CITY OF PHILADELPHIA

LAW DEPARTMENT
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1515 Arch Street
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MARCEL S. PRATT
Philadelphia City Solicitor
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June 8, 2020

Honorable Darrell L. Clarke, President
City Council of Philadelphia
494 City Hall
Philadelphia, PA 19107

Re: Gas Works Revenue Bonds (1998 General Ordinance) – Fifteenth Supplemental Ordinance

Dear Council President Clarke:

The office of the City Solicitor has reviewed The First-Class City Revenue Bond Act, Act No. 234 of October 18, 1972, the General Gas Works Revenue Bond Ordinance of 1998, as supplemented (the "1998 General Ordinance") and the proposed Fifteenth Supplemental Ordinance thereto, Bill No. 200296 (the "Fifteenth Supplemental Ordinance"). The 1998 General Ordinance and the Fifteenth Supplemental Ordinance authorize the issuance of Gas Works Revenue Bonds (1998 General Ordinance) (the "Bonds") of the City of Philadelphia in the maximum principal amount of three hundred million dollars ($300,000,000) or, if the Bonds are sold at a discount, such greater principal amount as will reflect such discount so long as the aggregate gross proceeds to the City do not exceed three hundred million dollars ($300,000,000), and provided that the Bonds may be sold at a premium so long as the aggregate principal amount of the Bonds does not exceed three hundred million dollars ($300,000,000).

Based on that review, it is my opinion that, under the 1998 General Ordinance and the Fifteenth Supplemental Ordinance, as introduced in Council, the holders or registered owners of the Bonds will have no claim upon the taxing power or general revenues of the City of Philadelphia, nor any lien upon any property of the City of Philadelphia other than the Gas Works Revenues (as defined in the 1998 General Ordinance) and the funds properly pledged to such registered owners pursuant to the terms and conditions of the 1998 General Ordinance and the Fifteenth Supplemental Ordinance.

Sincerely,

Marcel S. Pratt

Marcel S. Pratt
City Solicitor

C I T Y O F P H I L A D E L P H I A

OFFICE OF THE DIRECTOR OF FINANCE
Room 1330 Municipal Services Building
1401 John F. Kennedy Boulevard
Philadelphia, PA 19102
(215) 686-6140
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ROB DUBOW
Director of Finance

June 15, 2020

To The President and Members of the Council of the City of Philadelphia

FINANCIAL REPORT OF THE DIRECTOR OF FINANCE

Re: Philadelphia Gas Works Revenue Bonds (1998 General Ordinance)

The Mayor has transmitted to the Council the Fifteenth Supplemental Ordinance (the "Fifteenth Supplemental Ordinance") to the General Gas Works Revenue Bond Ordinance of 1998 (the "1998 General Ordinance"), authorizing the issuance and sale of a maximum principal amount of $300,000,000 of one or more series of Gas Works Revenue Bonds (1998 General Ordinance) (the "Bonds") of the City of Philadelphia (the "City") (or, if the Bonds are sold at discounts which are in lieu of periodic interest, the aggregate principal amount will be increased to reflect such discounts as long as the aggregate gross proceeds to the City do not exceed $300,000,000, plus accrued interest, if any, and provided that the Bonds may be sold at a premium so long as the aggregate principal amount of the Bonds does not exceed $300,000,000).

In preparation for the issuance of the Bonds, the Philadelphia Gas Works, a City-owned utility (the "Gas Works") engaged Black & Veatch Management Consulting, LLC ("Black & Veatch") to compile relevant data upon which to make projections to determine whether the revenues of the Gas Works are and will be sufficient to satisfy the tests of adequacy required by Act No. 234 of October 18, 1972, known as The First Class City Revenue Bond Act (the "Act"), and the 1998 General Ordinance.

Black & Veatch is an independent consulting company which has broad experience in utility systems similar in magnitude and scope to the Gas Works and has a favorable reputation for competence in this field of work. It has conducted an in-depth examination of the Gas Works and has collaborated with the officers and employees of the Gas Works in the preparation of a report (the "Engineering Report"), a copy of which is attached hereto.

The Engineering Report forms the basis for the statements and opinions contained in this financial report. The Engineering Report has been reviewed by the Gas Works.

The following statements and opinions are made in compliance with Section 8 of the Act and Section 4.03(a) of the 1998 General Ordinance:

(i) The Bonds are to be issued for the purpose of providing funds for any or all of the following purposes: (a) the capital projects included in the capital program of the Gas Works, which may include, without limitation: (1) the acquisition of land or rights therein; (2) the acquisition, construction or improvement of buildings, structures and facilities together with their related furnishings, equipment, machinery and apparatus; (3) the acquisition, construction or replacement of pipes and pipe lines; and (4) the acquisition or replacement of property of a capital nature for use in the operation, maintenance and administration of the Gas Works system of the City; (b) paying the costs of issuing the Bonds any required payments to the Sinking Fund Reserve; (c) if determined by the Director of Finance of the City, the provision of capitalized interest on any series of Bonds that are issued to finance capital projects during the construction of such capital projects; and (d) paying any other Project Costs (as defined in the Act);

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(ii) The revenues pledged for the payment of the Bonds will consist of all operating and nonoperating revenues of the Gas Works derived from its activities and assets involved in the supply, manufacture, storage and distribution of gas, including all rents, rates and charges imposed or charged by the City upon the owners or occupants of properties connected to, and upon all users of, gas distributed by the Gas Works and all other revenues derived therefrom and all other income derived by the City from the Gas Works (the "Gas Works Revenues");

(iii) I find that on the basis of actual and estimated future financial operations of the Gas Works, as detailed in the Engineering Report, the Gas Works will, in my opinion, yield pledged Gas Works Revenues over the amortization period of the Bonds sufficient to meet the payment and/or deposit requirements of: (a) all expenses of operation, maintenance, repair and replacement of the Gas Works; (b) all reserve or special funds required to be established out of Gas Works Revenues; (c) the principal of and interest on all revenue bonds or notes issued under the 1998 General Ordinance, as the same shall become due and payable; and (d) any State taxes assumed by the City to be paid on such bond and notes and also to provide such surplus requirements as prescribed by the 1998 General Ordinance;

(iv) The Gas Works Revenues forming the basis for the statements set forth in clause (iii) above comply with the requirements of the definition of "Project Revenues" contained in Section 2 of the Act; and

(v) Based on its investigations, Black & Veatch has found the capital improvements proposed during the projection period, September 1, 2020 through August 31, 2025, should, along with continued good operation and maintenance practices, enable the Gas Works to maintain the system in good operating condition, and that good operation and maintenance is likely to continue.

For the purpose of the opinion expressed in clause (iii)(d) above, you are advised that no State taxes on any of such bonds and notes have been or are being assumed by the City.

Respectfully submitted,

Rob Dubow
Director of Finance

FINAL

INDEPENDENT CONSULTANT'S ENGINEERING REPORT

City of Philadelphia, Pennsylvania

Gas Works Revenue Bonds

Sixteenth Series (1998 General Ordinance)

B&V PROJECT NO. 404714

PREPARED FOR

City of Philadelphia, Pennsylvania

Philadelphia Gas Works

24 APRIL 2020

BLACK & VEATCH

BLACK & VEATCH

Black & Veatch Management Consulting, LLC
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P +1 724-935-3027 E FeingoldRA@bv.com

April 24, 2020

Mr. Rob Dubow
Director of Finance
City of Philadelphia
13th Floor, Municipal Services Building
1401 John F. Kennedy Boulevard
Philadelphia, PA 19102

Dear Mr. Dubow:

In accordance with our agreement with the Philadelphia Gas Works ("PGW") through the Philadelphia Facilities Management Corporation, the management entity for PGW, Black & Veatch Management Consulting, LLC ("Black & Veatch") submits herewith our independent consulting engineer's report (the "Report") to be included as an appendix to the official statement or official statements ("Official Statements") prepared in connection with the issuance of the City of Philadelphia, Pennsylvania (the "City") Gas Works Revenue Bonds, (1998 General Ordinance), which have been authorized to be issued from time to time, pursuant to the 1998 General Ordinance (as defined herein) of Philadelphia City Council. The bonds to be issued may be issued as Sixteenth Series Bonds or as Bonds of subsequent series. The Sixteenth Series Bonds consists of Sixteenth Series A (the "Series A Bonds") in an aggregate principal amount not to exceed $300,000,000, and Sixteenth Series B (the "Series B Bonds"). Proceeds of the Series A Bonds will be used to (i) finance a portion of PGW's ongoing Capital Improvement Program, (ii) make a deposit to the Sinking Fund Reserve held under the General Gas Works Revenue Bond Ordinance of 1998 (the "1998 General Ordinance"), and (iii) pay the costs of issuing the Series A Bonds. Proceeds of the Series B Bonds, together with other available moneys, may be used to (i) refund all or a portion of certain bonds currently outstanding under the 1998 General Ordinance, (ii) fund a termination payment for all or a portion of a swap contract to the extent such swap contract is related to the bonds to be refunded, and (iii) pay the costs of issuing the Series B Bonds. This Report assumes that the Series A Bonds will be issued in the aggregate principal amount of $260,000,000 and does not address the impact of any refunding transaction in connection with the issuance of the Series B Bonds. If PGW refunds bonds, it is assumed that such refunding will result in a reduction in interest costs and annual debt service from the levels reflected in this Report.

The purpose of this Report is to present the findings of our evaluation of PGW's gas works system (the "System") and to set forth information concerning financial factors relating to the Sixteenth Series Bonds. This Report is based on our analysis of the records and Capital Improvement Program (the "CIP") of PGW, discussions with key PGW personnel in March 2020, physical inspections of predominately above-ground facilities conducted in March 2020, and such other investigations as we have deemed necessary.

The evaluation of the System, which includes a discussion of organization, management, and staffing; system service area; supply facilities; distribution facilities; and the CIP for fiscal years 2021 through 2025, including two major initiatives: replacement of PGW's Customer Information System ("CIS") and implementation of PGW's Building Consolidation Initiative, all of which is presented in the first part of the

Report. The second part of the Report contains: (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, as amended and supplemented (the "1998 General Ordinance") authorizing the issuance of the Bonds (as defined below); and (f) information regarding potential liquefied natural gas ("LNG") expansion opportunities. PGW is currently exploring the expansion of liquefaction capacity of its Richmond Plant and adding liquefaction to its Passyunk Plant. "Prior Bonds" are defined as the outstanding bonds (senior and subordinate bonds) issued under the 1998 General Ordinance. Together, the Prior Bonds and Sixteenth Series Bonds are collectively referred to as the "Bonds". A listing of our principal assumptions and opinions developed as a result of our studies is presented at the end of this Report.

This Report was prepared for the City based on information not within the control of Black & Veatch. In conducting our studies, we reviewed the books, records, agreements, the CIP; customers, sales and financial projections of PGW; and investigated such physical properties of PGW as we deemed necessary to express our opinion of PGW's operating results and projections. While we consider such books, records, documents, and projections to be reliable, Black & Veatch has not verified the accuracy of these documents or the validity of the information provided by others. This Report is subject to the limitations set forth herein.

