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February 29, 2024

VIA ELECTRONIC FILING

Rosemary Chiavetta, Secretary
Pennsylvania Public Utility Commission
400 North Street
Keystone Building, 2 North
Harrisburg, PA 17120

RE: Philadelphia Gas Works' ("PGW") Annual Resource Planning Report
Forms 1 & 2; Docket No. M-2024-3045244

Dear Secretary Chiavetta:

On behalf of Philadelphia Gas Works ("PGW") enclosed please find its Annual Resource Planning Report, Forms 1 and 2. Please feel free to contact me if you have any questions.

Sincerely,



Karen O. Moury

KOM/jls
Enclosures

cc: Certificate of Service w/encs. (via email only)
Paul Diskin, Director, Bureau of Technical Utility Services (via pdiskin@pa.gov)

CERTIFICATE OF SERVICE

I hereby certify that this day I served a copy of PGW’s Annual Resource Planning Report Forms 1 and 2, upon the persons listed below in the manner indicated in accordance with the requirements of 52 Pa. Code Section 1.54.

Via Email

Allison Kaster, Esq.
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Pennsylvania Public Utility Commission
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Date: February 29, 2024

Karen O. Moury, Esquire

ANNUAL RESOURCE PLANNING REPORT

Philadelphia Gas Works

Philadelphia, Pennsylvania

March 2024

Forms 1 & 2

BEFORE THE PENNSYLVANIA PUBLIC UTILITY COMMISSION

**Philadelphia Gas Works
800 West Montgomery Avenue
Philadelphia, Pennsylvania 19122**

ANNUAL RESOURCE PLANNING REPORT
MARCH 2024

Forms 1 & 2

**Information Submitted in Compliance with and Pursuant to Title 52
Pennsylvania Code Section 59.81**

PHILADELPHIA GAS WORKS

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<u>EXHIBIT NO.</u>	<u>REGULATION</u>	<u>DESCRIPTION</u>
1	59.81	General
2	59.81	Forms IRP-Gas 1A, and 1B Annual and Peak Day Energy Demand
3	59.81	Forms IRP-Gas 2A, 2B, and 2C Annual and Peak Day Energy Resources, And transmission and storage contracts

Section 59.81: **General**

Pursuant to Section 59.81 (a), each major jurisdictional gas utility must file an annual resource planning report (ARPR) on or before June 1, 1996 and June 1 of each succeeding year, except Form 1A/2A which filing date is March 1. The report must be submitted to:

Secretary
Pennsylvania Public Utility Commission
P.O. Box 3265
Harrisburg, PA 17105-3265

One courtesy copy should also be submitted to:

Pennsylvania Public Utility Commission
Conservation, Economics and Energy Planning
P.O. Box 3265
Harrisburg, PA 17105-3265

Also submit one (1) copy to the following:

Office of Consumer Advocate
555 Walnut Street
Forum Place, 5th Floor
Harrisburg, PA 17101-1921

Office of Small Business Advocate
Suite 202, Commerce Building
300 N. Second Street
Harrisburg, PA 17101

Be sure to indicate the name and telephone number of at least one individual at the company who is familiar with the filing and will be available to answer any questions the Commission staff may have. You may also wish to list those individuals who are directly involved in the preparation of the various document components.

Information contained in annual resource planning reports must be utility-specific. The report should follow an outline similar to that which is contained herein, with narrative accompanying the required data. Forms may be modified to accommodate wide columns of numbers and enhance readability, but the general format should be used to maintain consistency.

This information is not generally considered confidential. Utilities are obligated to provide complete information. However, we will treat as confidential those portions of the report designated by the utility as proprietary. If a utility's proprietary claim is challenged, the Commission will direct the utility to file a petition for protective order pursuant to 52 PA Code 5.423.

All questions concerning the reporting requirements for Forms IRP Gas 1A through 9 should be addressed to Pennsylvania Public Utility Commission Bureau of Conservation, Economics and Energy Planning.

Response:

Forms 1A, 1B, 2A, 2b, and 2C along with a general discussion of the methodologies, data sources, and assumptions are being submitted to meet the requirements of the March 1 filing.

All questions concerning the ARPR should be directed to Mr. Florian Teme Vice President, Marketing & Gas Planning at 215-684-6463. The following individual is available to answer questions concerning Forms 1 and 2: Mrs. Meriola Gjergo, Director – Gas Planning & Rates at (215) 684-6484.

