear relationship, *e.g.*, when heat load falls on the regression line for sensitivity of heat load to HDD. This may be considered the base case where heat load is exactly as predicted by historical relationships with HDD. This ensures us that all of the surveyed WNA mechanisms will perform the same under these controlled conditions.

3.3.2 When Weather Deviates from the Historical Linear Relationship between Consumption and HDD – a Review of January 2022 and June 2022 Residential Performance

Atrium analyzed performance of PGW’s WNA mechanism for the January and June 2022 billing months again under the same weather scenarios as used in the previous test, ranging from 100% increase in AHDD over normal to 100% decrease in AHDD (1 HDD). Atrium compared the WNA performance under this range for the average Ccf per AHDD during January and June billings (calculated as heat load/AHDD) to what was predicted using linear regression. In January, as shown below, the mean and median HL/AHDD was very close to that predicted by regression.



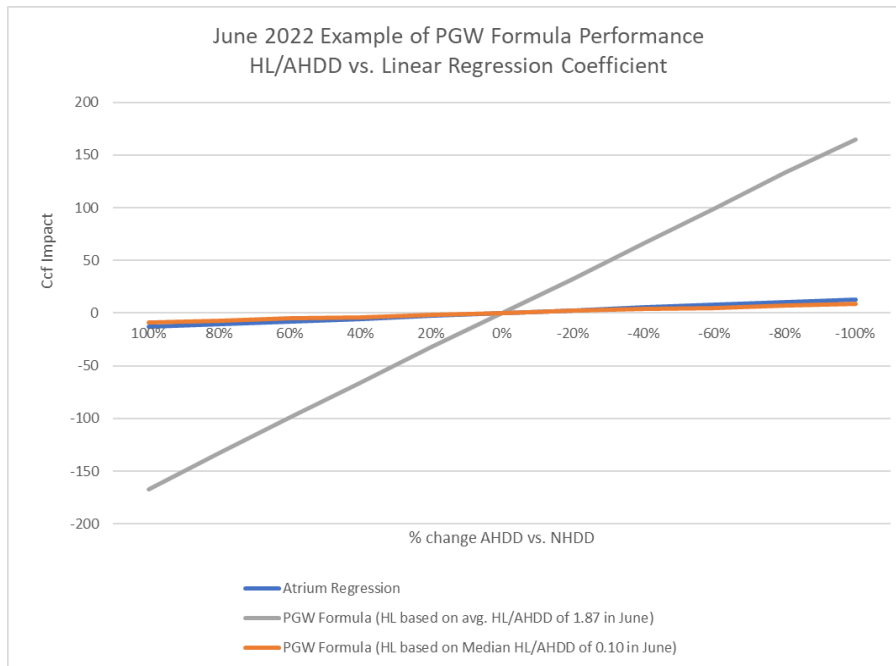
Figure 5: WNA Model Results for January 2022 - Actual Mean and Median HL/AHDD used to project HL vs. Regression



In June, the average HL/AHDD for residential customers was 1.87 Ccf/AHDD, unusually high considering that the median was 0.10/AHDD and the mode was 0.00/AHDD. Clearly, there were a number of May customers with very high consumption in excess of their calculated base load – much higher than regression would predict for June 2022 bills of 0.1687 Ccf/AHDD as shown previously in Table 8.

As shown in Figure 6 below, Atrium has used the mean and median of Ccf/AHDD for June billings for all residential customers to determine the “HL” factor in PGW’s WNA formula and compared these results to the results of the linear regression formula.

Figure 6: WNA Model Results for June 2022 (which included May usage) - Actual Mean and Median HL/AHDD used to project HL vs. Regression



Findings and Observations

PGW's WNA performs well when the calculation of heat load for each customer is in line with historical relationships (as was the case in January 2022). But, as Figure 6 illustrates, when HL does not follow the historical relationship between HL and AHDD as determined by a heat coefficient, WNA methodologies using a heat coefficient will diverge from those using a ratio of NHDD/AHDD. When heat load is unusually large (average HL/AHDD was 1.87 for the residential class in June billing month), WNAs based on a ratio of NHDD/AHDD will overestimate the impact of HDD when AHDD is significantly below NHDD (warmer than normal), and will underestimate the impact of HDD when AHDD is significantly above NHDD (colder than normal).

3.3.3 When Consumption Deviates from the Historical Linear Relationship between Consumption and HDD – a Review of January 2022 and June 2022 Residential Performance

In Atrium's last stress test scenario, Atrium analyzed performance of the WNA mechanism for January and June 2022 billing months under the same assumed weather scenarios, i.e., ranging from 100% increase in AHDD over normal to 100% decrease in AHDD (1 HDD). Atrium compared the WNA performance to what is predicted via linear regression, by holding heat load constant at the average heat load generated for all residential customers versus a linear-generated estimate of HL. Because HL was held constant regardless of whether HDD is colder than normal or warmer than normal, the Ccf portion of the WNA adjustment would be lower

than expected when weather is colder than normal, and higher than expected when weather is warmer than normal. The regression equations for January and June 2022, are shown previously in Table 7 and Table 8, respectively.

The results of those analyses are shown in Figure 7 and Figure 8, below, and emphasize the multiplicative effect of significantly warmer than normal temperatures and heat loads that are increasingly large relative to the normal heat load/AHDD relationship.

Figure 7: WNA Model Results for January 2022 – HL Held Constant at Average Residential HL of 129 Ccf vs. Regression

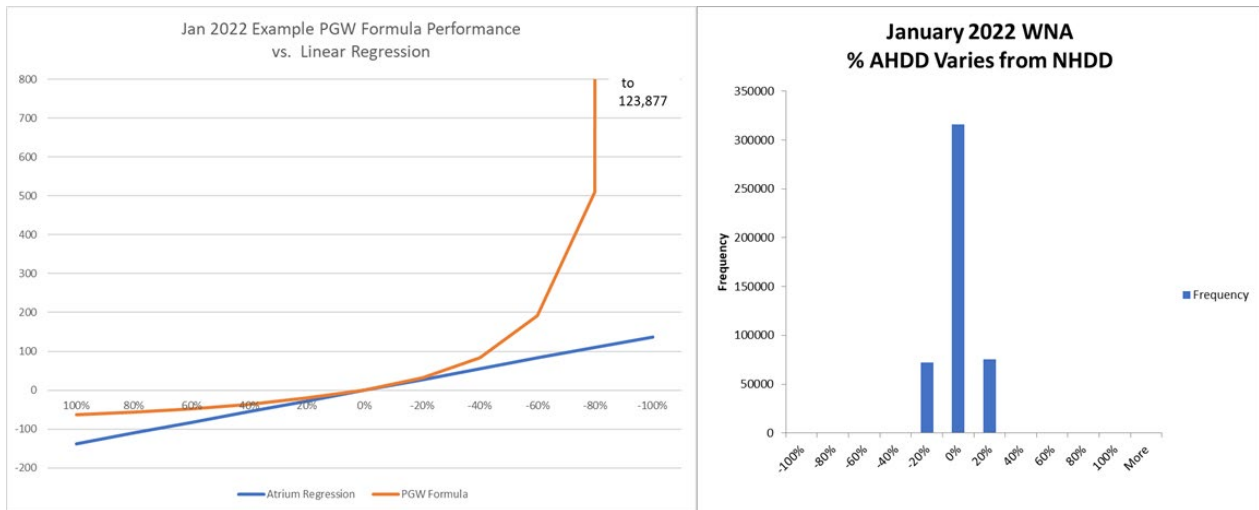
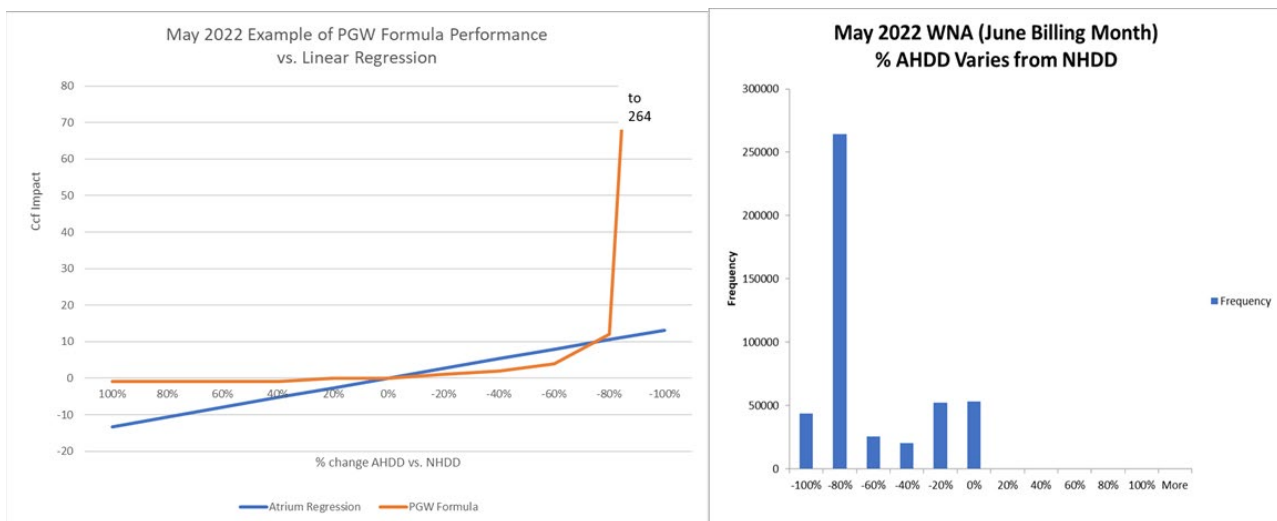


Figure 8: WNA Model Results for June 2022 Billing – HL Held Constant at Average Residential HL of 3 Ccf vs. Regression



Findings and Observations

PGW’s WNA performs well when the calculation of heat load for each customer is in line with historical relationships. But, when heat load is abnormally large in relation to what the



historical linear relationship would predict, due either to the incorrect derivation of HL or BL, or due to unexplained customer usage above their BL, the NHDD/AHDD factor in the formula will overestimate the impact of HDD when NHDD is significantly above AHDD (warmer than normal), and when heat load is unusually small the NHDD/AHDD factor will underestimate the impact of HDD when temperatures are colder than normal. However, the impact is much more dramatic when weather is warmer than normal given the multiplier effect of the ratio once weather becomes more than 50% warmer than normal.