This report does not take into consideration the impact, if any, that the COVID-19 pandemic might have in the projections and assumptions contained herein.

Black & Veatch is one of the oldest, largest and most diversified engineering, procurement, and construction companies in the United States. Black & Veatch operates and maintains a global network of regional, marketing, and project offices. Founded in 1915, Black & Veatch employs over 10,000 people performing financial, economic, and engineering studies and design and construction of facilities for clients in government and industry in the fields of energy, water, wastewater, and telecommunications. Black & Veatch has extensive experience in the design and analysis of the operation and financing of electric, natural gas, water, and wastewater systems serving communities ranging in size from small cities to large metropolitan systems of the magnitude of the System.

In this Report, where standards or requirements are indicated as being applicable, being fulfilled, or to be attained, such standards or requirements are those promulgated by the Pennsylvania Public Utility Commission ("PUC") and other Federal, State, and local agencies, in accordance with the provisions of Federal laws and the laws of the Commonwealth of Pennsylvania governing the storage, delivery, and sale of natural gas. Capitalized terms not otherwise defined herein have the same meanings as ascribed to them in the 1998 General Ordinance. References made herein to specific years are for the fiscal years of PGW ending August 31, unless otherwise noted.

The Report includes our assessment of the condition of PGW's facilities, including PGW's existing storage and distribution facilities, based upon site inspections of certain PGW facilities as deemed appropriate during March 2020. We also reviewed and evaluated existing and planned natural gas transportation and supply contracts with respect to volumes of natural gas to be delivered. The general physical condition of the System's facilities has been evaluated using three rating categories - good, adequate, and poor - as described below.

- Good: The facility is in condition to provide reliable operation in accordance with design parameters and requires only routine maintenance.
- Adequate: The facility is operating at or near design levels, however, non-routine renovation, upgrading, and repairs are needed for continued reliable operation. Significant expenditures for these improvements may be required.
- Poor: The facility cannot be operated within design parameters. Major renovations are required to restore the facility to reliable operating condition. Major expenditures for these improvements may be required.

The ratings assigned in this Report are the result of physical observations of individual above-ground facilities at existing sites conducted between March 2nd and March 12th, 2020.

An evaluation of a gas storage and distribution system of the magnitude and complexity of PGW's requires an assessment of each of the System's various components. The evaluation described in this Report is based on estimates of the degree of improvement that has been or will be provided by the projects in the current CIP and their impact in meeting service requirements.

The projections set forth in this Report are "forward-looking statements." In formulating these projections, Black & Veatch has made certain assumptions with respect to conditions, events, and circumstances that may occur in the future. The methodologies utilized by Black & Veatch in performing these analyses follow generally accepted practices for such projections. Such assumptions and methodologies are summarized in this Report and are reasonable and appropriate for the purpose for which they are used. While Black & Veatch believes the assumptions are reasonable and appropriate and the projection methodology valid, actual results may differ materially from those projected, as influenced by conditions, events, and circumstances that may actually occur that are unknown as of the date of this Report and/or which are beyond the control of Black & Veatch. Such factors may include, but are not limited to, PGW's ability to execute the capital improvement plan as scheduled and within budget, regional climate and weather conditions affecting the demand for gas, adverse legislative, regulatory or legal decisions (including environmental laws and regulations) affecting PGW's ability to operate the System, and public health crises such as the COVID-19 pandemic.

Based on these analyses and the assumptions set forth or referred to in this Report, we offer the following opinions to indicate PGW's conformance with specific requirements which must be met for the issuance of the Sixteenth Series Bonds as provided in the 1998 General Ordinance:

1. PGW is a competently managed and operated gas distribution utility. PGW and the System are organized, operated, and maintained at a level equal to, or in excess of, regulatory requirements and generally accepted industry practices. The System is in good operating condition.

2. Based upon Black & Veatch's evaluation of financial projections and certain assumptions with respect to the System which Black & Veatch believes to be reasonable, and on the basis of actual and estimated future annual financial operations of the System, the System should yield Gas Works Revenues (which are pledged under the 1998 General Ordinance) over the amortization periods of the Bonds issued under the 1998 General Ordinance which will be sufficient to: (a) meet all expenses of operation, maintenance, repair and replacement of the System; (b) meet all reserve or special funds required to be established under the 1998 General Ordinance; (c) meet the principal of and interest on all Bonds issued under the 1998 General Ordinance as the same shall become due and payable; and (d) provide such surplus requirements as are contained in the rate covenant of the 1998 General Ordinance. The Gas Works Revenues forming the basis of this opinion are defined in the 1998 General Ordinance and comply with the requirements of the definition of Project Revenues contained in Section 2 of the First Class City Revenue Bond Act (the "Act").

3. The Gas Works Revenues which are pledged as security for the Bonds issued under the 1998 General Ordinance are currently, and are projected to be, sufficient to comply with the rate covenant set forth in Section 4.03(b) of the 1998 General Ordinance.

4. The capital improvements proposed during the projection period, September 1, 2020, through August 31, 2025 should, along with continued good operation and maintenance practices, enable PGW to maintain the System in good operating condition. Review of present management practices indicates that good operation and maintenance is likely to continue.

5. Contracted PGW gas supplies plus: (a) spot market purchases; (b) anticipated additional contracted supplies plus supplemental gas capacities; as well as, (c) the pipeline transport capacity to move these supplies to PGW, appear adequate to meet PGW's projected demand on a day of maximum demand (a "design peak day"), in an hour of maximum demand (a "design peak hour"), and during a year of maximum demand (a "design peak year").

Very truly yours,

Russell A. Feingold

Vice President

Black & Veatch Management Consulting, LLC

Table of Contents

LIST OF TABLES

LIST OF FIGURES

Acronym List

AFUDC	Allowance for Funds Used During Construction
AMR	Automatic Meter Reading Program
Bcf	Billion cubic feet
BPS	Boiler and Power Plant Service
BTU	British Thermal Unit
CDS	Comprehensive Delivery Service
CG	Cogeneration Service
CHP	Combined Heat and Power
CIP	Capital Improvement Program
CIS	Customer Information System
CLNP	Commercial Lien Notification Program
CNG	Compressed Natural Gas
COVID-19	Coronavirus Disease 2019
CRP	Customer Responsibility Program
CSC	Customer Service Centers
CWP	Conservation Works Program
DB	Daily Balancing Service
DSIC	Distribution System Improvement Charge
DSM	Demand-Side Management
dt or Dth	Dekatherm
ECA	Energy Coordinating Agency of Philadelphia
FOI	Field Operations Initiative
FERC	Federal Energy Regulatory Commission
FPL	Federal Poverty Level
FT	Firm Transportation
FY	Fiscal year beginning September 1 through August 31

GCR	Gas Cost Rate
GS	General Service
GSS	General Storage Service
GTS	Gas Transportation Service
HDD	Heating Degree-Day
IRC	Interruptible Revenue Credit
IT	Interruptible Transportation
IVR	Interactive Voice Response
kWh	Kilowatt-hour
LBS	Load Balancing Service
LCP	Landlord Cooperation Program
LIHEAP	Low-Income Home Energy Assistance Program
LIME	Low Income Multifamily Efficiency
LNG	Liquefied Natural Gas
LTIIP	Long Term Infrastructure Improvement Plan
Mcf	Thousand Cubic Feet
MS	Municipal Service
NGS	Natural Gas Supplier
NGV	Natural Gas Vehicle
Notes	Gas Works Revenue Capital Project Commercial Paper Notes
OPEB	Other Post-employment Benefits
OSBA	Office of Small Business Advocate
PFMC	Philadelphia Facilities Management Corporation
PGC	Philadelphia Gas Commission
PGW	Philadelphia Gas Works
PHA	Philadelphia Housing Authority
PHMSA	Pipeline and Hazardous Materials Safety Administration

PSFT	Peaking Service Firm Transportation
Psig	Pounds per Square Inch Gauge
PUC	Pennsylvania Public Utility Commission
PWD	Philadelphia Water Department
SCADA	Supervisory Control and Data Acquisition
SS	Storage Service
UAAL	Unfunded Actuarial Accrued Liability
UESF	Utility Emergency Services Fund
VOIP	Voice Over Internet Protocol
W.C.	Water Column
WNA	Weather Normalization Adjustment
WSS	Washington Storage Service

1. Introduction

The Philadelphia Gas Works ("PGW") is a gas distribution utility owned by the City of Philadelphia, Pennsylvania (the "City"). PGW acquires, stores, distributes, and sells natural gas to residents and other customers within the City.

Under the terms of certain current revenue bond covenants, PGW is obligated to charge and collect rents, rates and charges to maintain net revenues at or above certain specified levels in excess of annual debt service requirements. In addition, prior to the authorization of the issuance of bonds under the General Gas Works Revenue Bond Ordinance of 1998, as amended and supplemented ("1998 General Ordinance"), a financial report from the City's Chief Fiscal Officer, which may be given in reliance on an engineering report, is required.

1.1. PURPOSE

The purpose of this Independent Consultant's Engineering Report ("Report") is to summarize the findings of engineering studies performed by Black & Veatch Management Consulting, LLC ("Black & Veatch") related to the gas system of PGW and to set forth information concerning the financial factors relating to the issuance of not to exceed $300,000,000 in Gas Works Revenue Bonds (1998 General Ordinance) which have been authorized to be issued from time to time, pursuant to Ordinance of Philadelphia City Council. The bonds to be issued may be issued as Sixteenth Series Bonds or as Bonds of subsequent series (the "Sixteenth Series Bonds"). The Sixteenth Series Bonds consists of Sixteenth Series A (the "Series A Bonds"), and Sixteenth Series B (the "Series B Bonds").

Proceeds of the Series A Bonds will be used to: (i) finance a portion of PGW's ongoing Capital Improvement Program ("CIP"); (ii) make a deposit to the Sinking Fund Reserve held under the General Gas Works Revenue Bond Ordinance of 1998 (the "1998 General Ordinance"); and (iii) pay the costs of issuing the Series A Bonds. The proceeds of the Series B Bonds, together with other available moneys, may be used to: (i) refund all or a portion of certain bonds currently outstanding under the 1998 General Ordinance; (ii) fund a termination payment for a swap contract to the extent such swap contract is related to certain of the bonds to be refunded; and (iii) pay the costs of issuing the Series B Bonds. This Report assumes that the Series A Bonds will be issued in the aggregate principal amount of $260,000,000 and does not address the impact of any refunding transaction in connection with the issuance of the Series B Bonds. If PGW refunds additional bonds, it is assumed that such additional refunding will result in a reduction in interest costs and annual debt service from the levels reflected in this Report.

"Prior Bonds" are defined as the outstanding bonds issued under the 1998 General Ordinance. Together, the Prior Bonds and Sixteenth Series Bonds are collectively referred to in this Report as the "Bonds". "Notes" constitute Bonds within the meaning of the 1998 General Ordinance and are issued as Subordinate Bonds constituting Interim Debt under the 1998 General Ordinance.