Section 59.81 **Forms IRP-Gas 1A, and 1B – Annual and Peak Day Demand**

The load growth projections shall reflect the effects of price elasticity, market induced conservation, building and appliance efficiency standards, and the effects of the utility's existing and planned conservation and load management activities.

Response: Please see the attached documentation and forms.

**FORM-IRP-GAS-1A: ANNUAL GAS REQUIREMENTS
REPORTING UTILITY: PHILADELPHIA GAS WORKS
(VOLUMES IN MMcf)**

Index Year Actual Year	Historical Data		Current Year	Three Year Forecast		
	-2 2021-2022	-1 2022-2023	0 2023-2024	1 2024-2025	2 2025-2026	3 2026-2027
Firm Requirements:						
Retail Residential	31,339	27,793	28,278	32,631	32,751	32,659
Retail Commercial	8,155	7,544	7,243	8,125	8,113	8,094
Retail Industrial	464	401	357	437	433	429
Electric Power Generation	-	-	-	-	-	-
Exchanges with Other Utilities	-	-	-	-	-	-
Unaccounted For Gas	1,049	429	1,075	741	744	742
Company Use	300	315	313	288	288	288
Other - Prior Period Adjustment	-	-	-	-	-	-
Subtotal Firm	41,308	36,483	37,266	42,223	42,329	42,213
Interruptible Requirements:						
Retail	1,319	893	461	416	416	416
Electric Power Generation	-	-	-	-	-	-
Company's Own Plant	49	48	82	119	119	119
Unaccounted For Gas	11	13	10	9	9	9
Subtotal Interruptible	1,379	954	553	544	544	544
SUBTOTAL FIRM AND INTERRUPTIBLE	42,687	37,436	37,820	42,767	42,874	42,757
Transportation:						
Firm Residential	1,528	1,868	2,173	2,409	2,467	2,526
Firm Commercial	3,926	3,933	4,615	3,634	3,646	3,665
Firm Industrial	404	407	419	408	411	416
Interruptible Residential	-	-	-	-	-	-
Interruptible Commercial	7,017	6,473	6,308	6,907	6,907	6,907
Interruptible Industrial	5,049	4,644	4,462	5,035	5,035	5,035
Other - Non-Utility Power Producers	13,391	14,006	14,059	13,391	13,391	13,391
Subtotal Transportation	31,315	31,331	32,037	31,785	31,857	31,940
TOTAL GAS REQUIREMENTS	74,002	68,767	69,857	74,552	74,731	74,697
Increase (Decrease)	772	(5,235)	1,089	4,695	179	(35)
Percent Change (%)	1.05%	-7.07%	1.58%	6.72%	0.24%	-0.05%

**FORM-IRP-GAS-1B:PEAK DAY REQUIREMENTS
REPORTING UTILITY: PHILADELPHIA GAS WORKS
(VOLUMES IN MMcf)**

Index Year Actual Year	Historical Data		Current Year ⁽²⁾	Three Year Forecast ⁽¹⁾		
	-2 2021-2022	-1 2022-2023	0 2023-2024	1 2024-2025	2 2025-2026	3 2026-2027
Firm Requirements:						
Retail Residential	327	336	348	439	441	440
Retail Commercial	85	91	89	109	109	109
Retail Industrial	5	5	4	6	6	6
Electric Power Generation	-	-	-	-	-	-
Exchanges with Other Utilities	-	-	-	-	-	-
Unaccounted For Gas	11	5	13	10	10	10
Company Use	3	4	4	4	4	4
Other	-	-	-	-	-	-
Subtotal Firm	431	442	459	568	570	569
Interruptible Requirements:						
Retail	0.4	1.5	1.4	1.2	1.2	1.2
Electric Power Generation	-	-	-	-	-	-
Company's Own Plant	0.3	0.3	0.6	0.6	0.6	0.6
Unaccounted For Gas	0.0	0.0	0.0	0.0	0.0	0.0
Subtotal Interruptible	0.7	1.8	2.0	1.8	1.8	1.8
SUBTOTAL FIRM AND INTERRUPTIBLE	431	443	461	570	572	570
Transportation:						
Firm Residential	13	15	29	35	36	37
Firm Commercial	30	31	49	44	44	44
Firm Industrial	2	3	4	4	4	4
Interruptible Residential	-	-	-	-	-	-
Interruptible Commercial	43	43	-	-	-	-
Interruptible Industrial	15	13	-	-	-	-
Other - Non-Utility Power Producers	48	43	-	-	-	-
Subtotal Transportation	151	148	82	83	84	85
TOTAL GAS REQUIREMENTS	583	592	543	653	656	656
Increase (Decrease)	30	9	(49)	110	3	-
Percent Change (%)	5.5%	1.6%	-8.2%	20.2%	0.4%	0.0%

⁽¹⁾ Peak Day is forecasted at a 2 degree temperature.