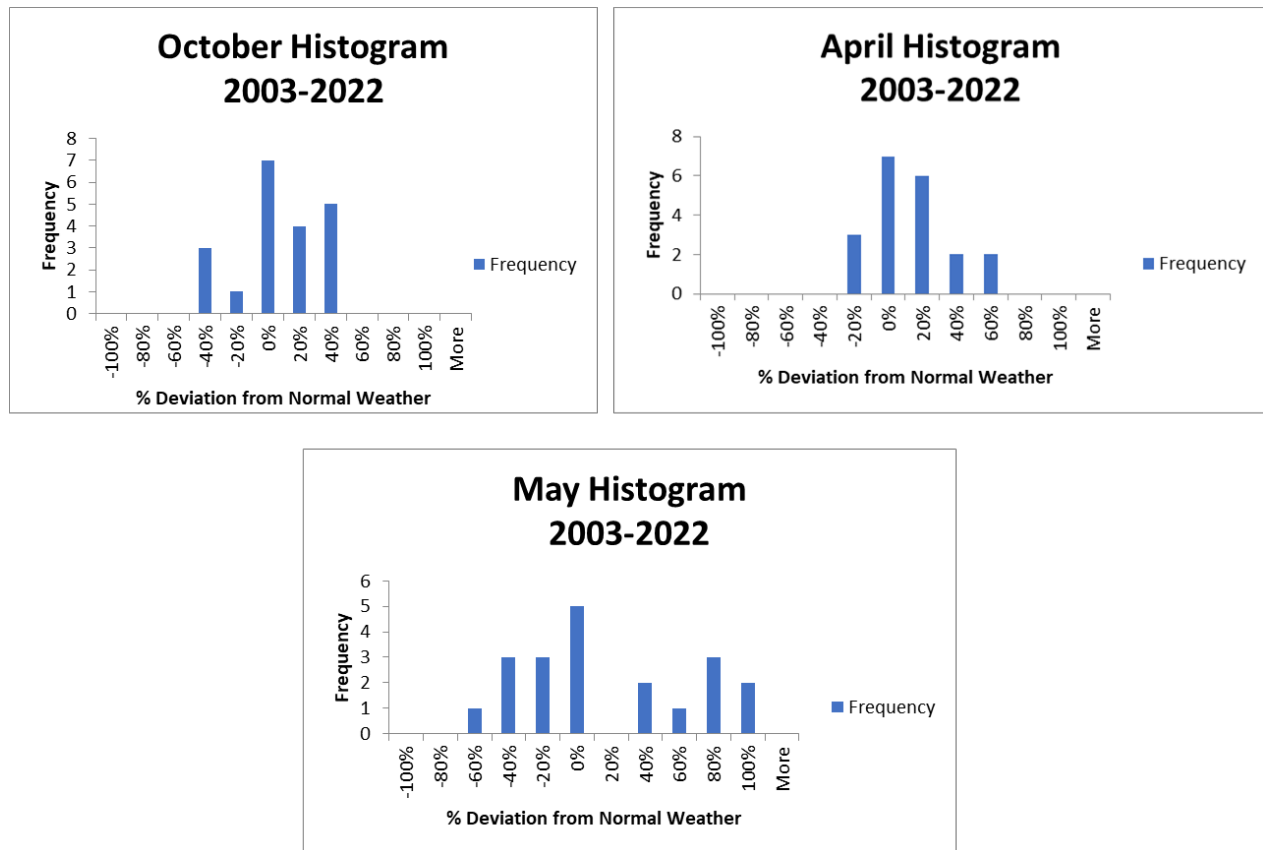
3.4 Weather Analysis

3.4.1 Historical Dispersion between NHDD and AHDD in Philadelphia (2003 - 2022)

Atrium examined AHDD vs. NHDD for each month for the past twenty years. The histograms chart the frequency of a given variation from normal weather. Deviation from normal weather is calculated as $(AHDD_{month}/NHDD_{month}) - 1$

Shoulder Months in Philadelphia

Figure 9: Historical Variances from Normal Weather in Shoulder Months (2003 – 2022)



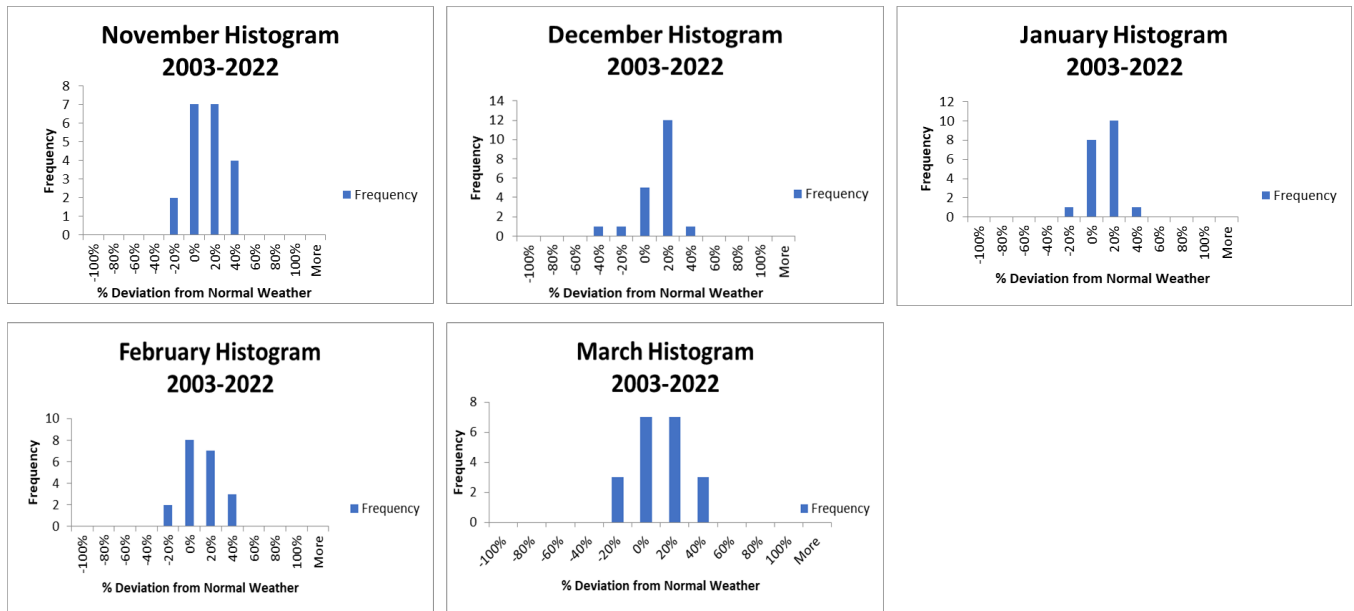
As shown Figure 9, May is outside the typical shoulder months of April and October for heat-related gas usage and has much more variable weather than a typical shoulder month relative to normal weather. Figure 9 shows that only May has the propensity to deviate from normal weather by 100%, which occurred twice since 2003; and has been 80% warmer than normal three times since 2003. No other month has experienced warmer than normal weather to that degree (i.e., 80% to 100% warmer than normal) during our study period 2003-2022.

Findings and Observations

Weather in the shoulder months, and May in particular, tend to be more dispersed than during the winter months, leading to greater deviations from normal weather.

Winter Months in Philadelphia

Figure 10: Historical Variances from Normal Weather in Winter Months (2003 – 2022)



Findings and Observations

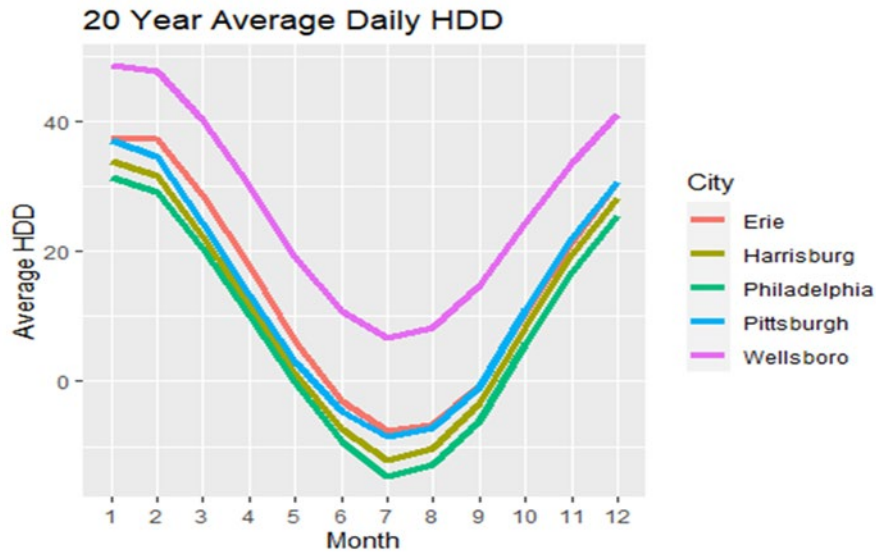
Weather in the winter months tends to cluster more closely around the average normal weather, therefore leading to lesser deviations from normal weather.



3.4.2 Normal Weather Patterns

Pennsylvania

Figure 11: 20 Year Average HDD/Day for Major Pennsylvania Cities



Findings and Observations

Philadelphia is the warmest of the major Pennsylvania cities. On average, over the previous 20 years, the months of May, June, July, August, and September have little to no HDD. July and August provide the lowest possibility for heat-related gas usage, which supports PGW’s practice of looking to July and August usage to determine its daily base load calculation.