1.2. SCOPE

This Report addresses the organization and management, regulation, physical condition, system capacity, operation and maintenance practices, and staffing levels of PGW's facilities. Black & Veatch performed observations of PGW's facilities in March 2020. This Report provides a review of the proposed CIP for fiscal years 2021 through 2025 and includes the results of engineering studies regarding the financial requirements of the System. Evaluation of the projected financing of future capital improvement needs is based upon a review of historical operating and financial data and projected capital program and operating budget[1] information provided by PGW. Projections of revenues and revenue requirements are presented for the fiscal years 2021 through 2025. The financial feasibility of the issuance of the Sixteenth Series Bonds should be evaluated considering the results of these analyses and PGW's projected compliance with applicable revenue bond covenants. It should be noted that none of the information provided by PGW takes into consideration the impact, if any, of the COVID-19 pandemic on PGW's assumptions.

PGW representatives and others have provided certain historical data and other information presented in this Report. Black & Veatch has not conducted verification tests of this information. In conducting our analysis and preparing our opinions and the projections, Black & Veatch has made certain assumptions with respect to conditions, events, and circumstances that may occur in the future. The methodologies utilized by Black & Veatch in performing these analyses follow generally accepted practices for such projections. Such assumptions and methodologies are summarized in this Report. While Black & Veatch believes the assumptions are reasonable and the projection methodology valid, actual results may differ materially from those projected, as influenced by conditions, events, and circumstances that may actually occur. Such factors may include, but are not limited to, PGW's ability to execute the CIP as scheduled and within budget, regional climate and weather conditions affecting the demand for gas, adverse legislative, regulatory or legal decisions (including environmental laws and regulations) affecting PGW's ability to operate the System, and public health crises such as the COVID-19 pandemic.

1.3. BLACK & VEATCH QUALIFICATIONS

Black & Veatch is one of the largest and most experienced engineering companies in the United States specializing in utility engineering. Our experience includes the planning, design, operation analysis, and construction of gas, electric, water, wastewater, and telecommunications systems. In addition, the firm has extensive experience in assisting utilities with management and financial aspects of their operations. Black & Veatch has been engaged in several thousand projects with a range of clients that include utilities owned by municipalities ranging in size from small communities to large metropolitan regions, investor-owned utilities, industrial and commercial businesses, local and state agencies, and the United States and various foreign governments. Black & Veatch performed the Independent Consultant's Engineering Report ("2001 Report") for PGW's (1998 General Ordinance) Third Series Bonds issued in 2001, the Independent Consultant's Engineering Report ("2002 Report") for PGW's (1998 General Ordinance) Fourth Series Bonds issued in 2002, the Independent Consultant's Engineering Report ("2003 Report") for PGW's General Gas Works Revenue Bond Ordinance of 1975, as amended and supplemented ("1975 General Ordinance"), Gas Works Revenue Refunding Bonds, Seventeenth Series issued in 2003, the Independent Consultant's Engineering Report ("2004 Report") for PGW's (1998 General Ordinance) Fifth Series A-1 and A-2 issued in 2004, the Independent Consultant's Engineering Report ("2006 Report") for PGW's (1998 General Ordinance) Sixth Series Bonds issued in 2006, the Independent Consultant's Engineering Report ("2007 Report") for PGW's (1998 General Ordinance) Seventh Series Bonds issued in 2007, the Independent Consultant's Engineering Report ("2009 Report") for PGW's (1998 General Ordinance) Eighth Series Bonds issued in 2009, the Independent Consultant's

[1] Budget references in this report refer to PGW's proposed fiscal year 2021 budget, the approval of which was recommended by the Gas Commission to City Council on April 21, 2020.

Engineering Report ("2010 Report") for PGW's (1998 General Ordinance) Ninth Series Bonds issued in 2010, the Independent Consultant's Engineering Report ("2011 Report") for PGW's (1975 General Ordinance) Twentieth Series Bonds and (1998 General Ordinance) Tenth Series Bonds issued in 2011, the Independent Consultant's Engineering Report ("2013 Report") for PGW's (1998 General Ordinance) Twelfth Series Commercial Paper Notes, the Independent Consultant's Engineering Report ("2015 Report") for PGW's (1998 General Ordinance) Gas Works Revenue Refunding Bonds, Thirteenth Series Bonds issued in 2015, the Independent Consultant's Engineering Report ("2016 Report") for PGW's (1998 General Ordinance) Gas Works Revenue Refunding Bonds, Fourteenth Series Bonds issued in 2016, and the Independent Consultant's Engineering Report ("2017 Report") for PGW's (1998 General Ordinance) Gas Works Revenue Bonds, Fifteenth Series Bonds issued in 2017. Since 1972, the Philadelphia Water Department ("PWD") also has engaged Black & Veatch for various consulting services. These consulting services have included engineering evaluation reports for Water and Wastewater System Revenue Bonds sold by the City since 1974 and various projects involving the development of water and wastewater rates.

Experienced personnel from Black & Veatch have performed the physical evaluation of PGW's gas supply and distribution systems. In performing our engineering assessment of PGW, Black & Veatch reviewed the current condition, operation and maintenance of the gas supply and distribution systems. We conducted observations of PGW's major facilities in March 2020, including PGW's city gate stations and liquefied natural gas ("LNG") facilities. We also interviewed key members of PGW's management team in March 2020 regarding operations and maintenance issues and practices.

The financial feasibility review has been performed by personnel from Black & Veatch experienced in providing services in such areas as utility rates, utility property valuation, depreciation rate studies, financial analysis and planning, non-audit accounting, management and operations analysis, and the preparation of independent engineering reports for official statements.

This Report does not take into consideration the impact, if any, that the COVID-19 pandemic might have in the projections and assumptions contained herein.

2. Organization and Management

PGW is owned by the City and is authorized to acquire, store, and distribute natural gas within the limits of the City. PGW is accounted for as a component unit of the City. As described in greater detail herein (*See Section 3, The PGW Gas System*), PGW is the largest municipally-owned gas utility in the nation.

PGW's operations are managed by the Philadelphia Facilities Management Corporation ("PFMC"), a not-for-profit corporation whose Board is appointed by the Mayor. PFMC's responsibilities are set forth in a Management Agreement between the City and PFMC dated December 29, 1972, as subsequently amended from time to time ("Management Agreement"), which delegates responsibility for PGW's operation to an executive management team provided by PFMC. Under the Management Agreement, those responsibilities that are not specifically granted to PFMC fall under the domain of the Philadelphia Gas Commission ("PGC"), except to the extent preempted by the PUC pursuant to the Pennsylvania Natural Gas Choice and Competition Act ("Gas Choice Act"). The Gas Choice Act provides that PGW is subject to regulation by the PUC effective July 1, 2000, and that choice among natural gas suppliers will be provided to PGW's customers.

On March 31, 2003, the PUC approved PGW's restructuring plan, which among other things, provided for an unbundled tariff permitting customer choice of the commodity supplier. On September 1, 2003, PGW began operating under its Restructuring Compliance Tariff. PGW's Restructuring Compliance Tariff Rates are designed to maintain revenue neutrality and the Tariff Rules and Regulations are designed to comport with the Pennsylvania Public Utility Code.

2.1. CITY OF PHILADELPHIA

The City was founded in 1682 and merged with the County of Philadelphia in 1854. There are two principal governmental entities in Philadelphia: (1) the City, which performs ordinary municipal functions as well as traditional county functions, and (2) the School District, which has boundaries coterminous with the City and has responsibility for all public primary and secondary education. The court system in Philadelphia, consisting of Common Pleas, Municipal, and Traffic Courts, is part of the Commonwealth of Pennsylvania (the "Commonwealth") Judicial System. Although the Commonwealth pays judges and top-level administrators, the City pays all other court costs, with partial reimbursement from the Commonwealth.

The City is governed primarily under the Philadelphia Home Rule Charter ("Home Rule Charter")[2], which provides for the election, organization, powers, and duties of the legislative branch (the "City Council"); the powers and duties of the executive and administrative branches; and the City's fiscal and budgetary matters, contracts, procurement, property, and records.

2.2. PHILADELPHIA GAS WORKS

In March 1835, a City ordinance was passed authorizing private ownership and operation of a public gas utility under trustee management. This ordinance also contained an option clause permitting the City to take ownership of the gas utility properties by issuing City bonds to the private stockholders. The City exercised this option, initiating City ownership of gas utility

[2] Philadelphia Home Rule Charter, 351 Pa. Code §1.1-100 et seq., adopted pursuant to authorization of the First Class City Home Rule Act approved April 21, 1949, P.L. 665, §1 et seq. (53 P.S. §13101 et seq.).

properties to ultimately form PGW, on March 1, 1841. The City has owned the gas system continuously since that date. Manufactured gas production commenced February 8, 1836, and service was inaugurated February 10, 1836, to 46 gas lamps along Second Street.

During its more than 180 years of existence, the operation and management of PGW has evolved to its present configuration through a variety of arrangements. Initially the private owners managed it. In 1841, a Board of Trustees assumed management of PGW in accordance with an enabling City ordinance. This arrangement continued through April 1887, when the City, under the Director of Public Works, assumed direct management and operation of PGW. Serious financial and operating problems led to a change in this arrangement on November 12, 1897. At that time, the City, unable to sell PGW, contracted with the United Gas Improvement Company, now UGI Corporation, for the operation and management of PGW under authority granted by the Home Rule Charter. Operation and management by UGI Corporation continued through December 31, 1972.

On December 5, 1972, the City caused the incorporation of the PFMC as a not-for-profit Pennsylvania corporation for the specific purpose of operating PGW. PFMC currently manages PGW in accordance with the Management Agreement. The relationship between the City, PGC, PFMC, and PGW as originally detailed in the Management Agreement and as revised by the Gas Choice Act *(See Section 2.5, Pennsylvania Public Utility Commission and Section 7.1 Regulation History)* is summarized below:

Organization	**Function**
City of Philadelphia	• The City owns PGW property. • The City Administration reviews certain transactions and processes (chiefly through the Director of Finance). • City Council enacts legislation for the functioning of PGW (e.g., the capital budget, real estate transactions, pension modifications and certain gas supply contracts).

Philadelphia Gas Commission	• The Commission consists of the City Controller, two members appointed by the City Council and two members appointed by the Mayor.
	• Responsibilities include:
	  • Approval of certain executive personnel provided by PFMC.
	  • Review of gas supply contracts for approval by City Council.
	  • Approval of PGW's operating budget.
	  • Review of PGW's capital budgets for approval by City Council.
	  • Review and approval of real estate transactions for approval by City Council.

PFMC	• Incorporated by the City in 1972 for the purpose of operating PGW. • Is governed by a seven-member board of directors. • Provides executive management for PGW. • Directs operation of PGW facilities and operations.
PGW	• Manages construction, operation and maintenance of the gas system on a day-to-day basis. • PGW executive management is responsible for hiring PGW staff.
PUC	• Regulates rates, customer service and safety.