⁽²⁾ Current Year Peak Day is forecasted at a 5 degree temperature.

Section 59.81

Forms IRP-Gas 2A, 2B and 2C - Annual and Peak Day Energy Resources, Transmission and Storage Contracts

The forecast of energy sources shall indicate sources of all presently available and new supplies which the utility estimates will become available, displayed by component parts.

Response:

Please see the attached documentation and forms.

FORM-IRP-GAS-2A: ANNUAL/PEAK SUPPLY
TABLE 1: ANNUAL/PEAK SUPPLY
REPORTING UTILITY: PHILADELPHIA GAS WORKS
(Volumes in MMcf)

Index Year Actual Year	Historical Data				Current Year (2)		Three Year Forecast (1)					
	-2 2021-2022		-1 2022-2023		0 2023-2024		1 2024-2025		2 2025-2026		3 2026-2027	
	Annual	Peak	Annual	Peak	Annual	Peak	Annual	Peak	Annual	Peak	Annual	Peak
Gas Supply for Sales Service												
Spot Purchases	44,166	84	38,421	65	39,577	237	43,942	241	44,029	240	43,883	240
Storage Withdrawals	10,308	175	8,692	158	8,798	188	14,165	189	14,289	189	14,130	189
LNG Withdrawal	3,106	172	1,610	221	1,524	94	1,609	205	1,634	208	1,629	207
LNG Purchases	-	-	-	-	-	-	-	-	-	-	-	-
Exchanges with other LDCs	-	-	-	-	-	-	-	-	-	-	-	-
Other	-	-	-	-	-	-	-	-	-	-	-	-
Total Gas Supply	57,580	431	48,723	443	49,898	519	59,716	634	59,952	637	59,642	636
Total Transportation Services	31,315	151	31,331	148	32,037	33	31,785	30	31,857	31	31,940	31
TOTAL GAS SUPPLY AND TRANSPORTATION SERVICE	88,895	583	80,054	592	81,935	551	91,501	664	91,809	667	91,581	667
Deductions												
Pipeline: TRANS FUEL	689	-	535	-	566	6	643	6	643	6	613	6
Storage: INJ, INJ FUEL, WITHDRAW FUEL, TRANS FUEL	12,418	-	8,763	-	10,130	1	14,578	2	14,708	2	14,544	2
LNG: LIQUE, INJ FUEL, TRANS FUEL	1,786	-	1,989	-	1,383	2	1,727	4	1,728	4	1,728	4
Sales to other LDC's	-	-	-	-	-	-	-	-	-	-	-	-
Total Deductions	14,893	-	11,287	-	12,078	8	16,949	12	17,078	12	16,885	12
NET GAS SUPPLY	74,002	583	68,767	592	69,857	543	74,552	653	74,731	656	74,697	656
BTU	1,031		1,034		1,036		1,034		1,034		1,034	

(1) Peak Day is forecasted at a 2 degree temperature.

(2) Current Year Peak Day is forecasted at a 5 degree temperature.