Philadelphia

Figure 12: Philadelphia Weather Trends

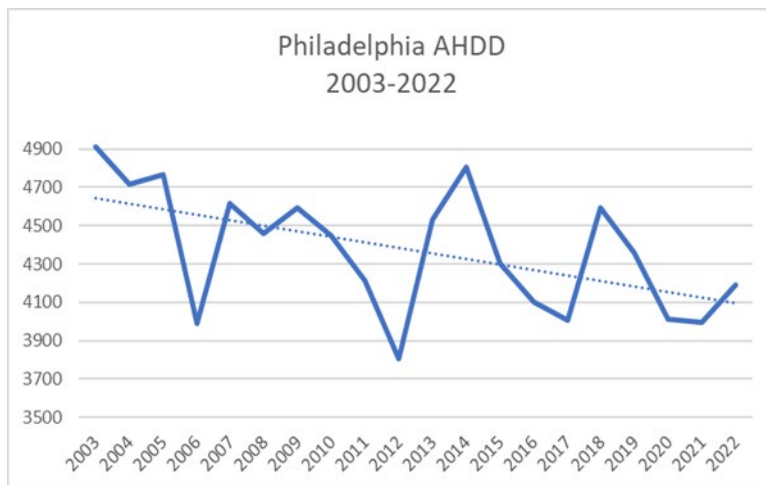
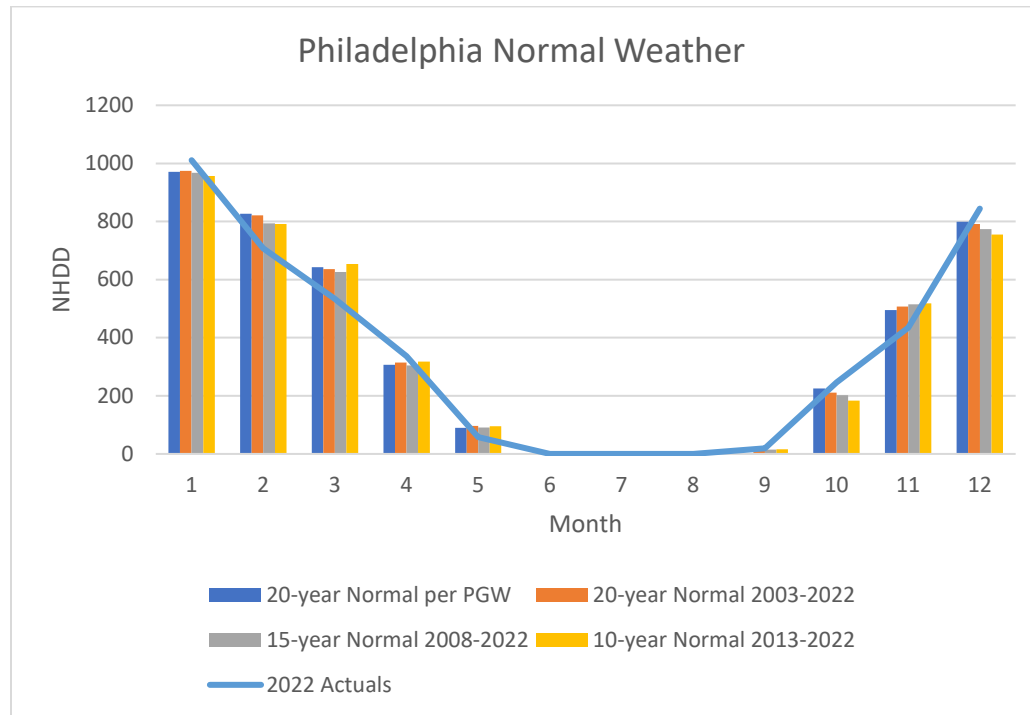


Figure 13: Normal Weather under Varying Averaging Scenarios for Philadelphia

Findings and Observations

Though, as shown in Figure 12, actual temperatures have been trending lower, Figure 13 shows that PGW’s calculation of normal weather 20-year average ending May 2019, provides a reasonable basis for the WNA calculations as it is comparable to the other forecasts by virtue of the differing averaging periods and monthly weather fluctuations despite the overall lowering trend. Overall, the 15-year Normal and the 10-year Normal forecasts call for lower overall HDD, i.e., 4,294 annual HDD for the 15-year forecast and 4,291 HDD for the 10-year forecast, compared to PGW’s current forecast of 4,357 annual HDD. Note also, that PGW’s current forecast does not include forecasted HDD for June and September, which over the periods in question have averaged between 19 and 21 HDD together.

4 Internal Processes and Controls around WNA Mechanism

4.1 Forecasting Process

PGW develops its revenue requirement forecast by first obtaining a trial domestic factor (“DOM”) for each class of customers from sales reported for the summer months in the previous year. This average factor is then utilized in the sendout formula with the customer counts for the months of July, August, and September. A comparison between what the formula calculates and the actual experienced for those three months is ascertained and the trial domestic (base load) factors are finalized to replicate the total sendout experienced.

The finalized DOMs are then utilized in conjunction with the actual sales and customer counts for the months of December, January, and February to determine the average Mcf per degree day for each of the individual months for the remaining temperature sensitive load. The results are weighted by degree-days to give an average value which is utilized as a trial value for the heating factor.

The finalized DOM and the trial heating factor are then applied in the sendout calculations together with customer counts for the months of December, January, and February (the peak winter heating period) to project an estimated sendout for each of these months. The projected sendout is then compared with the actual sendout experienced. Any variation between the projected and actual is adjusted to force the replication of the actual sendout experience, thus resulting in the determination of a finalized heating factor.

Once the final DOM and heating factor have been derived, PGW may predict its class average load, assuming normal weather.

4.1.1 Findings and Observations

PGW uses a heating factor of Mcf/degree day, determined by dividing heat sensitive load by HDD, to forecast sendout. However, PGW relies on a ratio of NHDD/AHDD, applied to a given customer's heat sensitive load, to determine the revenue impact of normal to actual weather variances as determined by its WNA. This represents a disconnect between PGW's forecast methodology and its WNA methodology, whereby PGW's WNA may compute a different impact per HDD for recovery in rates than it assumes in the design of its rates and its revenue requirement.

4.2 Billing Controls

PGW performs a regular review of billing cycle charges for each billing cycle to determine if charges appear reasonable. In June, PGW's review identified the abnormally high charges immediately, which prompted PGW's June 30, 2022, Emergency Petition. Further, PGW performs an annual review of a sampling of WNA charges to ensure that the calculations are in accordance with the Tariff.

4.2.1 Formulaic Controls

Proposed Controls

Though PGW's billing controls were immediately able to identify the abnormally high bills, Atrium recommends that PGW implement the following additional controls that will constrain the WNA formula during significantly warmer than normal periods.

As a guard against the re-occurrence of the severe WNA adjustments in the future, Atrium recommends implementing a billing system control, or cap, that limits the amount of the ratio

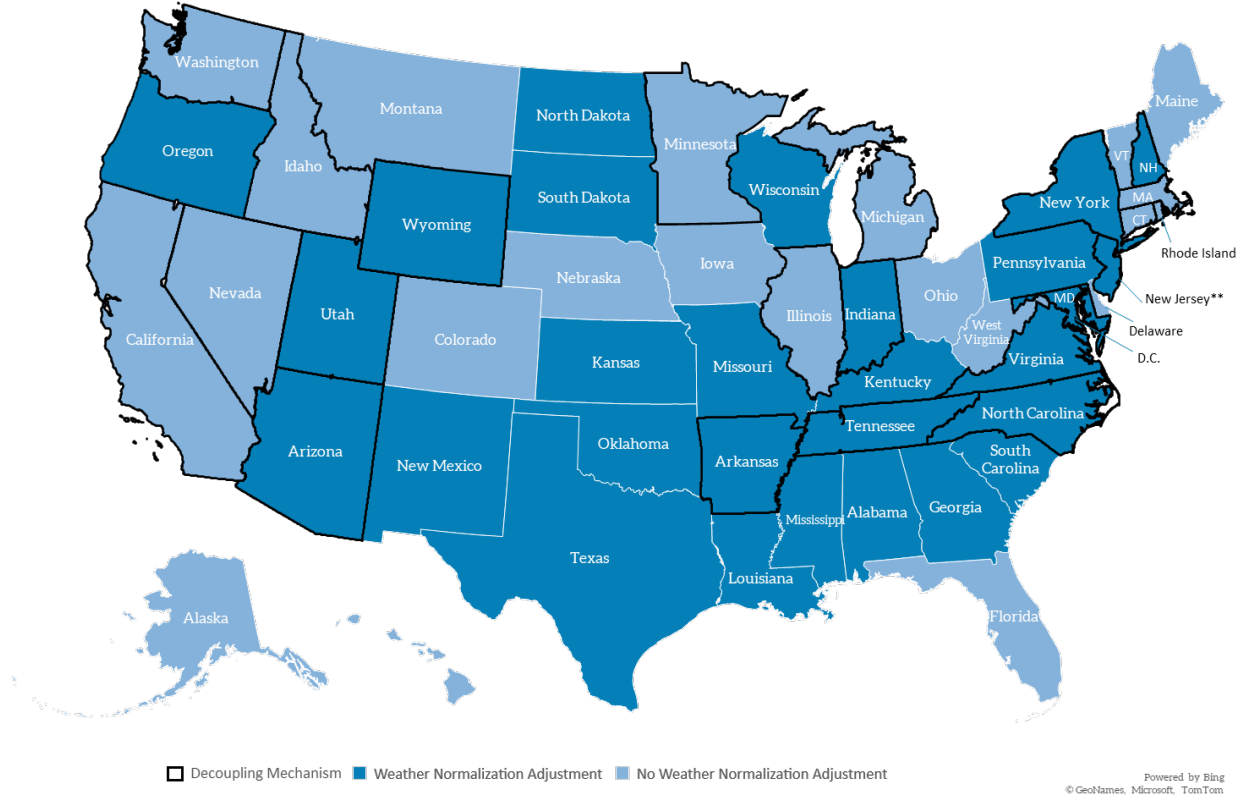
adjustment to consumption to a multiple factor of 60% warmer than normal, resulting in 2.5x adjustment to HL. An alternative billing system control could use the class average heating coefficient at +/- 1 standard deviation as the limit to the HL adjustment, as determined from the Company's weather normalized billing determinant process.

In addition, Atrium recommends that PGW consider implementing controls to ensure the reasonableness of its per-customer base load calculations and to minimize the number of customers that rely on the default base load calculation due to incomplete usage data. There are a number of approaches that PGW could take to check the reasonableness of its base load calculation. This could be performed by aggregating all of its customer-specific base loads for each class and comparing to the actual class base load sendout, adjusting the class default base load such that the aggregated calculated base load agrees to actual sendout. A second alternative control could calculate the standard deviation of the average historic base load calculation (for three to five years) and verify that the current year's calculated base load is within +/- 1 standard deviation from the average base load calculation. Under a third alternative control, PGW could implement a regression-based billing control that would limit the base load calculation to the upper and lower bounds of the confidence interval for the y-intercept of a monthly regression of HDD against total usage for a given customer over a two to five-year period. If PGW were to move to use the class average base load developed by its forecasting group, a process control already exists to ensure the reasonableness of the base load at the class level, and the issue of using default base loads in customer specific WNA calculations is resolved. Alternatively, PGW could adopt a two- or three-year average of July and August usage for determining base load, which also may reduce the number of customers that receive default base loads in their WNA calculations.