In preparing this Report, Black & Veatch interviewed key PGW officers[3] and a number of its managers. The interviews were supplemented with reviews of PGW's policies, practices, procedures, and field observations of employees at various facilities performing their daily

[3] For the purpose of this Report, PGW officers and management include individuals provided by PFMC.

activities. Based on these interviews, reviews, and observations, it is our opinion that PGW is suitably organized, managed, and operated by qualified personnel. PGW's organizational chart is shown in Figure 1.

2.2.1. Personnel Matters, Succession Planning and Training

As of March 31, 2020, PGW employed 1,636 people. PGW is aware that the number of eligible retirees has been building for years. In anticipation of a high number of retirements, PGW has instituted different organizational programs over the last ten years including an active succession planning process.

PGW meets with most departments twice a year to discuss departmental talent, potential training and development programs for identified candidates, and projected retirements. PGW evaluates its potential future leaders and takes active measures to develop employees into candidates for senior level and executive positions. This appears to be especially important at the executive level, as the CEO, CFO, and COO are similarly tenured and could conceivably retire in a relatively similar time window. Risk of loss, impact of loss and nine box reviews are performed at all meetings, as is the review of potential successors and the time needed for placement. PGW has maintained more managerial roles at the Vice President level to provide a broader number of management level employees with the requisite experience needed to succeed in an executive role.

PGW provides extensive leadership training opportunities, including: coaching, the Management Academy, and the Leadership Development Program. Since 2009, fourteen Leadership Development alumni (38 percent) have been promoted to the level of Director/Vice President. The Management Academy provides managers and directors with an understanding of the many different facets of PGW's business, teaches important soft skills, and enables better decision making through critical thinking exercises. PGW has also partnered with Leadership Philadelphia to better prepare its leaders to make differences within the organization as well as the community.

PGW recognizes the importance of maintaining a work environment that is diverse, inclusive and equitable. All PGW management employees receive biennial training on the prevention of harassment and discrimination. The majority of the Management Team has attended a day long off-site learning session of recognizing and preventing unconscious bias. Sexual harassment prevention training is presented to all new employees as well as being embedded into the annual training programs of Field Operations.

For engineers and information services professionals, PGW created job ladders that reward performance on an accelerated basis. In addition, a rotational program has been implemented for engineers so that they have a better understanding of the various career paths within PGW. Because of this program, PGW has been able to promote many of the engineers who started with PGW ten years ago into more senior level positions such as superintendents and directors.

Further, PGW has identified several senior employees who have a wealth of institutional knowledge and who are respected within the organization. By participating in various affinity groups, these individuals actively serve as mentors to more junior staff members to facilitate the knowledge transfer process. From fiscal year 2017 to present, PGW has filled over 350 positions either through internal promotions or external hires.

2.2.3. Collective Bargaining Agreement

As of March 31, 2020, 1,136 of the approximately 1,636 employees of PGW are represented by the Gas Works Employees' Union of Philadelphia, Local 686, Utility Workers' Union of America, AFL-CIO ("Local 686" or the "Union"). The Collective Bargaining Agreement ("2015 CBA") currently in effect between PGW and the Union expires May 15, 2020.

On March 11, 2020, PGW and Local 686 agreed upon a Memorandum of Understanding regarding the outline of a two-year extension of the 2015 CBA. On March 30, 2020 the two-year contract extension of the 2015 CBA was ratified by the PFMC Board of Directors. On March 31, 2020 the two-year extension of the 2015 CBA was ratified by Local 686.

The terms of the 2015 CBA extension include general wage increases of 3.0% and 3.0% effective May 15, 2020 and May 15, 2021, respectively. Other changes to the 2015 CBA include an increase in the co-pay for Union employee's emergency room visits from $100 to $175 and a reduction in the Union employee's co-pay for urgent care visits from $75 to $30. PGW anticipates this change will drive utilization away from the emergency room and into urgent care, substantially reducing PGW's costs for emergency room visits. PGW has also received concessions from the Union regarding employee absence, lateness, and productivity issues. PGW has also redesigned the Corporate Discipline Policy to achieve greater operating efficiency.

The early resolution of contract issues has saved PGW approximately $1.0 million in strike preparation expenses.

2.2.4. Strategic Planning

PGW's annual strategic planning process has been in place since FY 2018. The process begins with a re-examination and confirmation of the company's mission, vision, core values, and goals. Next, PGW's senior management team develops a set of "SMART" (specific, measurable, achievable, relevant, and time-bound) objectives for approval by the Cabinet (*listed in section 2.2.6 Executive Leadership*) and Board of Directors and builds an annual plan that identifies impactful, strategic initiatives that will accomplish the approved set of goals and objectives. The process is collaborative and iterative. Finally, initiative owners provide quarterly status updates to the Cabinet and Board.

2.2.5. Performance Management

PGW's senior officers monitor certain key performance metrics compiled in monthly reports to gauge the overall health of the utility and the effectiveness of the organization in fulfilling its mission of providing safe and reliable natural gas service, including the ongoing upgrade of its underground infrastructure. These monthly reports are then shared with the Board of Directors of the PFMC. The Summary Metrics Monthly Board Report is organized under the following categories of metrics: a) Corporate Citizenship – including M/W/DSBE Participation Rate, Philadelphia LBE Participation Rate, Pennsylvania LBE Participation Rate, and Brand Impact; b) Customer – including Customer Satisfaction and Self-Service Interaction scores; c) Financial – including Rolling 24-Month Collection, Cash flow Quick Ratio, Days Sales Outstanding, and Capital Budget and Operating Expense Variance; d) Internal – including Retention Rate; and e) Operational including Operational Risk Score (composite based on PMVA, Safety Training, and OSHA Rate). Annually, PGW management provides a Detail Metrics Annual Report to the PGC, with monthly and yearly actual-to-goal metrics, covering a comprehensive list of individual performance metrics.

2.2.6. Executive Leadership

The following are brief biographical descriptions of the current PFMC/PGW senior officers:

Craig E. White, President and Chief Executive Officer

Craig White is the President and Chief Executive Officer of PGW. Mr. White started with the organization in 1980. During his 40 years of service, he progressed through the ranks and in March of 2011 he was elevated to his present position as President and Chief Executive Officer. Mr. White received a Bachelor of Science Degree from Kutztown University. He is a graduate of Drexel University's MBA Program and has completed executive development programs at Drexel University and Harvard Business School. Mr. White currently sits on the boards of the American Gas Association, the Northeast Gas Association, the National Petroleum Council, the Energy Association of Pennsylvania, the Delaware Valley Citizens Crime Commission, Jefferson Health and most recently was named Co-Chair of the Greater Philadelphia Energy Action Team.

Douglas A. Moser, Executive Vice President and Acting Chief Operating Officer

Mr. Moser started with the Philadelphia Gas Works in 1979. During his 41 years of service, he progressed through the ranks and in 2012 he was elevated to his present position as Executive Vice President and Acting Chief Operating Officer. Mr. Moser received his Bachelor of Science degree in Chemical Engineering from Pennsylvania State University and a master's degree in Business Administration degree from Widener University. He serves on the Gas Board of the Energy Association of Pennsylvania, the Board of Directors of the American Public Gas Association and the Leadership Council of the American Gas Association.

Joseph F. Golden, Jr., Executive Vice President and Acting Chief Financial Officer

Mr. Golden was appointed Executive Vice President and Acting Chief Financial Officer in March 2012. In this capacity he is responsible for the treasury, accounting, budgeting, and finance functions. Prior titles held by Mr. Golden at PGW include: Controller, Treasurer, Manager Treasury Department, Senior Staff Accountant, and Staff Accountant. Mr. Golden started his career with PGW in August of 1986. Mr. Golden has prior work experience in public accounting, treasury accounting and cash management, and manufacturing. Mr. Golden holds a Bachelor of Science degree in Accounting from Villanova University, a Master of Business Administration degree from Drexel University, and a Juris Doctor degree (Cum Laude) from Temple University School of Law.

Charles J. Grant, Senior Vice President – Human Resources, Labor, and Corporate Communications

Mr. Grant was appointed Senior Vice President in April 2016. Previously, Mr. Grant held the title of Chief of Staff in the Office of the President and Chief Executive Officer. He held the same position in the Office of the Executive Vice President and Chief Operating Officer when he joined PGW in June 2010. In his current position, he is responsible for human resources, organizational development and staffing. His responsibilities also include oversight and enforcement of PGW's labor contracts and PGW security. He is also responsible for media relations, crisis communications, community partnerships, government affairs, internal communication, digital communication/social media and advertising campaign development. Prior to joining PGW, Mr. Grant was the owner and managing partner in the law firm of Grant & Lebowitz, LLC. Mr. Grant also served as the Chief of the Homicide Unit for the Philadelphia District Attorney's Office, Deputy District Attorney in the Los Angeles County District Attorney's Office and an adjunct professor at the Beasley School of Law, Temple University. Mr. Grant earned his Bachelor of Arts degree from the Honors College of Ohio University and his Juris Doctor degree from the Georgetown University Law Center.

Raymond J. Welte, Senior Vice President, Field Operations and Supply Chain

Mr. Welte was appointed Senior Vice President, Field Operations and Supply Chain in January 2018. Mr. Welte is responsible for the day to day operations of the Distribution and Field Operations Department. Mr. Welte also oversees Supply Chain, which encompasses Fleet and Procurement. Mr. Welte previously held the position of Vice President, Field Operations since November 2014. Mr. Welte has held many positions in the Field Operations Department since beginning his career with PGW in October 1978. Some of the positions he has held were: Director, Field Operations, Manager, Field Service Department, Manager Meter Measurement, Pressure Force; Superintendent of Commercial & Industrial, Supervisor Field Service. Mr. Welte has been an active member of the American Gas Association, Society of Gas Operators, and Energy Association of Pennsylvania.

John C. Zuk, Senior Vice President - Gas Management

Mr. Zuk began his career at PGW over 32 years ago in the Distribution Department. He continued in Field Operations to level of Director of Labor Relations for Field Operations and Customer Affairs. Mr. Zuk also held positions within the Marketing Department from Account Manger up to the title of Vice President. His current position as Senior Vice President of Gas Management includes responsibility for Gas Processing, Engineering, Gas Acquisition, Transportation & Gas Control, as well as PGW-owned and leased properties. Mr. Zuk serves as a member of the APGA Research Foundation board and Vice-Chair of the APGA Gas Supply Committee. Mr. Zuk received his Bachelor of Science and MBA from LaSalle University.

Eloise N. Young, Senior Vice President, Strategic Planning and Information Services

Ms. Young was named Senior Vice President, Strategic Planning and Information Services where she has oversight of the Information Services Department and Strategic Planning in April 2016. Prior to her appointment, she served in a number of positions in PGW's Information Services Department including Chief Information Officer, Director of Technical Strategy and Support, Manager of Systems Services, System Administrator in both the Unix and CICS environments, DBA, and applications developer. She received a Bachelor of Science degree in Information Technology from the University of Phoenix in 2003 and a Generalist Master of Business Administration from Rosemont College in 2014.