**FORM-IRP-GAS-2B: NATURAL GAS TRANSPORTATION
REPORTING UTILITY: PHILADELPHIA GAS WORKS
(volumes in MMcf)**

Index Year Actual year	Historical Data				Current Year		Three Year Forecast					
	-2		-1		0		1		2		3	
	2021-2022		2022-2023		2023-2024		2024-2025		2025-2026		2026-2027	
	Annual	Peak	Annual	Peak	Annual	Peak	Annual	Peak	Annual	Peak	Annual	Peak
<u>City Gate Transportation Contracts:</u>												
Transcontinental Transmission Corp.	4,000	60	3,988	60	3,980	59	3,988	60	3,988	60	3,988	60
Texas Eastern Transmission Corp.	2,250	43	2,250	43	2,258	43	2,250	43	2,250	43	2,250	43
Texas Eastern Transmission Corp.	445	20	444	20	446	20	444	20	444	20	444	20
Transcontinental Transmission Corp.	445	5	444	5	446	5	444	5	444	5	444	5
Total	7,139	128	7,127	127	7,130	127	7,127	127	7,127	127	7,127	127
<u>Upstream Transportation Contracts:</u>												
Transcontinental Transmission Corp.	58,489	160	58,320	160	58,207	159	58,320	160	58,320	160	58,320	160
Texas Eastern Transmission Corp.	26,552	73	26,475	73	26,424	72	26,475	73	26,475	73	26,475	73
Texas Eastern Transmission Corp.	8,434	23	8,409	23	8,393	23	8,409	23	8,409	23	8,409	23
Texas Eastern Transmission Corp.	2,584	17	2,576	17	2,571	17	2,576	17	2,576	17	2,576	17
Texas Eastern Transmission Corp.	2,584	17	2,576	17	2,571	17	2,576	17	2,576	17	2,576	17
Transcontinental Transmission Corp.	172	2	171	2	171	2	171	2	171	2	171	2
Texas Eastern Transmission Corp.	1,770	5	1,765	5	1,762	5	1,765	5	1,765	5	1,765	5
Total	100,584	298	100,292	297	100,099	297	100,292	297	100,292	297	100,292	297
<u>Storage-Related Transportation Contracts:</u>												
Dominion Transmission Inc.	9,102	25	9,075	25	9,058	25	9,075	25	9,075	25	9,075	25
Dominion Transmission Inc.	2,757	8	2,749	8	2,744	8	2,749	8	2,749	8	2,749	8
Total	11,859	32	11,824	32	11,802	32	11,824	32	11,824	32	11,824	32

Dth to Mcf Conversions: FY21-22 Conversion at 1031 BTU. FY22-23 Conversion at 1034 BTU. Current Year Conversion at 1036 BTU. Three Forecasted Years Conversions at 1034 BTU

FORM-IRP-GAS-2C: NATURAL GAS STORAGE
REPORTING UTILITY: PHILADELPHIA GAS WORKS
(volumes in MMcf)

Index Year Actual year	Historical Data				Current Year		Three Year Forecast					
	-2 2021-2022		-1 2022-2023		0 2023-2024		1 2024-2025		2 2025-2026		3 2026-2027	
	Annual	Peak	Annual	Peak	Annual	Peak	Annual	Peak	Annual	Peak	Annual	Peak
Transcontinental Transmission Corp.	4,000	60	3,988	60	3,980	59	3,988	60	3,988	60	3,988	60
Dominion Transmission Inc.	3,685	32	3,675	32	3,667	32	3,675	32	3,675	32	3,675	32
Transcontinental Transmission Corp.	3,165	33	3,138	33	3,123	33	3,138	33	3,138	33	3,138	33
Texas Eastern Transmission Corp.	2,419	43	2,419	43	2,428	43	2,419	43	2,419	43	2,419	43
Texas Eastern Transmission Corp.	2,250	20	2,250	20	2,258	20	2,250	20	2,250	20	2,250	20
Transcontinental Transmission Corp.	445	5	444	5	446	5	444	5	444	5	444	5
Total	15,965	194	15,913	193	15,902	192	15,913	193	15,913	193	15,913	193

Forecast Dth to Mcf Conversions at 1034 BTU.

	Contract Expiration Date ⁽¹⁾
Transcontinental Transmission Corp.	3/31/2027
Dominion Transmission Inc.	3/31/2028
Transcontinental Transmission Corp.	9/30/2024
Texas Eastern Transmission Corp.	4/30/2029
Texas Eastern Transmission Corp.	4/30/2029
Transcontinental Transmission Corp.	4/15/2025

⁽¹⁾ For purposes of this report, contracts that are due to expire are assumed renewed for the forecast years.