5 Survey of WNA Mechanisms Across the U.S.

Based on data maintained by Atrium, compiled through our research and informed by periodic American Gas Association surveys, many gas utilities across a wide geographic area, have implemented WNA mechanisms. Approximately half of US states have approved or are in the process of approving "full" revenue decoupling mechanisms. Specifically, Atrium's survey results indicate that there are 27 states that have approved WNAs for gas companies serving 65 different service areas. In addition, the data indicates that 66% of the gas companies with WNAs utilized a class average HDD factor approach versus a customer-specific HDD factor calculation (used by 33%). Some utilities use both class average for residential or general service classes, and customer-specific for classes with more commercial customers.

Figure 14: Weather Normalization and Full Decoupling Across the U.S.¹⁷



Geographically, decoupling mechanisms are most prevalent in the West, upper Midwest, Northeast and mid-Atlantic regions. In addition, ND, OH, and GA have had “Straight Fixed Variable” rate designs, a pure form of decoupling. A few other states contain much higher fixed costs recovery.

Approximately half of US states have approved weather normalization adjustment mechanisms. Geographically, they are most prevalent in the South, mid-Atlantic and Northeast regions.

**WNA in NJ is suspended as a result of the Gas Conservation Incentive Program Rate Schedule implementation.

5.1 WNA Mechanisms across the Mid-Atlantic and Eastern U.S.

Atrium conducted research on 17 Gas Utilities located across the mid-Atlantic region, including MD, NH, NY, NJ, PA, and VA where WNAs are prevalent.

¹⁷ Full decoupling mechanisms are employed in states that are outlined in black.

Atrium notes that the WNA for PSEG in New Jersey has been suspended as a result of the implementation of the Gas Conservation Incentive Rate Program, however the WNA structure is included for comparative purposes. We consider the following variables for comparison:

- Which months are included in the WNA rate period? (i.e., typically limited to heating season months)
- How does each utility define “normal” weather? (i.e., 10 years, 15 years, 20 years or other)
- WNA Formula and Structure (i.e., is there a coefficient factor or ratio of NHDD/AHDD utilized for the WNA formula)
- Will a “dead-band” apply? (i.e., 1%, 2%, 3% or other)

The survey is attached as Appendix A to this Report.

5.1.1 Findings and Observations

15 of the 17 gas utilities in the mid-Atlantic region limit the WNA rate period to heating season months ranging between 5-8 months, 2 utilities in VA have a year-round WNA rate period.

Atrium notes that most Gas Utilities utilize a 30-Year Average for normal heating degrees days, whereas utilities in PA utilize a 20- or 15-year average.

Utilities across NY, NJ, and VA apply a coefficient x variance between AHDD and NHDD to their WNA formula.

A ratio or proportion of NHDD and AHDD is applied in the WNA formula for all Pennsylvania utilities as well as Columbia Gas of Maryland and Liberty Utilities, NH.

Atrium notes Dead-bands are only applied in PA Utilities at 1% or 3%, except for National Fuel Gas Distribution which does not include a dead-band.

6 Findings and Recommendations

While we find that PGW is executing its existing WNA in accordance with its Tariff, and that the present methodology is aligned with other major gas utilities in Pennsylvania, there are several areas where the WNA mechanism and implementation could be improved. The most immediate concern is to prevent dramatically skewed results from the ratio method in the current WNA formula, when the conditions described in Section 3.3.3 occur; that is, as was experienced in May 2022. The likelihood of this phenomenon occurring is much greater in the shoulder months, and May in particular, whereby the variance of AHDDS from NHDDs is very large, as evidenced in Figure 9 and Figure 10. Atrium notes that Recommendations 1, 2, 3, and 4 serve as reasonable alternatives to each other. Any one of the first four recommendations would prevent the anomalous charges that occurred in June 2022 billings from reoccurring.

Furthermore, Recommendations 5 and 6, though considered improvements to the current WNA processes, are offered for PGW's consideration and are not necessary for the reasonable operation of the WNA formula. Since, in Atrium's review of two years of WNA history, the proposed ratio cap in Recommendation 2 would only have been triggered for May 2022, removing the month of May from the WNA period (Recommendation 1) would also prevent a recurrence of the anomalous June 2022 bills.

Recommendations 3 and 4 offer more extensive changes to the WNA structure and are each a variation of a heat coefficient methodology, where a heat coefficient is applied to the delta between NHDD and AHDD and then applied to the distribution rate to derive the WNA adjustment. In Atrium's opinion, any one of the four recommendations could be adopted to prevent the occurrence of abnormally high bills when weather is significantly warmer than normal. However, Atrium has not examined the cost and time required to implement its recommendations, or the financial impact on PGW.

Recommendation 1: May weather is highly unpredictable and could deviate significantly from normal, though NHDD for May are relatively low compared to other months in the WNA period. As Atrium's analyses show in Section 3.4, the only occurrences where actual monthly HDDs deviated from normal by greater than 60%, occurred in May over the last two decades. Though Atrium believes the billing control it proposes in Recommendation 2, or the structural changes proposed in Recommendations 3 and 4 will address the structural factors of PGW's WNA formula when weather is significantly warmer than normal such that the anomalous charges that occurred in June 2022 could not be repeated, the removal of May from the weather normalization period would also provide an immediate and simplistic solution to avoid the potential for extreme warmer than normal weather conditions such as that which led to the anomalously high bills in June 2022.

Recommendation 2: As a guard against the re-occurrence of the severe WNA adjustments in the future, Atrium recommends implementing a billing system control that limits the amount of the NHDD/AHDD ratio adjustment in PGW's WNA formula to a multiple factor of 60% warmer than normal, resulting in 2.5x adjustment to HL in the formula. An alternative billing system control could use the class average heating coefficient at +/- 1 standard deviation as the limit to the HL adjustment, as determined from the Company's weather normalized billing determinant process. Per Atrium's analysis, over the past two years, the 2.5x ratio cap would only have been triggered in one month for usage in May 2022.

Recommendation 3: A closer tie between the WNA structure and the forecast methodology for setting rates would be desirable to better align the revenue recovered through the WNA with that contemplated in rates. As discussed in more detail in Section 4.1 of this Report, as part of PGW's normal forecasting process, PGW derives a heat coefficient per Mcf, by dividing the class average heat load by HDD. PGW could move to this methodology for its WNA formula, by

making adjustments based on the per-customer class average, i.e., apply the class heat coefficient to the delta between NHDD and AHDD for the month, and then apply the distribution rate (if this is to be a volumetric charge, the WNA adjustment would be divided by actual units consumed for the month for each customer). This modification may simplify PGW's WNA process and would ensure that any WNA recoveries would be more aligned with PGW's rate-setting methodology as the class heat coefficient are calculated for each rate case. In Atrium's view, moving to a class average heat coefficient for the WNA would fit better with PGW's urban residential customer base that includes long term residents, renters and/or customers moving residences, and would eliminate the need to derive a base load for each customer and the difficulties associated with that when the customer base is often changing. This approach would alleviate the issues noted with the ratio approach and would more closely link methods for developing the Company's normalized billing determinants by customer class used to develop rates, with the WNA mechanism.

Recommendation 4: Deriving the heat coefficient through linear regression provides a second variation of a heat-coefficient based WNA alternative. Linear regression can be used to derive the base load (through the y-intercept) and the heat coefficient (or slope coefficient that measures the responsiveness of load to HDD), by regressing load over a period of at least 36 months by HDD. This regression could be performed on a class average basis or on a per-customer basis. This would also alleviate the issues noted with the ratio approach and would provide a statistically sound basis for determining a customer's (or customer class's) response to HDD. It also provides greater alignment to PGW's methods for developing the Company's rates than the existing WNA approach. However, this approach may be difficult to implement and would require a more complicated explanation to customers.

Recommendation 5: Philadelphia weather is trending progressively warmer, and it may be beneficial to PGW to investigate use of a shorter normal averaging period – 15 years, or 10 years – by use of a statistical analysis of degree days, a “root mean squared error” analysis to establish the best estimate of “normal weather. A “root mean squared error,” or “RMSE,” compares the predictive capabilities of the various selected averages. The RMSE is a number representing the degree to which the forecasted values fail to correspond to the actual data. It is a widely used measure to assess the accuracy of point forecasts. While there are other statistical measures used to convey information about a forecast's performance, such as the mean error or mean absolute error, these measures tend to de-emphasize the consistency of the forecasting technique, while the RMSE tends to emphasize this element of the forecast's predictive capabilities.

Recommendation 6: PGW should consider implementing controls to check the reasonableness of its per-customer base load calculations and to minimize the number of customers that rely on the default base load calculation due to incomplete usage data. In some cases, unusually

high heat loads (or unusually small base loads) could have been contributing factors to the anomalously high bills in June 2022. There are a number of approaches that PGW could take to check the reasonableness of its base load calculation. This could be performed by aggregating all of its customer specific base loads for each class and comparing to the actual class base load sendout, adjusting the class default base load such that the aggregated calculated base load agrees to actual sendout. A second alternative control could calculate the standard deviation of the average historic base load calculation (for three to five years) and verify that the current year's calculated base load is within +/- 1 standard deviation from the average base load calculation. Under a third alternative control, PGW could implement a regression-based billing control that would limit the base load calculation to the upper and lower bounds of the confidence interval for the y-intercept of a monthly regression of HDD against total usage for a given customer over a two to five-year period. If PGW were to move to a class average methodology as described in recommendation 3 above, a process control already exists to ensure the reasonableness of the base load at the class level, and the issue of using default base loads in customer specific WNA calculations is resolved. Alternatively, PGW could adopt a two- or three-year average of July and August usage for determining base load, which also may reduce the number of customers that receive default base loads in their WNA calculations.