Raquel N. Guzmán, Esq., Senior Vice President, Legal and General Counsel

Ms. Guzmán has held various positions within PGW's Legal Department since joining the department in 1998. She was appointed General Counsel in February 2016. Prior to joining PGW's legal staff, Ms. Guzmán was a Deputy City Solicitor for Regulatory Affairs for the City and also practiced at a major Philadelphia law firm in its real estate department. She holds a Juris Doctor degree from the University of Pennsylvania Law School and an undergraduate degree from Harvard College.

Gregory J. Stunder, Vice President – Regulatory and Legislative Affairs

Mr. Stunder joined PGW's Legal Department in 2001 and was appointed Vice President – Regulatory & External Affairs in January 2015. While in PGW's Legal Department, Mr. Stunder represented PGW in regulatory and legislative matters relating to base rate & gas cost rate proceedings, main replacement, gas choice and PGW's operations. In his current position, Mr. Stunder's primary responsibility is working with the President and CEO and other members of senior management regarding certain matters relating to state and federal legislatures and regulatory agencies. Prior to attending law school, Mr. Stunder was a Certified Public Accountant and he managed all aspects of the Philadelphia Thermal Energy accounting department (which is now Veolia Energy Philadelphia) including rate matters before the PUC. Mr. Stunder holds a Juris Doctorate from Temple University and a BS in Accounting from LaSalle University.

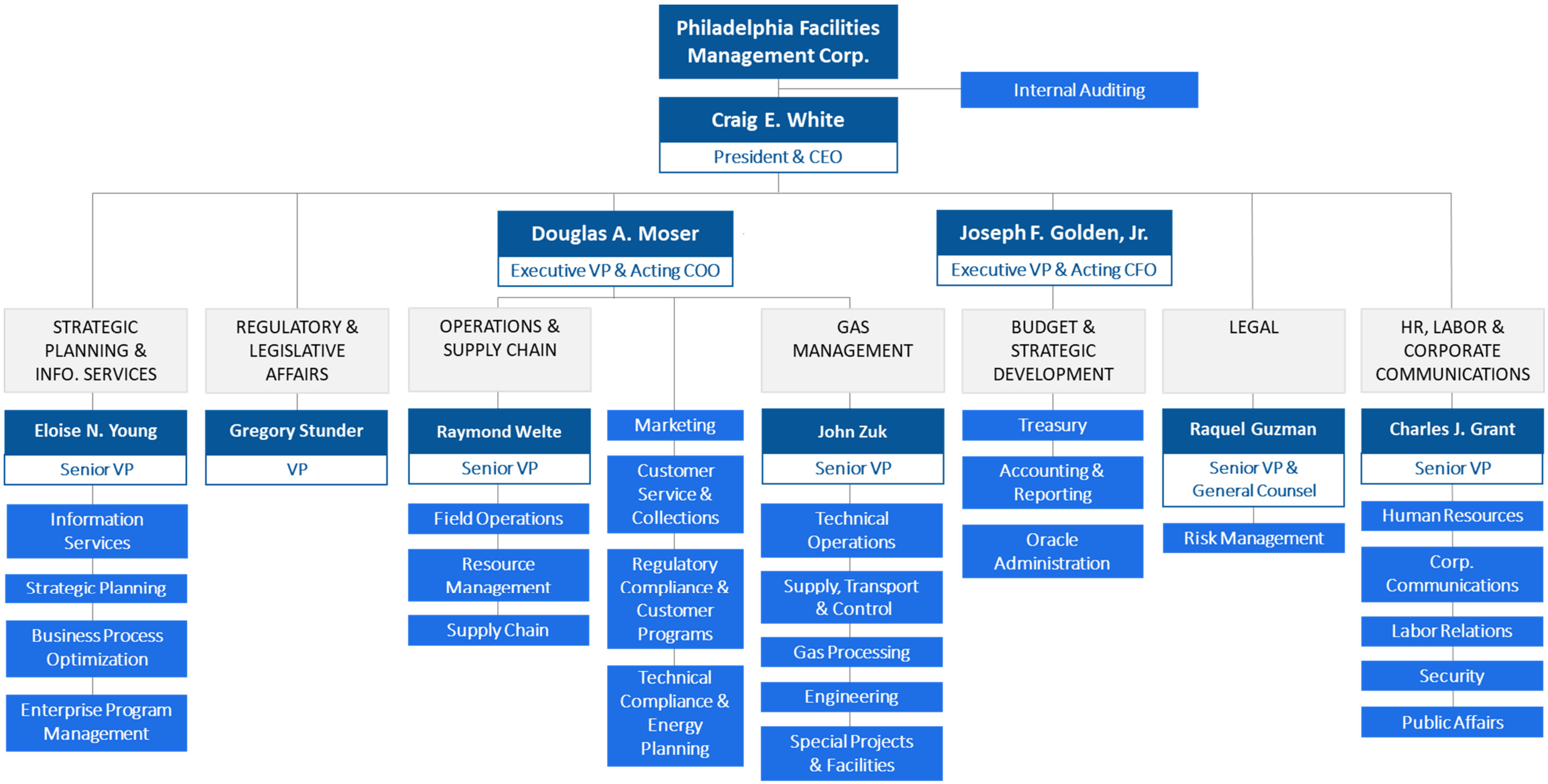

Figure 1 Philadelphia Gas Works Organization Chart

2.3. PHILADELPHIA GAS COMMISSION

The Philadelphia Home Rule Charter contains provisions for the establishment of the PGC with powers and duties as set forth in ordinances and contracts. The Management Agreement grants PGC certain specified powers and duties and all other powers not specifically granted to PFMC. The powers and duties granted to PGC include: (i) approval of personnel provided by PFMC; (ii) review of gas supply contracts and recommendations thereon to City Council; (iii) approval of changes in tests and standards of gas quality and pressure; (iv) approval of PGW's operating budget; (v) review of PGW's capital budgets and recommendations thereon to City Council; (vi) approval of certain short-term loans (but not the issuance of bonds); (vii) access to and review of all books, records and accounts of PGW; (viii) prescription of insurance requirements; (ix) promulgation of standards for procurement and disposal of material, supplies and services; and (x) approval of all real property acquisitions for further approval of City Council.

2.4. PHILADELPHIA FACILITIES MANAGEMENT CORPORATION

The Management Agreement between the City and PFMC dated December 29, 1972, states that for the operation of PGW, the PFMC shall provide:

- A Chief Executive Officer ("CEO");
- A Chief Operating Officer ("COO");
- A Chief Financial Officer ("CFO"); and
- Other personnel as deemed appropriate by PFMC.

All PFMC personnel are subject to the approval of the PGC. The PGC consists of five members: the City Controller, two Mayoral appointees, and two City Council appointees. The PGC has the general responsibility to oversee operation of PGW by PFMC and retains all powers not specifically granted to PFMC. In addition, the Management Agreement specifies certain functions of the PGC, mainly:

- Approval of PFMC personnel;
- Review and make recommendations regarding gas supply contracts for City Council approval;
- Approval of PGW's annual operating budget;
- Review and make recommendations regarding PGW capital budgets for City Council approval;
- Approval of short-term loans; and
- Review and approval of all PGW real estate acquisitions, sales, or leases for submittal to City Council for approval by ordinance, and power to establish procurement standards and to fix and regulate rates and charges[4] for supplying gas to customers other than the City and the Board of Education, which will annually produce revenues sufficient to:
  - Pay all operating and maintenance expenses of PGW and the interest and amortization expense of its debt;
  - Maintain debt coverage ratios;

[4] As of July 1, 2000, PGW rates and charges became subject to PUC jurisdiction, pursuant to the Gas Choice Act.

- Pay $18 million to the City each year; and
- Provide such other funds as may be approved by the PGC and City Council for debt reduction or capital additions.

2.5. PENNSYLVANIA PUBLIC UTILITY COMMISSION

The PUC regulates the rates and service of Pennsylvania's public utilities, including electricity, water, natural gas, and telephone. Under current law, all rate regulation authority for PGW is held by the PUC, pursuant to the Gas Choice Act. The Gas Choice Act contains provisions which are designed to: (i) preserve the tax-exempt status of Approved Bonds, defined in the Gas Choice Act as bonds or other obligations issued by the City for PGW, including the Sixteenth Series Bonds; (ii) preserve the ability of the City to comply with its covenants, including the City's covenants with respect to the imposition and collection of rates and charges to the holders of Approved Bonds, including the Sixteenth Series Bonds; and (iii) require rates to be set for PGW utilizing the ratemaking methodology and requirements that were applicable to PGW's natural gas distribution operation prior to the assumption of jurisdiction by the PUC. Pursuant to the Gas Choice Act, among other things:

- Commencing July 1, 2000, PGW became subject to regulation by the PUC and, except as otherwise provided in the Gas Choice Act, the provisions of the Public Utility Code apply to PGW as if it were a public utility. The PUC, instead of the PGC, sets rates for PGW's customers.
- Notwithstanding customer choice in gas suppliers, PGW's gas distribution business will remain a regulated monopoly.
- In setting rates and notwithstanding any other provision of the Public Utility Code, the PUC must permit the City to impose, charge and collect rates or charges as necessary to permit the City to comply with its covenants to the holders of any Approved Bonds, as defined in the Gas Choice Act. All bonds issued by the City on behalf of PGW under the Act, including the Sixteenth Series Bonds, are Approved Bonds.
- The PUC is obligated to use PGW's ratemaking methodology and requirements until all outstanding Approved Bonds are paid in full or are refunded or defeased.
- The PUC is barred from requiring the City or PGW to take any action (or omit taking any actions) under the Public Utility Code if such action or omission would have the effect of causing the interest on any Bonds issued by the City on behalf of PGW, including the Sixteenth Series Bonds, to be includable in the gross income of the holders of such Bonds for Federal income tax purposes.
- Effective July 1, 2000, the provisions of the Home Rule Charter with respect to the powers and duties of the PGC are abrogated to the extent inconsistent with the Gas Choice Act.
- On March 31, 2003, the PUC approved PGW's restructuring plan (Docket No. M-00021612), which implements customer choice and permits licensed natural gas suppliers to deliver gas to customers in Philadelphia using PGW's distribution system.
- On September 1, 2003, PGW began operating under its Restructuring Compliance Tariff.

- The PUC may, but is not required to, approve a senior citizen discount. On September 30, 2004, the PUC denied PGW's request to continue the senior citizen discount program for post-September 1, 2003, applicants. Since September 1, 2003, the program is not available to new participants. *(See Section 7.10, Senior Citizen Discount Program).*
- The PUC is required to provide for a management audit of all employees, records, equipment, contracts, assets, liabilities, appropriations, and obligations of PGW prior to the commencement of the restructuring proceeding. *(See Section 7.1 Regulation History).*
- The City cannot be required to take any action under the Public Utility Code if the effect of the action is to cause a variation in the City's financial plan approved by the Pennsylvania Intergovernmental Cooperation Authority.
- The City's executive or legislative powers to "legislate or otherwise determine the powers, functions, budgets, activities and mission of PGW" are not abrogated or limited.