BEFORE THE PENNSYLVANIA PUBLIC UTILITY COMMISSION

**PHILADELPHIA GAS WORKS
800 WEST MONTGOMERY AVENUE
PHILADELPHIA, PENNSYLVANIA**

Annual Resource Planning Summary Report

Filed: March 2024

**Information Submitted in Compliance with and Pursuant to Title 52
Pennsylvania Code Sections 59.81-59.84**

PHILADELPHIA GAS WORKS
2024 Annual Resource Planning Summary Report

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SECTION V -- PGW Corporate Modeling System

Introduction

By Order entered January 11, 1996, the Pennsylvania Public Utility Commission (PUC) adopted final regulations (52 PA Code §§ 59.81 - 59.84) which set forth revised requirements for filing an Annual Resource Planning Report (the Plan). The Plan submitted represents Philadelphia Gas Works' (PGW or the Company) belief that integrated resource planning (IRP) is a workable approach to utility planning.

This plan summary contains historical data and projections for annual, winter and peak day supply to meet projected customer requirements in a least cost manner, while ensuring adequate and reliable service. It is organized into the following five sections:

- I. PGW's Overall Approach to Integrated Resource Planning
- II. Supply Forecasting Methodology and Assumptions
- III. Demand Forecasting Methodology and Assumptions
- IV. Design Day Forecasting Methodology and Assumptions
- V. PGW Corporate Modeling System

I. PGW's Overall Approach to Integrated Resource Planning

PGW Optimization Standard for Purchasing and Utilizing Gas Supplies

As reasonably anticipated PGW intends on meeting its contractual obligations to supply all of its current firm customers in its service territory on the coldest day, throughout the heating season and throughout the year. Projected customer requirements for design day and design winter conditions form the basis for capacity commitments for pipeline supply, storage, and transportation contracting.

Natural gas supplies are purchased under a portfolio approach with PGW intending to secure the lowest overall price consistent with the corporate goals of reliability and security of supply. In addition, consideration is given to maintaining a diversity of sources and types of supply, coupled with contractual and operational flexibility on both a daily and seasonal basis. Short term purchases from spot market sources are utilized to the maximum degree that they are more economical, available, and transportable.

Natural gas supplies are utilized so as to minimize gas costs subject to reliability constraints. Supply contract obligations are honored and prudent Gas Control operational requirements are assumed. Storage gas is drawn down so as to always maintain an inventory level sufficient for the remaining winter in the event that design temperature conditions should occur in the remaining segment of the winter season. Within the above parameters, priority is given to utilizing the most economical sources of supply first within the context of preserving the capability of meeting seasonal and annual demands rather than the momentary daily requirements. All facilities and sources of supply – flowing, storage and LNG – are available to achieve the intended end, namely, minimizing gas costs subject to reliability constraints.

II. Supply Forecasting Methodology and Assumptions **Basic Assumptions**

The PGW Gas Supply Policy Committee, comprised of senior corporate management as well as Gas Planning, Gas Control, Gas Supply, and Regulatory departmental management, approved the aforementioned Optimization Standard for Purchasing and Utilizing Gas Supplies (Section I). All natural gas purchases continue to be made in accordance with this standard. Projected sales, revenues and natural gas expenses in this report result from this agreement particularly in the areas of inventory valuation, priorities of gas selection and interruptible supply availability.

Incorporated into PGW's projections are additional implementation steps involved with developing a cohesive gas supply/demand strategy for the near term and the longer range. These include developing a cost relationship comparison for current resources and a review of current contract terms and alternatives for continuing, extending, modifying or eliminating contracts. In order to achieve this while maintaining a balance between economics and security of supply, the Company uses a portfolio strategy approach. This approach incorporates a menu driven selection of services which allows the Company to choose only those specific services necessary to meet its requirements. This is achieved by taking into consideration transportation capacity rights and then sources of supply are contracted to cover the firm transport rights over differing seasonal obligations.

Operating flexibility is sustained by variations in contract stipulations to permit the system to swing on the most economical gas supplies available while maintaining the ability to supply rapidly fluctuating temperature requirements. Storage facilities are substituted wherever opportunity affords to reduce annual expense for flowing 365-day pipeline service without reducing design day and design winter season delivery capability. Direct control of all storage is paramount to permit PGW to minimize winter costs by injecting lower priced purchases and to cycle storage to balance daily take fluctuations to avoid overrun/balancing charges.