Appendix A: Eastern Utilities with Approved Weather Normalization Adjustments¹⁸

State	Utility	Weather Averaging Period	Heating Season	WNA Formula	Formula Factors	Deadband
PA	Philadelphia Gas Works	20 Year Average, updated for each rate case	Oct - May	$HL = TU - (BL * BC)$ $WNA = DC * [(HL * \frac{NHDD +/- (NHDD * 1\%)}{AHDD}) - HL]$	Ratio	1%
PA	Columbia Gas of Pennsylvania, Inc. (d/b/a NiSource)	20 Year Average, updated for each rate case	Nov - May	$WNBT = BLMT + [(NHDD / AHDD) * (AMT - BLMT)]$ $WNAT = WNBT - AMT$ $WNA = WNAT * \text{Distribution Usage Charge}$ <p style="text-align: center;">i</p>	Ratio	3%
PA	National Fuel Gas Distribution Corporation (Proposed)	15 Year Average, updated every 5 years	Oct - May	$WNBC = BLMC + [\frac{NHDD}{AHDD} * (AMC - BLMC)]$ $WNAC = WNBC - AMC$ $WNA = WNAC * \text{Distribution Charge}$ <p style="text-align: center;">ii</p>	Ratio	N/A
PA	UGI Utilities, Inc.	15 Year Average, updated every 5 years	Oct - May	$WNBC = BLMC + [((NHDD +/- (NHDD * 3\%)) / AHDD) * (AMC - BLMC)]$ $WNAC = WNBC - AMC$ $WNA = WNAC * \text{Distribution Charge}$ <p style="text-align: center;">iii</p>	Ratio	3%

¹⁸ Each formula presented is described in the pages following the table. Atrium has selected several WNA formulas which utilize a coefficient factor to review in detail on pages A-5 through A-21. For those formulas not detailed on pages A-5 through A-21, Atrium has included formula parameter descriptions in the end notes to this Appendix beginning on page A-22 through A-24.

Weather Normalization Adjustment Review

NJ**	Public Service Electric and Gas Company	20 Year Average updated annually in the WNC proceeding	Oct - May	At the end of the Winter Period during the Annual Period, a calculation shall be made that determines for all months of the Winter Period the level by which margin revenues differed from what would have resulted if normal weather (as determined by reference to the Degree Day Dead Band) occurred. This calculation is made by multiplying the monthly Degree Day Consumption Factor by the difference between Normal Calendar Month Degree Days as adjusted for the Degree Day Dead Band, and Actual Calendar Month Degree Days and, in turn, multiplying the result by the Margin Revenue Factor.	Coefficient Factor	0.5%
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**WNA for Gas Utilities in NJ are suspended as a result of the Gas Conservation Incentive Program Rate Schedule implementation

State	Utility	Weather Averaging Period	Heating Season	WNA Formula	WNA Formula Structure	Deadband
MD	Columbia Gas of Maryland, Inc. (d/b/a NiSource)	30 Year Average	Nov - Mar	$WNA = ((\text{Actual therms} - \text{Base Load therms}) / \text{Actual Degree Days}) \times (\text{Normal Degree Days} - \text{Actual Degree Days})$	Coefficient Factor	N/A
NH	Liberty Utilities (EnergyNorth Natural Gas) Corp.	30 Year Average	Nov - April	$NWF = \frac{\text{DeliveryCharge}_{\text{Normal}} - 1}{\text{DeliveryCharge}_{\text{Actual}}}$ $NWA = \text{DeliveryCharge}_{\text{Actual}} \times NWF$	Ratio	N/A
NY	Consolidated Edison Company of New York, Inc. (d/b/a Consolidated Edison, Inc.)	30 Year Average	Oct - May	$\text{Weather Normalization Adjustment (cents/therm)} = \frac{[\text{NHDD} - \text{AHDD}] * \text{THDD} * \text{PPBR}}{(\text{BL} * \text{BC}) + (\text{THDD} * \text{AHDD})}$	Coefficient Factor	N/A
NY	KeySpan Gas East (Brooklyn Union of Long	30 Year Average	Oct - May	$WAF = \frac{M * DDF * [(NDD + \text{or} - (NDD * .022)) - \text{ADD}]}{(\text{BL} * \text{BC}) + (\text{DDF} * \text{ADD})}$ $WNA \text{ R/S} = (WAF) * (U)$	Coefficient Factor	N/A

Weather Normalization Adjustment Review

	Island) Corporation (d/b/a National Grid)					
NY	Niagara Mohawk Power Corporation (d/b/a National Grid)	30 Year Average	Oct - May	$WAF = M * \frac{DDF * (NDD - ADD)}{BL + (DDF * ADD)}$ $WNA\ R/S = (WAF) * (U)$	Coefficient Factor	N/A
NY	Orange and Rockland Utilities, Inc. (d/b/a Consolidated Edison, Inc.)	30 Year Average	Oct - May	$\text{Weather Normalization Adjustment (cents/ccf)} = \frac{(NHDD - AHDD) * HDDF * PBR}{(BL * BD) + (HDDF * AHDD)}$	Coefficient Factor	N/A
NY	Rochester Gas & Electric Corporation (d/b/a Avangrid)	10 Year Average	Oct - May	$WAF = \frac{DDF * (NHDD - AHDD)}{(BP * BLT) + (DDF * AHDD)}$ $\text{Therms}_{Normal} = \text{Therms}_{Actual} + (\text{Therms}_{Actual} * WAF)$ $WNA_n = (R_n * \text{Therms}_{Normal(n)}) - R_n * \text{Therms}_{Actual(n)}$ $WNA_{Total} = \text{Sum}(WNA_n)$	Coefficient Factor	N/A

State	Utility	Weather Averaging Period	Heating Season	WNA Formula	Formula Mechanics	Deadband
VA	Columbia Gas of Virginia, Inc. (d/b/a NiSource)	30 Year Average	Dec - Apr	$WNBQ = \frac{[(AMQ - BLMQ) * (NHDD/AHDD)] + BLMQ}{v}$	Ratio	N/A
VA	Roanoke Gas Company	30 Year Average	Apr - Mar	<ol style="list-style-type: none"> (1) Dth Volume Adj. = $(HDD_{Normal} - HDD_{Actual}) * M * (\text{Annual no. of bills} / 12)$ (2) Total Revenue Adjust = (a) + (b), where a and b are calculated as follows: (a) = Dth Volume Adj. * X * non-gas margin from the first rate block (b) = Dth Volume Adj. * Y * non-gas margin from the second rate block (3) Adjustment Factor Per Therm = Total Rev Adj./Weather Sensitive Usage 	Coefficient Factor	N/A

VA	Virginia Natural Gas, Inc.	Most recent 30 years ending June	Nov - Apr	$WNA = WNA \text{ Factor} \times (\text{Customer's Volume} - \text{Base Usage})$ <p>The formula for the WNA Factor calculation described in II.A. follows:</p> $WNA \text{ Factor} = \frac{NGRx(NxUCDx(NDD - ADD))}{TOTAL \ CCF - TOTAL \ BASECCF}$	Coefficient Factor	N/A
VA	Washington Gas Light Company	10 Year Average	Oct - May	<p><u>Step 2: The formula for the WNA adjustment is:</u></p> <ol style="list-style-type: none"> 1) Volume Adjustment = (Normal HDD's as shown in II.D.3. - actual HDD's) x (Variation per HDD by class as shown in II.D.1.) x (Total number of bills for the WNA period / 8) 2) Total Revenue Adjustment = Volume Adjustment x Weighted average cost rate per therm by class as shown in II.D.2. 3) Adjustment Factor per therm = Total Revenue Adjustment / (Total Actual Therms - (Base Usage as shown in II.D.4. x Total number of bills)) 4) Individual Customer WNA Charge/Credit = Adjustment Factor per therm x (Actual usage for the WNA period - (Individual Customer's Base Usage x 8)) 	Coefficient Factor	N/A
VA	Atmos Energy Corporation	30 Year Average	May - Apr	<ol style="list-style-type: none"> (1) Ccf Volume Adj. = (HDD Normal - HDD Actual) * M * (Annual no. of bills/12) (2) Total Revenue Adjustment = Volume Adj. * Non-Gas Commodity Margin (3) Adjustment Factor Per Ccf = Total Rev Adj./Annual Weather Sensitive Usage (4) Any residual balance (positive or negative) as a result of actual Weather Normalization Adjustment revenue collected compared to the total revenue adjustment set forth in (2) above shall be added to the following year's revenue adjustment amount. 	Coefficient Factor	N/A

Maryland

Columbia Gas of Maryland, Inc. (NiSource):

A. Heat Coefficient – Customer Based

Columbia Gas of Maryland applies a Heat Coefficient factor formula to the WNA each billing cycle as follows:

$$\text{WNA} = \frac{(\text{Actual therms} - \text{Base Load therms})}{\text{Actual Degree Days}} \times (\text{Normal Degree Days} - \text{Actual Degree Days})$$

Heat coefficient determined by the quotient of the actual therms used in the month of billing less the average Base Load, divided by the actual degree days.

Monthly sales quantities above or below usage associated with normal degree days shall be adjusted in the month of billing by multiplying the degree day variance from normal by the heat coefficient.

B. Base Load

Unspecified

C. Normal Heating Degree Days

Normal heating degree days shall be the same number of degree days used to determine the adjusted sales quantities and revenue requirement in the Company's most recent General Rate Case or Make Whole Proceeding.

D. Method of WNA Adjustment

See part A., above.

New York

Consolidated Edison Company of New York:

A. Heat Coefficient – Class Based

The heat coefficient (**THDD or therms per heating degree day**) are the estimated therms per Customer needed to provide temperature sensitive usage for each degree day, based on average usage by Customers to which this adjustment applies. It is determined separately for each service classification and will be revised annually to reflect the temperature sensitivity reflected in the prior heating season's sales to Customers to which this adjustment applies.

B. Base Load

Base Load therms (**BLT**) per billing day is the estimated therms per Customer used per day for non-temperature sensitive purposes, based on average usage by Customers to which this adjustment applies. It is determined separately for each service classification and will be revised annually to reflect the non-temperature sensitive usage of Customers to which the adjustment applies reflected in the prior heating season's sales.

C. Normal Heating Degree Days

Normal Heating Degree Days (**NHDD**) for any given calendar day within a month are based on the average of the degree days for that calendar day over the thirty year period ending December 31 of the year prior to October 1.

D. Method of WNA Adjustment

The WNA is calculated by dividing the estimated deficiency or excess in pure base revenues per Customer due to weather variation for each billing cycle by the estimated total therms used per Customer for that billing cycle. The weather-related revenue variation per Customer is calculated by taking the **actual heating degree days (AHDD)** for the billing cycle and calculating the amount by which the heating degree days exceed the **normal heating degree days (NHDD)** or are less than the **normal heating degree days (NHDD)** for the billing cycle. That amount is multiplied by the **therms per heating degree days (THDD)** per Customer and the applicable **penultimate pure base rate (PPBR)**. The weather-related revenue variation is then divided by the estimated average total usage per Customer for the particular billing cycle. That amount is calculated by multiplying the **base load therms per billing day (BLT)** by the number of days in the **billing cycle (BC)** and adding the **therms per heating degree days (THDD)** multiplied by the **actual heating degree days (AHDD)** for the particular billing cycle.

$$\text{Weather Normalization Adjustment (cents/therm)} = \frac{[\text{NHDD}-\text{AHDD}] * \text{THDD} * \text{PPBR}}{(\text{BLT} * \text{BC}) + (\text{THDD} * \text{AHDD})}$$

HDD or heating degree days are the difference between 62 degrees and the average outdoor dry bulb temperature for a day based on readings made every hour on the hour throughout the day. HDD are always zero when that average temperature is above 62 degrees. A single heating day is each degree of temperature difference. Heating degree days also refer to the cumulative heating degree days experienced over a period of time greater than one day.