By Order entered April 19, 2010, the PUC issued a Policy Statement which reaffirmed its use of PGW's prior ratemaking methodology, the cash flow method, to determine PGW's allowable revenue requirement. The Policy Statement also reaffirmed the PUC's obligation to establish rate levels adequate to permit PGW to satisfy its bond ordinance covenants. The PUC further set forth a series of factors it would consider in determining just and reasonable rates for PGW, including: Test Year year-end cash and projected future levels of non-borrowed year-end cash; available short-term borrowing capacity; internal generation of funds for construction; debt-to-equity ratios and the financial performance and level of operating and other expenses of similarly situated utility enterprises; level of financial performance needed to maintain or improve PGW's bond rating; PGW's management quality, efficiency and effectiveness; service quality and reliability; and effect on universal service.

This Report assumes rate regulation will be administered by the PUC to comply with PGW's prior ratemaking methodology (as interpreted by the Policy Statement) and the City's bond covenants, as required by the Gas Choice Act.

3. The PGW Gas System

PGW began gas production in February 1836 and has since continuously provided the City with service. Today, PGW is the largest municipally-owned gas utility in the nation, maintaining a distribution system of approximately 3,041 miles of gas mains and 476,605 service lines. In addition to this extensive distribution system, PGW operates facilities for the liquefaction, storage, and vaporization of natural gas to supplement gas supply taken directly from interstate pipeline and storage companies.

3.1. POPULATION AND SERVICE AREA

The PGW Gas System presently serves the limits of the City with a customer base of approximately 509,900 customers. This service area is shown in Figure 2. The service area consists of an urban area of 143 square miles located in southeast Pennsylvania along the Delaware River. Philadelphia is the largest incorporated area within the Delaware Valley region. According to the United States Census Bureau, as of July 1, 2018, Philadelphia has a population of approximately 1,584,138, an increase of about 3.8 percent since the 2010 census.

3.2. SUPPLY FACILITIES

The principal PGW natural gas supply facilities include nine city gate stations owned in large part by the interstate natural gas pipeline companies serving PGW and two LNG plants, Richmond Plant and Passyunk Plant, owned by the City. The supply facilities also include a gas control center, a deactivated propane/air plant, and two gas holders, one of which has been removed from service.

3.2.1. City Gate Stations

Natural gas is received through nine city gate stations from two interstate natural gas pipeline companies – Texas Eastern Transmission ("Texas Eastern") a division of Enbridge (formerly Spectra Energy), and Transcontinental Gas Pipe Line Corporation ("Transco-Williams"). The two pipeline companies own most of the facilities and land at eight of the nine city gate stations. The pressure delivered to PGW's distribution system is remotely controlled at each of the city gate stations. Eight city gate stations are equipped with gas heaters.

3.2.2. Gas Control Center

The gas control center is located at PGW's headquarters at 800 W. Montgomery Avenue with a backup at the Richmond Plant. The center monitors and controls gas flow and pressure from the nine city gate stations to the high-pressure distribution system. The gas control dispatchers also provide direction to the LNG production plant operators concerning startup, shutdown and gas flow output from the LNG facilities. Operations are facilitated through the use of a computer system located in the data center that includes redundant equipment, cooling and power.

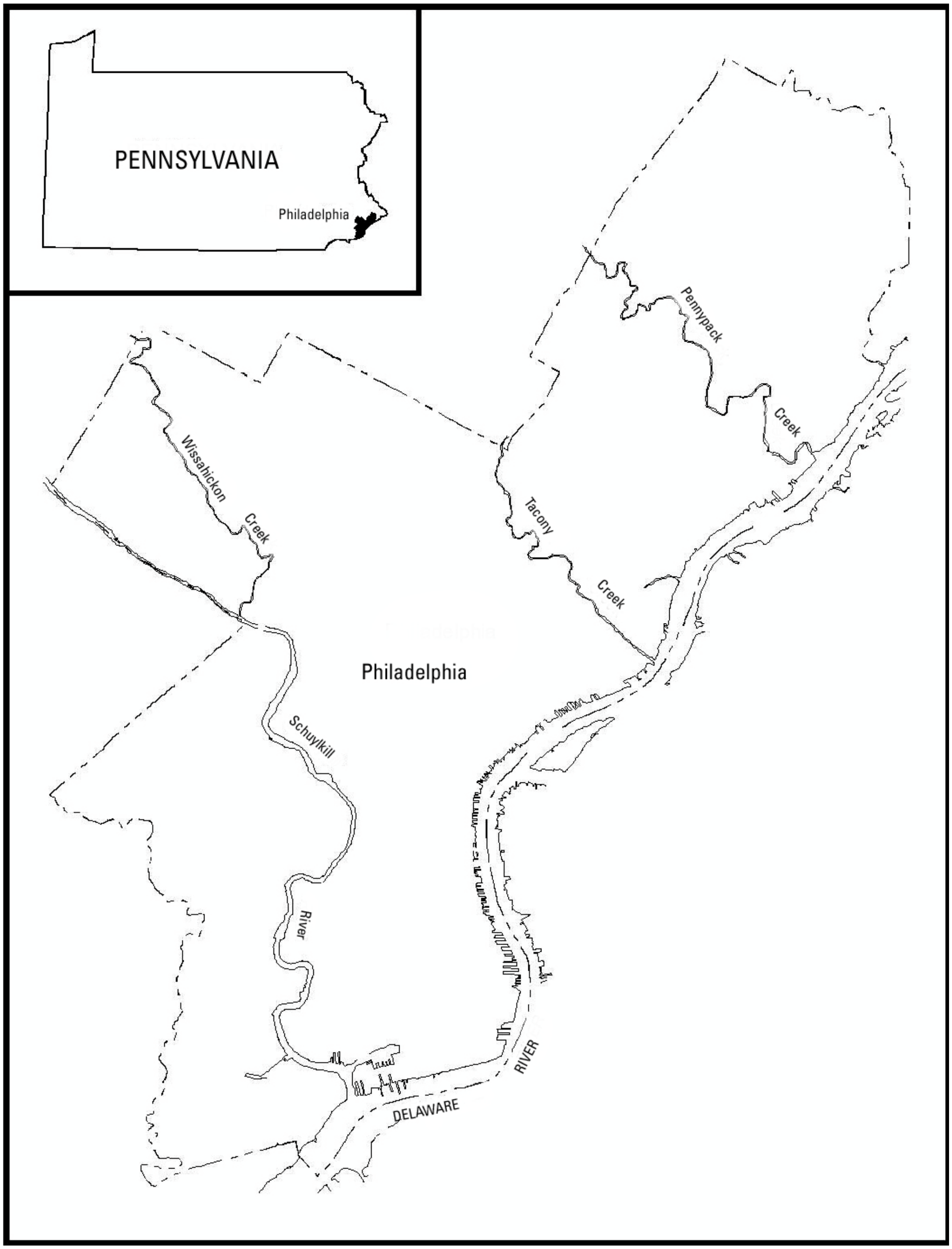

Figure 2 Philadelphia Gas Works Service Area

3.2.3. LNG Facilities

There are two LNG facilities – one at the Passyunk Plant and one at the Richmond Plant. The smaller satellite facility at the Passyunk Plant includes LNG storage and vaporization. It receives liquefied gas supply from the Richmond Plant via cryogenic trailer trucks. The Passyunk Plant consists of one LNG storage tank of 3,066,000 gallons gross capacity (i.e., the equivalent of 253,300 thousand cubic feet ("Mcf") of natural gas) and two LNG vaporizers, each having a capacity of 45,000 Mcf per day resulting in 45,000 Mcf per day planned capacity and 45,000 Mcf per day reserve. The Passyunk Plant also houses PGW's training facilities for gas distribution operations, field services, plastic fusion and driver training.

The Richmond Plant is one of the largest peak shaving facilities in the United States. It includes liquefaction, storage, and vaporization facilities. The liquefaction facility was placed into service in 2005 and replaced the original modified cascade liquefaction facility. The liquefaction facility utilizes open expander technology. It has a daily liquefaction capacity of 16,000 Mcf per day. This technology utilizes energy from the high-pressure interstate pipeline system to run the expander/compressors, significantly reducing fuel requirements. Further, this technology utilizes significantly fewer components than the older modified cascade facility and has resulted in lower operation and maintenance costs. The maximum capacity of the open expander liquefaction facility of 16,000 Mcf per day is not available during the summer months because the demand on the PGW system is not sufficient to create the throughput necessary to run at this capacity.

The two storage tanks at the Richmond Plant have a combined gross capacity of 48,970,000 gallons of LNG (4,045,800 Mcf). Regasification of the liquid natural gas is accomplished with six vaporizers having a total output of 500,000 Mcf per day plus 100,000 Mcf per day in reserve. The Richmond Plant also has facilities to receive LNG from and deliver LNG to cryogenic trailer trucks. In 2016, the control room at the Richmond Plant was expanded and updated.

Both the Passyunk and Richmond Plants are staffed 24 hours per day and have security personnel monitoring the facilities. In addition to on-site personnel, each Plant has fire suppression systems, including high expansion foam and sprinkler systems on tanks, emergency shutdown systems, and various other sensors to monitor the surrounding areas for leaks, fire and smoke.

PGW is actively negotiating to add liquefaction to its Passyunk Plant and exploring the expansion of liquefaction capacity of its Richmond Plant, as further discussed in Section 9, Potential LNG Expansion.

3.2.4. Gas Holder Storage Facilities

The Richmond Plant has a low-pressure gas holder. The Richmond holder has an operating capacity of 1,000 Mcf. It was installed in the manufactured gas era and is in working order. It is used to enhance operational flexibility of the LNG Plant. The Passyunk gas holder has been removed from service.

3.3. DISTRIBUTION FACILITIES

The principal gas distribution facilities consist of approximately 3,041 miles of main, 476,605 service lines, 198 district regulator stations, 573,500 meters (of which 520,000 are active), and miscellaneous distribution valves, instruments, and other appurtenances. PGW operates nine different operating pressure systems; each system is connected to the other by pressure control regulators. The minimum and maximum operating pressures for these systems are as follows:

Pressure System	Pressure (PSIG)	
	Minimum	Maximum
Richmond High Pressure Lateral	100	800
Transmission Main TP-1	200	500
Passyunk High Pressure Lateral	200	500
Ivy Hill Gate Station Inlet	100	420
150 PSIG System	60	150
60 PSIG System	30	60
High Pressure Distribution System	10	35
Intermediate Pressure Distribution System	1.5	5
Low Pressure Distribution System (Inches W.C.)	4.5”	14”

Approximately 76 percent (by length) of the gas mains in the PGW distribution system operate at low pressure (Inches W.C.). Also, the majority of PGW customers are served from the low-pressure distribution system (approximately 90% of customers).