PGW's supply strategy incorporates maintaining full current winter day deliverability with regard to transportation capacity but to convert, where possible, to storage rather than winter flowing contracts to enhance financial and operational flexibility. A variety of longer term supply contracts are necessary to support pipeline transportation capacity because reliance upon best effort spot suppliers to fill wintertime supply requirements to meet firm customers' demands has proven to be an unreliable alternative. As a result, longer-term contracts are utilized to support firm transportation capacity. To accomplish this end, the Company purchases winter supply contracts with daily deliverability equal to approximately 37% of the contractual daily transportation entitlements on its two interstate pipelines with direct connections to PGW's service territory. Additionally, these supply contracts match the contractual entitlements of the two pipelines by sourcing supply in a manner consistent with the pipeline's upstream contractual requirements. In this way, PGW not only helps ensure the security of supply by sourcing the gas from geographically diverse supply regions, but this diversity also allows PGW to take advantage of the pricing basis differential inherent in these supply locations.

These contracts all contain the ability to fix the price for upcoming months as well as to allow the pricing to default to an agreed upon market index when there is no market advantage in fixing a price before the month begins. PGW uses this fixed price option in conjunction with its Gas Cost Rate (GCR) filing (the GCR filing includes pricing based upon the NYMEX) by always attempting to buy under the GCR forecasted prices. Through the matching of the duration supply contracts to a seasonal demand, such as the winter operating season, the firm ratepayers benefit from not paying demand charges year-round.

A second component of PGW's supply portfolio, or a volume equal to 27% of pipeline capacity, is purchased gas based on the daily midpoint price published in "Platt's Gas Daily". These contracts allow for daily change in volumetric take. This allows the Company to effectively shut-off higher priced supply, replacing such supply with daily cheaper spot priced gases. Under assumed normal winter conditions, PGW utilizes WSS storage field in a manner similar to third party supply. Specifically, this storage contract does not contain transportation to the PGW city gate. Therefore, these storages must flow within PGW's contractual upstream capacity rights on TGPL.

Delivery from these fields utilizes approximately 8% of the daily TETCO and TGPL capacity rights to the Philadelphia city gates. These storage fields also act as a physical fixed price to counter winter price conditions since the WACOG usually reflects a winter/summer pricing differential. Additionally, PGW purchases 17% of its supply using day purchases as needed and releases eleven percent (11%) of its capacity to its choice suppliers.

PGW's summer purchasing strategy also incorporates a portfolio approach to the purchase of system supply and storage refill. The GCR filing is again used as a yardstick in purchasing supply for both system supply and storage refill. PGW attempts to always purchase a portion of its supply needs below the projected GCR cost estimate with a portion of the portfolio purchased at default, first-of-the-month pricing. These first of the month pricing option contracts, in most instances, allow PGW to evaluate daily spot prices and provide for a turn-off of first-of-the-month index priced supply in favor of the purchase of more advantageous daily spot purchases.

Operating conditions permitting, the Company enters into the FERC approved capacity release market to offset demand charges it pays for its firm transportation and the incremental off-systems sales market when it is economically advantageous for the firm ratepayer. In both instances, these opportunities are sought only when firm customer needs are satisfied.

Additionally, PGW's bundled storages and LNG can be utilized as a substitute for higher price gas supply based on market pricing conditions and the results of PGW's status report.

Effectively, the Gas Supply Group is at all times studying the market for any economic advantage it can bring to the firm ratepayer.

III. Demand Forecasting Methodology and Assumptions **Basic Assumptions**

PGW uses a combination of four basic methods to develop demand projections. They are:

- 1) Historical Data -- data showing long-term demand trends, conservation and utilization patterns by the various classes of customers -- Residential, Commercial, Industrial and Interruptible.
- 2) Customer Survey -- Information as gathered by PGW's Marketing Department and used for annual projections by month and year.
- 3) Relative End Use -- Projections via Marketing methods of customer load sizing by appliance type, maximum input, maximum summer and winter full load hour (FLH) calculations which are used to develop yearly and monthly demand requirements.
- 4) Judgment -- Experienced opinion as applied to the evaluation of the combination of all data to develop the basic demand requirements.

Customer Demand

The total system-wide demand is a function of the projected gas demand per customer and the anticipated number of customers in each class. In determining customer demand, consideration is given to projecting current customer usage, augmented by significant gains or losses in each of numerous homogeneous groups for the period being projected. The Gas Planning Department attempts to determine for each customer class, the level of demand relating to experienced temperatures and the component of demand that is apparently not affected by changes in temperature. Within each class the summer and winter usage patterns are established from historical records. Summer data provides an insight into each class of customers' non-temperature sensitive load requirements, or baseload, which can be expressed in terms of thousands of cubic feet (Mcf) per day, per customer. Similarly, winter data, after removal of the daily baseload level, provides the temperature sensitive load requirements for each class of customer.