NHDD or normal heating degree days (See C., above)

AHDD or actual heating degree days are the actual difference between 62 degrees and the average outdoor dry bulb temperature for a particular day or days based on readings made every hour on the hour throughout the day. AHDD are always zero when that average temperature is above 62 degrees.

THDD or therms per heating degree day (See A., above)

BLT or base load therms (See B., above).

KeySpan Gas (National Grid):

A. Heat Coefficient – Class Based

The heat coefficient “**DDF**” is the average degree day factor in therms/heating degree day, is the estimated number of therms/heating degree day required to provide space heating for the average customer. DDF is determined separately for each customer classification and is revised annually to reflect the temperature sensitivity reflected in the new throughput forecast. DDFs for the weather normalization period are shown on the Statement of Weather Normalization Degree Day Factors and Base Loads.

B. Base Load

The Base Load “**BL**” is the average Base Load expressed in therms per billing day. It is the estimated number of therms per customer used per day for non-heating purposes based on average usage by customers to which this adjustment applies. It is determined separately for each Service Classification and will be revised annually to reflect the non-temperature sensitive usage of customers to which the adjustment applies reflected in the prior heating season’s sales.

C. Normal Heating Degree Days

Normal Heating Degree Days “**NDD**” days are calculated in the same manner as the actual heating degree days, but they are based on a 30 year average of daily high and low temperatures for the period ending June 30, 2018.

D. Method of WNA Adjustment

The Weather Adjustment Factor will be applied to the customer's total consumption for the billing cycle. A new Weather Adjustment Factor will be calculated for each billing cycle. The monthly volume deviation shall be computed for each billing period for which adjustment is made using the formula described below:

$$WAF = \frac{M * DDF * [(NDD + \text{or} - (NDD * .022)) - ADD]}{(BL * BC) + (DDF * ADD)}$$

$$WNA \ R/S = (WAF) * (U)$$

M = Margin is the non-gas rate in dollars per therm. It equals the unit price of the rate block in which the customer’s monthly delivery usage ended.

DDF = Average degree day factor, see A., above.

HDD, or Heating Degree Days, are the difference between 65 degrees Fahrenheit (F) and the mean of the extreme temperatures during a day. HDD of a day is always zero when the mean temperature is above 65 degrees. A heating degree day is each degree of temperature difference. Heating degree days also refer to the cumulative heating degree days experienced over a period of time more than one day.

ADD = Actual heating degree days are the difference between 65 degrees Fahrenheit (F) and the mean of the extreme temperatures during a day. HDD of a day is always zero when the mean temperature is above 65 degrees. A heating degree day is each degree of temperature difference. Heating degree days also refer to the cumulative heating degree days experienced over a period of time more than one day.

NDD = Normal heating degree days (See C., above)

BL = Average Base Load expressed (see B., above)

BC = Actual Number of Heating Days in the customer billing cycle for which the adjustment applies.

Niagara Mohawk Power (National Grid):

A. Heat Coefficient – Class Based

The heat coefficient “**DDF**” is the average degree day factor in therms/heating degree day, is the estimated number of therms/heating degree day required to provide space heating for the average customer. DDF is determined separately for each customer classification and will be revised annually to reflect the temperature sensitivity reflected in the new throughput forecast. DDFs for the weather normalization period will be shown on the Statement of Weather Normalization Degree Day Factors and Base Loads.

B. Base Load

Base load “**BL**” is the average non-weather sensitive usage (in therms per customer) based on average usage by customers to which this adjustment applies. It is determined separately for each customer classification and will be revised annually to reflect the non-temperature sensitive usage of customers to which the adjustment applies in the new throughput forecast. Base Loads for the weather normalization period will be shown on the Statement of Weather Normalization Degree Day Factors and Base Loads.

C. Normal Heating Degree Days

The normal heating degree days (**NDD**) are calculated in the same manner as the actual heating degree days, but they are based on a 30 year average of daily high and low temperatures ending December 31, 2019.

D. Method of WNA Adjustment

The Weather Adjustment Factor will be applied to the customer's total consumption for the billing cycle. A new Weather Adjustment Factor will be calculated for each billing cycle. The monthly volume deviation shall be computed for each billing period for which adjustment is made using the formula described below:

Under this formula, the Weather Adjustment Factor (**WAF**) is calculated by dividing the estimated deficiency or excess in therms per customer due to weather variation for each billing cycle by the estimated average total therms used per billing cycle. The weather related variation per customer is calculated by taking the actual heating degree days (**ADD**) for the billing cycle and calculating the amount by which the heating degree days exceed the normal heating degree days (**NDD**), or are less than the normal heating degree days (**NDD**), for the billing cycle. That amount is multiplied by the therms per heating degree day (**DDF**) per customer. The weather-related therm variation is then divided by the estimated average total usage per customer for the particular billing cycle. That amount is calculated by taking the base load (**BL**) therms per customer and adding the therms per heating degree days (**DDF**) multiplied by the actual heating degree days (**ADD**) for the particular billing cycle. The resulting ratio is then multiplied by the applicable margin (**M**) to arrive at the Weather Adjustment Factor (**WAF**). The actual refund or surcharge would then be calculated by multiplying the **WAF** by the usage over the billing period (**U**).

$$\text{WAF} = \frac{\text{M} * \text{DDF} * (\text{NDD} - \text{ADD})}{\text{BL} + (\text{DDF} * \text{ADD})}$$

$$\text{WNA R/S} = (\text{WAF}) * (\text{U})$$

WAF = Weather adjustment factor

ADD = Actual heating degree days. Degree days are calculated by subtracting the average daily temperature (sum of the daily high and the daily low divided by two) from 65 degrees F. The remainder is the number of degree days for the day. Heating degree days result when the remainder is a positive number, (i.e., when the average temperature is below 65 degrees F). The heating degree days are then summed over the days that are in the billing cycle.

NDD = Normal Heating Degree Days (See C., above)

DDF = Average degree day factor in therms/heating degree day, is the estimated number of therms/heating degree day required to provide space heating for the average customer. DDF is determined separately for each customer classification and will be revised annually to reflect the temperature sensitivity reflected in the new throughput forecast. DDFs for the weather normalization period will be shown on the Statement of Weather Normalization Degree Day Factors and Base Loads.

BL = Base load (see B., above)

M = Margin is the non-gas rate in dollars per therm. It equals the unit price of the rate block in which the customer's monthly delivery usage ended.

R/S = Refund or Surcharge in \$/customer.

U = Usage over the billing period in therms/customer.

Daniel Clearfield
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April 4, 2023

Via Electronic Filing

Rosemary Chiavetta, Secretary
PA Public Utility Commission
400 North Street, 2nd Floor
Harrisburg, PA 17120

Re: PA Public Utility Commission v. Philadelphia Gas Works
2023 PGW Base Rate Case Filing – Docket No. R-2023-3037933

Dear Secretary Chiavetta:

On behalf of Philadelphia Gas Works ("PGW") enclosed for electronic filing please find the Supplemental Direct Testimony of Denise Adamucci (PGW St. No. 1-SD) and Ronald Amen (PGW St. No. 8-SD) with regard to the above-referenced matter. This filing replaces the document filed at 2466401, of which we have requested rejection. eFiling confirmation number Copies to be served in accordance with the attached Certificate of Service.

Sincerely



Daniel Clearfield
DC/lww

Enclosure

cc: Hon. Charles E. Rainey, Jr., w/enc.
Cert. of Service w/enc.

CERTIFICATE OF SERVICE

I hereby certify that this day I served a copy of PGW's Supplemental Direct Testimony upon the persons listed below in the manner indicated in accordance with the requirements of 52 Pa. Code Section 1.54.

Via First-Class Mail and Email

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Dated: April 4, 2023

Daniel Clearfield
Daniel Clearfield, Esq.

Orange and Rockland Utilities (Consolidated Edison):

A. Heat Coefficient – Class Based

The heat coefficient “**HDDF**” or heating degree day factor is the estimated number of ccf per customer needed to provide space heating for each degree of a degree day based on average usage by customers to which this adjustment applies. The HDDF shall be determined separately for each customer rate classification and shall be revised annually. The HDDF shall be submitted to Staff on or before August 31 for inclusion in the October 1 start date of each year's Weather Normalization Adjustment.

B. Base Load

Base Load per billing day “**BL**” is the estimated number of ccf per customer used per day for non-heating purposes based on average usage by customers to which this adjustment applies. BL shall be determined separately for each customer rate classification and shall be redetermined annually using the prior two heating seasons' sales.

C. Normal Heating Degree Days

Normal Heating Degree Days “**NHDD**” commencing May 1, 2022, NHDD or normal heating degree days shall be 4,945 heating degree days, the average for the 30 calendar years ended December 31, 2019.

D. Method of WNA Adjustment

The Weather Normalization Adjustment shall be calculated for each billing cycle and shall be calculated separately for each customer rate classification. The Weather Normalization Adjustment shall be calculated using the following formula rounding to the nearest 0.001 cents per 100 cubic feet:

$$\text{Weather Normalization Adjustment (cents/ccf)} = \frac{(\text{NHDD} - \text{AHDD}) * \text{HDDF} * \text{PBR}}{(\text{BL} * \text{BD}) + (\text{HDDF} * \text{AHDD})}$$

PBR or pure base rate is the tail block delivery charge set forth in Service Classification Nos. 1, 2 and 6.

BD or billing days is the actual number of days for which service is being billed.

HDD or heating degree days are the difference between 63 degrees F. and the average outdoor dry bulb temperature for a day based on readings made every hour on the hour throughout the day. HDD are always zero when that average temperature is above 63 degrees F.

NHDD or Normal Heating Degree Day (See C., above)



AHDD or actual heating degree days are the actual difference between 63 degrees F. and the average outdoor dry bulb temperature for a particular day or days based on readings made every hour on the hour throughout the day. AHDD are always zero when that average temperature is above 63 degrees F.