Approximately 42 percent (by length) of the gas mains are cast iron, 34 percent are steel, 4 percent are ductile iron, and 20 percent are plastic. Of the steel mains, approximately 51 percent are wrapped, coated, and cathodically protected. Approximately 27 percent of the service lines are steel (of which 18 percent are cathodically protected) and 73 percent are plastic.

3.4. PGW TECHNICAL COMPLIANCE

The Technical Compliance and Energy Planning Department provides regulatory guidance and oversight for PGW operations to ensure compliance with applicable Federal (Department of Transportation, Environmental Protection Agency, Federal Emergency Management Agency, Pipeline and Hazardous Materials Safety Administration (PHMSA)), State (Pennsylvania Department of Labor and Industry, Pennsylvania Department of Environmental Protection, and the PUC), and City (Philadelphia Water Department, Philadelphia Department of Public Health, Philadelphia Air Management Services, and Philadelphia Office of Emergency Management) laws and regulations. The Technical Compliance Department is currently staffed with approximately 14 personnel among four operating units: Chemical Services, Environmental Compliance, Gas Safety Regulatory Services, and Corporate Preparedness.

- Chemical Services provides chemical and physical analyses and technical advisory services relating to compliance with environmental, health, and safety regulations. Chemical Services provides services in the following areas:

- Analytical Services: Conducts routine and as-needed analytical services in support of PGW operations, including natural gas composition and BTU analysis, odorant analysis, LNG analysis, glycol analysis, wastewater, and stormwater analysis, and other analyses as needed.
- Regulated Waste Management and Spill Response: Provides company-wide regulated waste characterization, management, and disposal support, and provides spill response services.
- Permit and Regulatory Compliance: Manages compliance requirements for a total of 12 regulated storage tank systems as well as storm water and wastewater permits.
- Industrial Hygiene and Chemical Safety: Provides industrial hygiene services, including asbestos, lead, and mold assessments/remediation, as well as indoor air quality and exposure assessments. Maintains safety data sheets for chemical products and provides training.
- Natural Gas Odorization: Provides natural gas odorization services, including investigation of abnormal conditions and supplemental odorization, as needed.

- Chemical Services provides 24/7 on-call support to PGW operations to meet needs for spill response, analytical services, and supplemental odorization.
- Environmental Compliance manages environmental regulatory compliance with Federal, State, and City regulations for all activities conducted at PGW facilities and locations in support of PGW operations. Environmental Compliance is managing environmental remediation and monitoring efforts among five former manufactured gas plant sites.
- Gas Safety Regulatory Services supports PGW operations with provision and documentation of Federal regulations (PHMSA) advisories, PUC safety inspections, data requests and official correspondences for PGW's Gas Processing, Field Services, and Distribution departments and Operator Qualification management and support.
- Corporate Preparedness is engaged in the ongoing process of identifying and planning for risks of disruption to operations and services. The fundamental goals of Corporate Preparedness are to protect human life, minimize disruptions of service to the organization and customers, minimize financial loss, and to ensure a timely resumption of service.

3.5. OTHER FACILITIES

PGW's central building complex is located near Temple University in the north central section of Philadelphia. There is a 180,000 square foot executive and administrative office building located at 800 West Montgomery Avenue. It includes the company's state of the art data center. Adjacent to that location, the former general office building, located at 1800 N. 9th Street, still houses operations including; administrative, distribution and field service dispatch centers, gas control dispatching, a post office, duplicating center, radio repair shop, training facilities, parking facilities, information technology and telecommunications offices, warehousing, as well as a metal fabrication shop. The central complex also includes a meter repair shop and the main automotive maintenance and repair facility. The automotive maintenance and repair facility is responsible for the upkeep of PGW's fleet vehicles, portable compressors, and trailers. PGW also maintains three satellite automobile repair facilities at several of its outlying stations. Additional satellite facilities include five customer service district offices, the Tioga station for distribution crews, five other warehousing facilities and three operating stations for field service crews.

3.5.1. Data Center

In 2015, the data center facility and operations were relocated from the 1800 N. 9th Street building into a completely new data center in the 800 W. Montgomery building. With the move, PGW reduced its data center footprint from almost 7,000 square feet to 1,700 square feet and completed a major move toward updating the existing facility. The new data center design includes: a new dedicated backup generator, two fully independent or redundant PECO Energy Company power feeds supplying two new fully redundant uninterruptible power supplies. The modular data center design allows for information technology equipment load growth and provides increased redundancy of cooling systems to essentially four systems.

The data center features a highly efficient hot aisle containment system and is hosting state of the art information technology equipment providing a 90+% virtualized compute environment with over 600 servers and one Petabyte (i.e., one million gigabytes) of storage.

3.5.2. Combined Heat and Power

A 200 kW natural gas-fired micro-turbine Combined Heat and Power ("CHP") system produces electricity, heat and cooling for the 800 West Montgomery Avenue building. PGW estimates that approximately half of the building's electricity is produced by the CHP at approximately half the cost of that purchased from the local distribution grid. Waste heat from the micro-turbine's exhaust is converted via an absorber chiller into dedicated cooling for the data center providing substantial annual operating savings. The CHP system is also used by PGW marketing to demonstrate the advantages of CHP systems to customers in the growing CHP service segment.

4. Condition of Facilities

In March 2020, Black & Veatch conducted site observations of certain above-ground PGW facilities as deemed appropriate. During the site visits, Black & Veatch used three evaluation criteria based on observation to evaluate the condition of each facility. These criteria are described below:

- *Good*: The facility is in condition to provide reliable operation in accordance with design parameters and requires only routine maintenance.
- *Adequate*: The facility is operating at or near design levels; however, non-routine renovation, upgrading and repairs are needed to ensure continued reliable operation. Significant expenditures for these improvements may be required.
- *Poor*: The facility cannot be operated within design parameters. Major renovations are required to restore the facility and assure reliable operation. Major expenditures for these improvements may be required.

4.1. CONSTRUCTION SITES

Observations at construction sites included crews, vehicles, power-operated equipment, tools, safety procedures for the crew and public, construction standards, and general quality of work performed.

4.2. METER SETTINGS

Meter setting observations include materials and equipment. Observed meter settings conformed to accepted industry standards, accessibility, and safety and security measures.

4.3. FIELD AND DISTRICT OFFICES

Black & Veatch observed various district office sites, including structures, security features, parking lots, driveways and office equipment, during the site visit. PGW operates five district offices on a rotating schedule where three district offices are open each day and two are closed. PGW owns the West Philadelphia, North Philadelphia, and South Philadelphia district offices, and leases the Frankford and Germantown district offices. Offices are open from 9:00 am to 5:00 pm and are staffed with approximately 50 customer service agents and four supervisors. All district offices are located near public transportation for easy customer access. In addition to processing payments and handling customer service, the offices also offer LIHEAP application assistance during certain times of the year.

Subsequent to Black & Veatch field visit, the district offices have been temporarily closed due to physical distancing guidelines imposed as a result of the COVID-19 pandemic. PGW has modified its operations to allow customers who typically walk-in to the district offices to address issues through the call center, make payments online, apply for assistance online or via mail, and make cash payments using Retail Cash which is a free service that allows cash payments to be made at any CVS, 7-11, Speedway, and Family Dollar.

4.4. PERSONNEL

During the inspection period, Black & Veatch conducted interviews and was assisted by PGW staff who are experienced, qualified, well trained, and knowledgeable in their assigned tasks. In addition to details of the operations, they were knowledgeable in details of routine and preventative maintenance procedures PGW has in place.

The following is a list of key areas discussed in conducting inspections and in the collection of system data:

- Construction
- Corrosion Engineering
- Field Offices
- District Offices
- Treasury
- District Regulators
- Field Services
- Gas Supply
- System Losses & Meter Maintenance Programs
- Leak Surveys
- Operations
- SCADA System
- Meter Settings
- City Gates and LNG Plants
- Accounts Receivable
- Data Center

4.5. FACILITY INSPECTIONS

The following facilities were inspected in March 2020:

SUPPLY FACILITIES

Liquefied Natural Gas Facilities	***City Gate Stations***	
Richmond Plant	030	Penrose
Passyunk Plant	034	Richmond
	060	Somerton
	Ashmead	Whitman
	Ivy Hill	

DISTRIBUTION FACILITIES

Construction Sites

Location: W. Lehigh Avenue and N. American Street.

Description of Work:
- Contract crew installing approximately 6,500 feet of 12-inch high density polyethylene pipe to replace cast iron from B Street to 11th Street along W. Lehigh Ave.
- Observed placement of approximately 100 feet of 12-inch high density polyethylene pipe, electrofusion, backfill.

Location: Indiana Avenue, between N. 23rd Street and N. Croskey Street.

Description of Work:
- Contract crew installing new 8-inch high density polyethylene pipe along Indiana Avenue to replace cast iron from N. 23rd Street to N. Croskey Street

- Observed installation of prefabricated 8-inch to 4-inch tie-in tee, pipe preparation, electrofusion.

Location:	3950 N. Delaware Avenue, City Sanitation building.
Description of Work:	• Installation of two 1 ¼-inch high density polyethylene service lines to serve new customer. • Observed exposed 20-inch steel main being prepared to weld on a tap to run service to new customer's meter set. • Observed pressure test on 1 ¼ high density polyethylene service line, and traffic control.

Commercial/ Industrial Meter Settings

2714 E. Lehigh Avenue, Pottery business
1001 N. Delaware Ave., Rivers Casino
2609 E. York, Auto shop
1650 N. America Street, Catering business
246 W. Berks, Food service warehouse
1918 N. 5th Street, Cousins Supermarket
2700 Castor Avenue, Crystal Metal Works
2501 Margaret Street, AdvanSix/Honeywell

OTHER FACILITIES

PGW Main Office	Frankford district office (lease)
PGW CHP system	North Philadelphia district office (PGW owned)
Data Center	South Philadelphia district office (PGW owned)

4.6. CONCLUSIONS

All observed facilities, vehicles, equipment and warehouse stock appeared to be reasonably maintained and in good operating condition. During the site visits, Black & Veatch identified only minor items not in good operating condition as would be expected during the normal course of operation. These items were either in the process of being repaired or were essentially retired in place. Employees appeared to be knowledgeable of their job requirements and well trained.

PGW's highest operating priority is response to emergencies and the maintenance of a safe gas distribution system. PGW maintains maps and other records of the distribution system in good order and has comprehensive written construction, operating and maintenance standards and procedures. Its personnel appeared well trained in the operation and maintenance of the gas distribution system. PGW is routinely actively involved in entering its facility records (corrosion, service and leak records) into computer databases, thus facilitating and improving the accuracy of accessing information. PGW has continued to monitor its security measures at its major facilities, including the two LNG facilities, the city gate stations, and the headquarters building complex. PGW has concrete barriers around critical facilities at Richmond Plant and perimeter fencing around both Passyunk and Richmond Plants.