This usage primarily reflects space heating but also includes such other temperature sensitive needs as water heating attributable to colder ground water inlet temperatures and similar process variations. This overall heating requirement can be expressed in terms of the cubic feet of gas

utilized per degree of temperature change on a per customer basis for each separate customer classification.

In addition, consideration must be given to the variation of customer utilization patterns for space heating over the year, recognizing the transitional fall start-up of heaters, the deep winter period needs and the tapering off and shut-down which occurs in the spring. These usage patterns taken in conjunction with anticipated customer counts and appropriate temperature patterns form the basis of determining class and total system demands. Due to the inconsistencies of weather and weather forecasting techniques, no attempt is made to predict the specific daily temperatures of the projection period. Instead, PGW has developed a normal monthly temperature pattern by analyzing statistical records of actual temperature patterns over a 20-year period. This pattern reflects 3,878 degree-days annually distributed in a stylized pattern preserving the monthly range of colder to warmer daily temperatures experienced in the January to May period and warmer to colder daily temperatures in the September to December period.

The term "degree days" quantifies the number of degrees of temperature below a base level of 65 degrees Fahrenheit and is used as a tool to measure space heating requirements, i.e. on a day experiencing an average temperature of 40 degrees Fahrenheit, there would be 25 degree days. The annual 3,878 degree days, which are composed of the PGW normal monthly temperature patterns, form the basis of the calculation of the temperature sensitive component of demand. The application of the above described baseload, space heating factors and customer counts, when applied to a calendar based daily temperature pattern, produce a daily calculation of total customer requirements identified as sendout. It should be noted that there is a difference between sendout volume and sales volume. Sendout represents those volumes metered at the city gate to supply customers' requirements while sales are those volumes registered on customer meters. The variation between sendout and sales, after adjustments, is that portion which is lost and unaccounted for in the PGW distribution system.

Sales and sendout differ on a monthly basis in the degree day distribution pattern. For efficiency, meter reading and billing efforts are distributed uniformly over the available number of working days in a month and the majority of PGW customers are divided into 20 individual

groups or cycles containing residential, commercial and industrial accounts within a specific geographic area. When these cycle customers are billed each month they reflect meter reading usage not for the calendar month being billed, but for the number of days and temperature pattern of degree-days experienced during their specific interval between meter readings. For example, assume the month of January contained 900 calendar degree-days. The customers in cycle 10 being billed for the month of January might have had meter readings taken on December 15 and again on January 17. Sales billed and reported in the Company records for these customers would reflect the number of days and degree days between these reading dates rather than the 900 degree days of the month. Similarly, cycle 1 customers that might have had meter readings taken on December 1 and January 2 would reflect principally the month of December temperature experience, whereas, cycle 20 customers with meter readings taken possibly December 28 and January 29 would reflect principally the month of January temperature experience.

An average of the 20 cycles (Average Cycle Degree-Days) is used as the temperature pattern upon which to project the volume of sales in the forecast period. Both projections of sales and sendouts represent the full demand for that period from both firm and interruptible customers.

Methodology Used to Develop Monthly Estimates

A trial domestic factor is developed by classes 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 (baseload) factors are finalized to replicate the total sendout experienced.

The finalized domestic factors (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 domestic factor and the trial heating factor developed, as such, 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.

To project the number of customers for each individual rate class, each rate class of customers are reviewed and accumulated individually. Current customers are ascertained from the number of billings data available from sales and revenue actually experienced immediately prior to the commencement of a model run. Declines are projected for anticipated losses to electric and other fuels, demolitions and transfers to other rates. Direct transfers from a non-heating to a heating account, as a result of a current customer's conversion to gas heat, moves the domestic load to the new category. Projected additional customers are developed by the Marketing Department where staff dealing with individual classes of customers and having the most direct knowledge of conditions within their expertise, project annual load additions which are translated into customer counts based upon typical customer usage for that individual customer class. The approximate month of turn-on is also developed to permit reflection of the effective portion of the load addition within the fiscal period under study. Interruptible class customers, as well as other large special accounts, are detailed individually incorporating expected gains and losses as direct contact and experience has indicated.