HDDF or heating degree day factor is the estimated number of ccf per customer needed to provide space heating for each degree of a degree day based on average usage by customers to which this adjustment applies. The HDDF shall be determined separately for each customer rate classification and shall be revised annually.

BL or Base Load (See B., above)

Rochester Gas & Electric (Avangrid):

A. Heat Coefficient – Class Based

The heat coefficient "**DDF**" or Degree Day Factor is the estimated number of temperature sensitive Therms required for each heating degree-day. If the customer has insufficient billing history to calculate the DDF, the average DDF for the applicable service class shall be used. The service class average DDFs shall be revised annually.

B. Base Load

Base Load Therms "**BLT**" is the estimated number of non-temperature sensitive Therms per day. The estimate is based on the average daily use in the July and August billing months. If the customer has insufficient billing history to calculate the BLT, the average BLT for the applicable service class shall be used. The service class average BLTs shall be revised annually.

C. Normal Heating Degree Days

Normal Heating Degree Days "**NHDD**" for any given calendar day, are based upon a 10-year average of the heating degree-days for that calendar day. The applicable 10-year period ends on December 31st of the year before the current WNA season. NHDD is also used to refer to the cumulative NHDD for any defined period greater than one day.

D. Method of WNA Adjustment

The WNA shall be applied to the total gas usage during the WNA season of October 1st through May 31st of each year. If only a portion of a customer's total gas usage for a particular billing period is applicable to the WNA season, then the WNA shall be adjusted to reflect the portion applicable to the WNA season. The WNA is calculated using the formula below:

$$WAF = \frac{DDF * (NHDD - AHDD)}{(BP * BLT) + (DDF * AHDD)}$$

$$\begin{aligned} \text{Therms}_{\text{Normal}} &= \text{Therms}_{\text{Actual}} + (\text{Therms}_{\text{Actual}} * WAF) \\ WNA_n &= (R_n * \text{Therms}_{\text{Normal}(n)}) - R_n * \text{Therms}_{\text{Actual}(n)} \end{aligned}$$

$$WNA_{\text{Total}} = \text{Sum } (WNA_n)$$

"**WAF**" is the Weather Adjustment Factor.



"HDD" or Heating Degree Days are the difference between 65 degrees Fahrenheit and the average of the minimum and maximum temperature as reported by the Rochester National Weather Service station for a particular day. The HDD are zero when the average temperature is greater than 65 degrees Fahrenheit. HDD is also used to refer to the cumulative HDD for any defined period greater than one day.

"NHDD" or Normal Heating Degree Days, (See C., above)

"AHDD" or Actual Heating Degree Days are the actual difference between 65 degrees Fahrenheit and the average of the minimum and maximum temperature as reported by the Rochester National Weather Service station for a particular day. AHDD is zero when the average temperature is equal to or greater than 65 degrees Fahrenheit. AHDD is also used to refer to the cumulative AHDD for any defined period greater than one day.

"BP" or Billing Period is the actual number of billing days that occur during the WNA season.

"BLT" or Base Load Therms, (see B., above)

"DDF" or Degree Day Factor (See A., above)

"ThermsNormal" is the estimated number of Therms the customer would have used if the weather were normal during the billing cycle.

"ThermsActual" is the number of Therms the customer actually used during the billing cycle.

"ThermsNormal" is the number of ThermsNormal that fall in the applicable rate block. **"ThermsActual(n)"** is the number of ThermsActual that fall in the applicable rate block.

"WNA_n" is the weather normalization adjustment for the applicable rate block and is expressed in dollars.

"R_n" is the applicable block rate and is expressed in dollars per Therm.

"WNA_{total}" is the customer's weather normalization adjustment and is expressed in dollars.

Virginia

Roanoke Gas Company:

The Weather Normalization Adjustment will be applicable for each twelve-month period. The Weather Normalization Adjustment is applicable to service delivered under the terms of all firm rate schedules throughout the entire service area of the Company when the annual heating degree days from April to March in a given period do not match the heating degree days in the most recent 30-year period.

A. Heat Coefficient – Class Based Regression

The Heat Coefficient “**M**” will be the slope of the regression equation for the adjustment period for each rate schedule.

B. Base Load – Class Based

Base therms equal total customer bills times the Y intercept value of the regression equation for the adjustment period for each rate schedule.

C. Normal Heating Degree Days

Normal Heating Degree Days are heating degree days in the most recent 30-year period.

D. Method of WNA Adjustment

Calculation of Adjustment Factor:

The Weather Normalization Adjustment Factor will be calculated for each customer class as follows:

(1) Dth Volume Adj. = $[\text{HDD Normal} - \text{HDD Actual}] * M * (\text{Annual no. of bills} / 12)$

(2) Total Revenue Adjust = (a) + (b), where a and b are calculated as follows:

(a) = $\text{Dth Volume Adj.} * X * \text{non-gas margin from the first rate block}$

(b) = $\text{Dth Volume Adj.} * Y * \text{non-gas margin from the second rate block}$

(3) Adjustment Factor Per Therm = $\text{Total Rev Adj.} / \text{Weather Sensitive Usage}$

Notes:

M will be the slope of the regression equation for the adjustment period for each rate schedule.

X will be the percentage of weather sensitive therms in the first rate block for the rate schedule

Y will be the percentage of weather sensitive therms in the second block of the rate schedule

Weather sensitive therms equals total therms minus base therms. Base therms equals total customer bills times the intercept value of the regression equation for the adjustment period for each rate schedule.

Calculation of the Adjustment for Each Customer:



The Weather Normalization Adjustment Amount will be calculated for each individual customer bill as follows:

- (1) Weather Sensitive Usage = Total Usage – (Monthly Base Usage * 12)
- (2) Adjustment Amount = Weather Sensitive Usage * Weather Normalization Adjustment Factor

Note: Monthly Base Usage will be the average usage for the most recent months of July and August if there is usage in both months. If there is usage in only one of these months, then the usage for that month will be used. For customers who lack a sufficient history during the current year to compute Monthly Base Usage, the Company may substitute consumption data for the same premise, if available. Otherwise, the value of Monthly Base Usage will be based on the class average for the months of July and August.

Billing of WNA on Customer Bills:

All adjustments and refunds will be included in the customer’s bill following the Weather Normalization Adjustment for the preceding period. Budget billing customers shall have the surcharge or credit applied to the cumulative balance of their payments and charges. WNA adjustments are to be applied to the customer’s bill between May and August according to the following schedule:

WNA Trigger	Equal Monthly Billing Adjustment
< 5% Warmer than Normal	One
>5% to 10 Warmer than Normal	Two
>10% Warmer than Normal	Three
Colder than Normal	One

Virginia Natural Gas, Inc.:

A. Heat Coefficient – Class Based

UCD is the Usage per Customer per HDD derived from a regression analysis based on the three most recent six months WNA periods using cycle-specific data.

B. Base Load

BASE CCF is the average base usage per customer determined by averaging the average use per customer for cycles with 0 heating degree days during the most recent three years ending in June.

C. Normal Heating Degree Day

Normal Heating Degree Day (**NDD**) is the summation of the normal Heating Degree Days for the billing cycle based on the most recent 30 years ending June.

D. Method of WNA Adjustment

For each applicable customer class, the WNA will be applied during a billing cycle such that the WNA Factor will be multiplied by the individual customer's volume less the Base Usage per customer to get the WNA applied to the individual customer's bill. The formula for the WNA is as follows:

$$WNA = WNA \text{ Factor} \times (\text{Customer's Volume} - \text{Base Usage})$$

The formula for the WNA Factor calculation described in II.A. follows:

$$WNA \text{ Factor} = \frac{NGR \times (N \times UCD \times (NDD - ADD))}{TOTAL \ CCF - TOTAL \ BASECCF}$$

NGR is the effective volumetric non-gas rate.

UCD (see A., above)

N is the number of monthly bills issued to customers during the billing cycle for the applicable rate schedule.

NDD or normal Heating Degree Days (See C., above)

ADD is the summation of the actual Heating Degree Days experienced by the Company during the billing cycle.

TOTAL CCF is the aggregate volumes to be billed for the billing cycle for the applicable rate schedule.

BASE CCF (see B., above)

TOTAL BASE CCF is the average base usage per customer determined by averaging the average use per customer for cycles with 0 heating degree days during the most recent three years ending in June multiplied by the number of customers billed for the billing cycle.



Washington Gas Light Company:

A. Heat Coefficient – Class Based

Variation per HDD by class derived from a linear regression performed on the actual HDD's by month on a cycle sales basis against the average number of therms per bill each month. This provides a statistically representative estimate of the number of average weather sensitive therms per HDD by class of customer, or the variation per degree day¹⁹.

B. Base Load

Individual Customer's Base Usage is defined as each customer's average usage for July and August of the test year in the most current rate case. If in any given month during the WNA period the customer's actual usage is less than the Individual Customer's Base Usage, then that month's actual usage will be considered base usage for that month.

C. Normal Heating Degree Day

Normal Heating Degree Day for Washing Gas are based on historical data from the past 3,682 days (approximately 10 years).

D. Method of WNA Adjustment

The formula for the WNA adjustment is:

1) Volume Adjustment = (Normal HDD's - actual HDD's) x (Variation per HDD by class) x (Total number of bills for the WNA period / 8).

2) Total Revenue Adjustment = Volume Adjustment x Weighted average cost rate per therm by class.

3) Adjustment Factor per therm = Total Revenue Adjustment / (Total Actual Therms - (Base Usage x Total number of bills)).

4) Individual Customer WNA Charge/Credit = Adjustment Factor per therm x (Actual usage for the WNA period - (Individual Customer's Base Usage x 8))

Individual Customer's Base Usage is defined as each customer's average usage for July and August of the test year in the most current rate case. If in any given month during the WNA period the customer's actual usage is less than the Individual Customer's Base Usage, then that month's actual usage will be considered base usage for that month.

For new customers that did not receive service during July and August of the test year in the most current rate case, the class average Base Usage, will be used as the Individual Customer's Base Usage until an actual July and August usage is obtained. Once an actual July and August usage is obtained, the average usage for that July and August will be used as the customer's Individual Base Usage until the next rate case.

¹⁹ Washington Gas Light Company Rate Case PUE-2006-00059 Direct Testimony of James B. Wagner

Atmos Energy Corporation:

A. Heat Coefficient Regression – Class Based per Weather Zone

The Heat Coefficient “**M**” will be the slope of the most recent 36 months regression equation for the adjustment period for each rate schedule and weather zone. Annual Weather Sensitive Usage is defined as the 12 months total actual usage less the Base Load usage for the same period.