The base revenue projections for both firm and interruptible customer groups are derived as the product of the projected sales volumes and the present tariff rate for each individual customer

class within each group. The GCR revenue projections are derived as the product of the GCR factor and the projected sales volumes to the firm GCR customers.

IV. Design Day and Design Hour Forecasting Methodology and Assumptions

Each year, a six year estimate of Design Day and Design Hour requirements anticipated under design day and design hour operating conditions is prepared to ensure that adequate resources are under contract and to further ensure that PGW can fulfill its supply obligation for its firm customer requirements on a design day and design hour.

The projected demands for design day are developed utilizing previous winter periods data for all weekdays where the temperature average for the day is 32 degrees Fahrenheit or below. The total sendout for these days as recorded under actual conditions and is reduced to firm sendout by removal of the interruptible load. A computer generated linear regression procedure is utilized to develop a sendout model from actual daily sendout and degree days, and the process is repeated in a quadratic regression and a cubic regression procedure. From the predicted sendout in the regression, which are within a reasonable percent of error to the actual sendout, factors are derived to replicate the actual sendout. The factors derived from this are used to determine the current load requirements for a 0 degrees Fahrenheit day and from this data, the load for a -5 degrees Fahrenheit hour is calculated. PGW's Marketing Department's load projections for present and future years are then applied to these requirements to develop design day and design hour present and future load requirements. This is achieved by the addition of the projected marketing load growth on an annual basis (by day) to the derived base-year design day requirements.

V. **PGW Corporate Modeling System**

General Description

The Corporate Modeling System is a tool used by PGW management to project sales, revenues and expenses, as well as to examine key planning strategies and evaluate their effects on company operations. The system provides the ability to determine the results of alternate plans and scenarios, while at the same time allowing for responses to "what if" type situations quantifying revenue and expenses. The system combines the power of the computer with the experience of management to develop both short and long range projections based upon experienced historical data for sales and sendout volumes, raw material expenses and revenues. The corporate model system is composed of five separate parts. Each part operates independently but requires substantial external data inputs as well as data output results from one or more of the other parts in the system.

Gas Demand Model

The Gas Demand Model is used to forecast total requirements for gas based upon current customer usage experience with adjustments for projected gains and losses. Input data includes domestic and space heating usage factors, customer counts by rate classifications, temperature patterns and results in projections of sales and sendout volumes. Detail and summary reports include sales and sendout by rate classification. This data is then used by the Gas Supply Model.

Gas Supply Model

The Gas Supply Model is used to dispatch the various supply sources in accordance with contract availability limitations. It develops the necessary balance between supply and demand, which reflects plant fuel and storage injection requirements, as well as customer demands by identifying the availability of interruptible load balancing sales. Detail and summary reports include daily and monthly load requirements, the volumes taken from each source by pipeline contract, storage balances, LNG requirements, etc.

This model is also used to determine natural gas and other raw material costs dispatched. The model tracks the various cost components of each contract – the demand, capacity, commodity, injection and withdrawal charges – providing monthly and annual details and summary information including inventory valuations and expenses for supplemental LNG supplies. This data is then used by the Gas Cost Rate Model.

Gas Cost Rate Model

The Gas Cost Rate Model is used to develop the GCR. This model, in conjunction with the Gas Supply Model, ascribes responsibility for the raw material costs to firm rate classes in accordance with PGW's tariff requirements, and compensates for the Interruptible Revenue Credit, interest, gas transportation Supplier Storage Peaking and migration charges and the previous over or under billing of fuel expenses. The GCR is then used by the Revenue Model.

Revenue Model

The Revenue Model is used to project billed revenue by rate classification in accordance with PGW's rate tariffs. It prepares the net billed revenue, GCR revenues, senior citizen discounts, and cycle billing information all detailed by rate classification. The detail and summary reports provided by this model are directed to the accounting and financial departments for inclusion in various financial reviews.

Summary

The Corporate Modeling System allows PGW management to effectively address supply/demand balancing, supply facilities planning, projected sales, cost, revenues, and sendout volumes. Results assist in the development of PGW's annual Operating Budget, setting of the GCR and planning of supply resources.

The model also provides a Status Report for the evaluation of remaining winter period requirements on both normal and design temperature patterns and the extrapolation of the current year based upon the experience to date and an assumption of temperatures anticipated for the remaining period of the year, this latter acting as a guide for both financial cash flow planning and winter operations.