B. Base Load

The Base Load usage is defined as the intercept value resulting from the most recent 36 months regression equation multiplied times the 12 months total of bill counts.

C. Normal Heating Degree Days

Normal Heating Degree Days “**HDD Normal**” are based on the most recent 30-year average of heating degree days.

D. Method of WNA Adjustment

The Weather Normalization Adjustment Factor will be calculated for each customer class and weather zone as follows:

(1) $Ccf\ Volume\ Adj. = (HDD\ Normal - HDD\ Actual) * M * (Annual\ no.\ of\ bills/12)$

(2) $Total\ Revenue\ Adjustment = Volume\ Adj. * Non-Gas\ Commodity\ Margin$

(3) $Adjustment\ Factor\ Per\ Ccf = Total\ Rev\ Adj./Annual\ Weather\ Sensitive\ Usage$

(4) Any residual balance (positive or negative) as a result of actual Weather Normalization Adjustment revenue collected compared to the total revenue adjustment set forth in (2) above shall be added to the following year’s revenue adjustment amount.

ⁱ Weather Normalized Billing Therms (WNBT) will be calculated as the Base Load Monthly Therms (BLMT) added to the product of the Normal Heating Degree Days (NHDD) divided by the Actual Heating Degree Days (AHDD) and the Actual Monthly Therms (AMT) less the Base Load Monthly Therms (BLMT). (b) Base Load Monthly Therms (BLMT) are established for each customer using the customer's actual average daily consumption from the billing system, measured in therms, for the two months with the lowest consumption per billing day for the three billing months of July, August and September. The average baseload per day information will be updated annually. If actual BLMT information is not available for the year, the Company will use the most recently available base load information for the premise. If no history is available, the Company shall use the overall base load average for the residential class reflected in the most recent rate case. (c) Normal Heating Degree Days (NHDD) shall be updated annually by September 1st using the same methodology established in the Company's most recent Rate Case. NHDD for any given day are based upon the 20 year average for the given day. (d) Actual Heating Degree Days (AHDD) are the actual experienced heating degree days for the billing cycle. The degree day data is provided by the National Oceanic and Atmospheric Administration (NOAA). Customers will be assigned to weather stations based on their geographic locations. (e) Actual Monthly Therms (AMT) are measured for each customer and billing cycle. (f) Actual Monthly Therms (AMT) will be subtracted from the Weather Normalized Billing Therms (WNBT) to compute the Weather Normalized Adjustment Therms (WNAT). (g) The WNAT is then multiplied by the residential Distribution Usage Charge to compute the WNA amount that will be charged or credited to each residential customer.

ⁱⁱ **WNA** = Weather Normalization Adjustment will be applied to bills of Residential and Non-Residential customers under Residential, LIRA, and Commercial and Public Authority Rate Schedules, for any billing period during the heating season October through

WNBC = Weather Normalized Billing Ccfs ("WNBC") will be calculated as the Base Load Monthly Ccfs ("BLMC") added to the product of (1) the NHDD divided by the AHDD and (2) the Actual Monthly Ccfs ("AMC") less the BLMC. WNA will not be applicable for the billing period if AMC is less than the BLMC.

BLMC = Base Load Monthly Ccfs shall be established for each customer using the customer's actual consumption from the billing system, measured in Ccfs.

NHDD = Normal Heating Degree Days shall be based upon the 15-year average for the given day, as reported by the National Oceanic and Atmospheric Administration (NOAA) for the Erie International Airport weather station. NHDD shall be updated every 5 years with the next scheduled update of the NHDD to be effective on October 1, 2027, and thereafter every five years.

AHDD = Actual Heating Degree Days shall be the actual experienced heating degree days during the billing cycle AHDD shall be based upon experienced actual Gas Day temperatures as reported by the National Oceanic and Atmospheric Administration (NOAA) for the Erie International Airport weather station. The full proposed tariff language is provided as National Fuel Exhibit F – Proposed Tariffs, Tariff Pages 158 & 159 detailing Rider C, Weather Normalization Adjustment.

AMC = Actual Monthly Ccfs will be subtracted from the WNBC to compute the Weather Normalized Adjustment Ccfs ("WNAC").

The WNAC shall then be multiplied by the applicable Rate Schedule Distribution Charge based on service rendered to compute the WNA amount that will be charged or credited to each Residential and Non-Residential customer served under Residential, LIRA, and Commercial and Public Authority Rate Schedules.

ⁱⁱⁱ **WNA**= Weather Normalization Adjustment will be applied to bills of Residential and Non-Residential customers under Rate Schedules R/RT and N/NT, for any billing period during the heating season October through May. WNA will not be applicable for the billing period if AMC is less than the BLMC.

WNBC= Weather Normalized Billing Ccfs("WNBC") will be calculated as the Base Load Monthly Ccfs ("BLMC") added to the product of(1)the Normal Heating Degree Days ("NHDD") divided by the Actual Heating Degree Days ("AHDD") and(2)the Actual Monthly Ccfs ("AMC") less the BLMC. Weather Normalized Billing Ccfs (WNBC) will only be calculated if the AMC exceeds the BLMC.

BLMC= Base Load Monthly Ccfs for each customershall be established for each customer using the customer'sactual average daily consumption from the billing system, measured in Ccfs, using bills with read dates of June 21st thru September 20th over a 36-month period multiplied by the number of days in the billing period. The average daily base load is recalculated monthly using themost recent 36months of bill history. If less than 12months of bill history is available for the customer, an average baseload for the related customer class will be applied.

NHDD= Normal Heating Degree Days shall be applied on a Delivery Region specific basis as determined by the customer's geographical location and, for any given day within a billing period, shall be based upon the Delivery Region's 15- year average for the given day. NHDD shall be updated every 5 years using the methodology established in the Company's general rate case proceeding at R-2021-3030218 with the next scheduled update of the NHDD to be effective on October 1, 2025, and thereafter every 5years.

AHDD= Actual Heating Degree Days shall be the actual experienced heating degree days during the billing cycle for the customer's assigned Delivery Region, as determined by the customer's geographical location. A Delivery Region's AHDD shall be based upon experienced actual Gas Day temperatures as reported by the National Oceanic and Atmospheric Administration (NOAA) for weather stations located within that Delivery Region pursuant to the application of the Company's established Delivery Region calculation methodology.

AMC= Actual Monthly Ccfs will be subtracted from the WNBC to compute the Weather Normalized Adjustment Ccfs ("WNAC").

^{iv} The **Normal Weather Adj** is calculated by multiplying your Actual Distribution Charges and the **Normal Weather Factor (NWF)**

The **NWF** is calculated by dividing the Normalized Distribution Charges with your Actual Distribution Charges and subtracting 1

The **Normalized Distribution Charges** are calculated by multiplying the **Total Normalized Use** by the **Distribution Rate**

The **Total Normalized Use** is the **Base Use** plus the **Normalized Heating Use**

The **Normalized Heating Use** is the **Normalized HDD** multiplied by the **Normalization Slope**

The **Normalization Slope** is the **Actual Heating Use** divided by the **Actual HDD**

The **Actual Heating Use** is determined by subtracting the **Base Use** from the **Total Consumption**

The **Base Use** is calculated by multiplying the **Base Load** by the number of days on the bill

The **Base Load** is the usage per day during the last 2 Peak Summer bills from the last two years- currently July and August 2017 and July and August 2018

^v **Actual Heating Degree Days (AHDD)** -The average hourly temperature for each day subtracted from a reference temperature of 65 degrees, but not less than zero, for the cumulative days of an Applicable Customer's designated billing unit.

Normal Heating Degree Days (NHDD) - the 30 year rolling average of the AHDD, updated on a calendar year basis, corresponding to the period utilized in Section 12.2(c)(I) for an Applicable Customer's designated billing unit. The initial 30 year rolling average of the AHDD shall be for the 30 year period ending December 31, 2010 (WNA applicable to meter readings on and after February 1, 2011).

Base Load Monthly Quantities (BLMQ) -the average daily consumption by an Applicable Customer, measured in Dth, for the two months with the lowest consumption per billing day from the period of the three immediately preceding summer months, of July, August and September, updated annually, multiplied by the number of days in the Applicable Customer's designated billing unit. If an Applicable Customer's BLMQ cannot be determined in this manner, the Company will utilize the BLMQ for the premises or establishment or, if such BLMQ is not available, the Company will utilize the overall average base load quantity, measured in Dth, for the corresponding customer class to determine the Applicable Customer's BLMQ until such time as the BLMQ can be calculated using the Applicable Customer's consumption data.

Actual Monthly Quantities (AMQ) -the quantity of gas consumed by an Applicable Customer during the designated billing unit utilized in Section 12.2(c)(i), measured in Dth, as determined pursuant to Section 2 of the General Terms and Conditions.

Weather Normalized Billing Quantities (WNBQ) -the restated monthly Dth to be applied to the non-gas portion of bills referenced in Section 12.2(a), as computed for each Applicable Customer using the formula set forth in Section 12.2(d) below.

Net Winter Usage (NWU) -the AMQ less the BLMQ for the WNA application period.

Weather Normalization Adjustment Quantity (WNAQ) -the quantity in Dth by which a customer's bill will be adjusted to reflect normal weather.

^{vi} The weather Normalization Adjustment Amount will be calculated for each individual customer bill as follows:

(1) Weather Sensitive Usage = Total Usage – (Monthly Base Usage * 12)

(2) Adjustment Amount = Weather Sensitive Usage * Weather Normalization Adjustment Factor

Note: Monthly Base Usage will be the average usage for the most recent months of July and August if there is usage in both months. If there is usage in only one of these months, then the usage for that month will be used. For customers who lack a sufficient history during the current year to compute Monthly Base Usage, the Company may substitute consumption data for the same premise, if available. Otherwise, the value of Monthly Base Usage will be based on the class average for the months of July and August.



VERIFICATION

I, Ronald J. Amen, hereby state that: (1) I am employed by Atrium Economics, LLC (“Atrium”) as Managing Partner; (2) I have been retained by Philadelphia Gas Works (“PGW”) and am authorized to present testimony on its behalf; (3) the facts set forth in my testimony are true and correct (or are true and correct to the best of my knowledge, information and belief); and, (4) 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 18 Pa. C.S. § 4904 (relating to unsworn falsification to authorities).

Date: April 3, 2023



Ronald J. Amen
Managing Partner
Atrium Economics, LLC