Based on the physical observations and interviews conducted in March 2020, and the level of maintenance expense and capital improvements reflected in this Report, Black & Veatch is of the opinion that PGW operates and maintains its system in accordance with current regulatory standards and generally accepted industry practices.

5. PGW Gas Supply

PGW manages its gas supply through a mix of flowing supplies, off-system underground storage, and City-owned and PGW-operated LNG facilities. PGW utilizes this mix to meet its obligation to serve customers' demand on the coldest day (peak day) as well as customers' annual requirements. PGW's gas distribution facilities are directly connected to Spectra through four city gate stations and to Transco-Williams through five city gate stations. All gas delivered to customers by PGW is transported to the city gate stations through these pipelines. During predominantly off-peak periods, a portion of the purchased gas supply is stored in off-system underground storage facilities connected to these two pipelines or in PGW's LNG facilities. Through the effective use of off-system storage and LNG, PGW is able to more efficiently utilize its transportation contracts with Spectra and Transco-Williams.

5.1. SUPPLY SERVICES

PGW purchases gas through a combination of term contracts and spot market purchases. Natural gas supplies are purchased under a portfolio approach intended to secure the lowest price consistent with reliability of supply. Consideration is given to maintaining a diversity of sources and types of supply. During the 2020 fiscal year, purchased gas costs are estimated to account for approximately 59.4 percent of the total gas supply expenses of $195.4 million and approximately 18.2 percent of total gas revenues of $638.1 million. The cost of gas supply is a function of the prices paid and the quantity purchased, both of which are variable. While this price component can be managed by PGW to some extent through the timing of purchases, the prices paid are largely determined in a very competitive and sometimes volatile marketplace. While the total annual volumes purchased are highly dependent on temperatures during the heating season and are beyond the utility's direct control, PGW can manage the timing of purchases and hence prices to a limited degree, by utilizing off-system and LNG storage.

5.2. TRANSPORTATION AND STORAGE SERVICES

All of PGW's gas purchases are ultimately transported from the sources of supply to the city gate stations through either Texas Eastern or Transco-Williams facilities. Injections and withdrawals of gas from off-system storage also rely on these two pipelines. Table 1 summarizes the existing transportation and storage agreements. As shown in this table, PGW's currently available pipeline capacity is almost equally divided between the two pipelines. Of PGW's total contract pipeline capacity of 444,722 Mcf per day, Texas Eastern accounts for 226,343 Mcf per day, or 50.9 percent, and Transco-Williams accounts for 218,379 Mcf per day, or 49.1 percent. The initial terms of the major contracts for the Texas Eastern transportation service (CDS and FT) and for the Transco-Williams transportation service (FT) expired after the 2011-12 winter period. However, these contracts renew on an automatic year-to-year basis following the initial term. PGW's current long-term plan assumes that these contracts may also be renewed as longer-term contracts.

Table 1 Gas Supply, Transportation, and Storage Contracts

Contract	Contract Expiration[b]	Transportation[c] dt/day	Transportation[c] Mcf/day[f]	Storage[d] dt/day	Storage[d] Mcf/day[f]
Transco-Williams					
FT - 3691	2023	165,212	159,471		
PSFT - 5001	2021	1,967	1,899		
S-2	2021	5,191	5,011	5,191	5,011
GSS[e]	2023	53,871	51,999	53,871	51,999
WSS[a][e]	2021			35,115	33,895
Subtotal		226,241	218,379	94,177	90,904
Texas Eastern					
CDS - 800232R	2021	75,000	72,394		
FT1 - 800233R	2021	23,822	22,994		
FT1 - 800514R	2022	18,000	17,375		
FT1 - 800515R	2022	18,000	17,375		
FTS2 - 330791	2021	5,394	5,207		
Dominion/GSS/FTS7[e]	2022	6,815	6,578	6,815	6,578
Dominion/GSS/FTS8[e]	2022	22,495	21,714	22,495	21,714
SS1A	2023	44,118	42,585	44,118	42,585
SS1B	2023	20,847	20,123	20,847	20,123
Subtotal		234,491	226,343	94,275	90,999
Total		460,732	444,722	188,452	181,903

(a) Transportation included in FT.
(b) Contracts are assumed renewed based on evergreen clauses beyond their expiration date.
(c) Reference: SDS 6, Page 4 of 4, In the Matter of Proposed Operating Budget FY 2020-2021, Supporting Documentation Gas Costs and Purchasing Plans, Volume I & II, February 2020.
(d) Reference: SDS 6, Pages 1-2 of 4, In the Matter of Proposed Operating Budget FY 2020-2021, Supporting Documentation - Gas Costs and Purchasing Plans, Volume I & II, February 2020.
(e) Volumes reflect 87.5% contract limitation on maximum monthly storage withdrawal.
(f) Mcf conversion at 1.036 BTU.

Due to the highly seasonal nature of PGW's load (demand), the efficiency of pipeline transportation service can be increased significantly through the use of storage services. During periods when PGW's load is less than the contracted transportation service, PGW may utilize the available capacity to deliver gas to off-system storage facilities or to liquefy gas for storage in its LNG facilities. The ability to store gas off-system and in LNG facilities provides three significant benefits. First, less capacity needs to be reserved on interstate pipelines to serve higher seasonal loads to the extent that gas can be stored in off-system storage and local LNG facilities. Second, less natural gas needs to be actually purchased during the generally higher cost winter period to the extent that gas can be purchased during the lower cost non-winter period, stored and then redelivered from storage during the winter. Third, market area storage provides increased security of supply.

Of PGW's total contract daily storage withdrawal capacity of 181,903 Mcf per day, services provided on Texas Eastern account for 90,999 Mcf per day, or 50 percent, and Transco-Williams accounts for 90,904 Mcf per day, or 50 percent. Transco WSS storage does not include bundled transportation so volumes from this storage must be transported using the FT transportation contract. All other storage volumes are bundled storage and transportation. This storage deliverability is used primarily to reduce contract demand for long haul transportation services and to reduce the quantity of gas that needs to be purchased during the typically higher cost winter period to meet winter peak demand.

During the 2020 fiscal year, transportation and storage capacity costs are estimated to account for approximately 40.6 percent of the total gas supply expenses of $195.4 million. The prices paid for these services are determined by long-term contracts and tariff rates regulated by the Federal Energy Regulatory Commission ("FERC"). Generally, these components of gas supply cost represent the purchase of capacity, are relatively fixed, and do not vary directly with the volumes of gas purchased.

5.3. LNG FACILITIES

The City owns and PGW operates two LNG facilities: the Richmond Plant and the Passyunk Plant. The LNG facilities are primarily used to ensure availability of supply needed to serve peak day demand. The LNG facilities provide capacity that would otherwise be needed from flowing gas and off-system storage (i.e., pipeline and storage capacity) to meet peak day demands. The LNG facilities also allow for a nominal reduction in purchases during the higher cost winter period. Based upon current pipeline and storage charges, which have remained relatively constant over the past five years, PGW estimates that utilizing the existing LNG facilities in lieu of additional pipeline and storage capacity saves approximately $75 million per year.

Gas is liquefied at the Richmond Plant. After liquefaction, the LNG is stored and vaporized at both the Richmond Plant and the Passyunk Plant. Total liquefaction (converting natural gas to liquid state for storage) capacity at the Richmond Plant existing facilities is approximately 16,000 Mcf per day. The Richmond Plant can store approximately 49 million gallons of LNG (4.05 Bcf natural gas equivalent) and the Passyunk Plant can store approximately 3.0 million gallons of LNG (253,000 Mcf natural gas equivalent). The LNG stored at the Passyunk Plant is typically liquefied at the Richmond Plant and then transported by cryogenic trailer trucks to the Passyunk Plant, although LNG can also be purchased and transported from third parties. Total vaporization (converting the liquid LNG to gas) capacity at the Richmond Plant with six vaporizers, is 500,0000 Mcf per day and 100,000 Mcf per day in reserve, and the capacity at the Passyunk Plant with two vaporizers, is 45,000 Mcf per day and 45,000 Mcf per day in reserve. The highest daily vaporization rate from the LNG facilities of approximately 360,000 Mcf occurred in January 1994 when PGW recorded its maximum system sendout. (*See Section 9, Potential LNG Plant Expansion*)

5.4. SUPPLY AND DEMAND BALANCE

Table 2 summarizes the supply mix that was used to meet historical peak day demand from fiscal years 2015 through 2020, and the supply mix that would enable PGW to meet future demand assuming design conditions over the 2021 through 2025 fiscal years. PGW's highest actual historical peak day occurred on January 19, 1994, with a demand (sendout) of 752,707 Mcf. The average temperature on that day was 2°F. For design purposes, PGW projects total demand based on a 65 heating degree-day ("HDD") which translates to a design day average temperature of 0°F. This is the lowest expected temperature that PGW believes could reasonably occur and PGW did experience a design day in the 1980's with an average temperature of 0°F. During the past five fiscal years (2015-2019), pipeline deliveries (flowing gas plus underground storage) have met between 67.3 and 85.4 percent of actual peak day demand. These figures are relatively high due to significantly warmer than normal winters, as defined below. During the projection period, approximately 62.5 percent of peak day demand under design conditions would be met from pipeline supply with the remaining 37.5 percent met from LNG. PGW must maintain these capacity levels because it is considered the supplier of last resort if the customer's supplier is unable to deliver natural gas. PGW assigns proportionate shares of pipeline capacity and cost to firm transportation customers. Table 2 shows that PGW has sufficient capacity to meet forecast demand requirements.

Table 3 summarizes the supply mix that is projected to meet annual requirements during normal and design years from fiscal year 2021 through fiscal year 2025. For supply planning purposes, PGW defines a normal year as one containing 3,962 HDDs. The supply planning normal year is based on the ten-year average HDDs as recorded at the Richmond Plant. PGW defines a design year as one containing 5,280 HDDs. A design year is based on the temperatures experienced during the 1977-1978 winter, which was the coldest recorded winter in the last 60 years.

Even though 100 percent of PGW's supply is originally transported through one of the two interstate pipelines, the supply components shown in Table 3 are based on the source of gas when ultimately delivered to the end user. On a projected normal annual basis, approximately 71.3 percent of the total supply volume is delivered to firm customers, and 28.7 percent is gas transported by interruptible third-party suppliers. 97.4 percent of PGW's firm volume is delivered to firm end users through the interstate pipeline systems (of which 77.9 percent is flowing gas[5] and 22.1 percent is off-system storage), and 2.6 percent is delivered from the LNG facilities.

[5] Flowing gas represents gas that is purchased at the same time as delivered to customers.

Table 2 Peak Day Supply and Demand

	Fiscal Year Ending August 31,										
	Actual					Estimate	Projected - Design [a]				
Description	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
Actual[b]											
Peak Heating Degree-Days	54	49	44	52	48	35					
Demand - Mcf	645,370	583,377	528,423	639,043	611,853	461,382					
Supply - Mcf											
Pipeline/Storage	495,027	483,750	451,101	468,042	411,676	452,560					
LNG	150,343	99,627	77,372	171,001	200,177	8,822					
Total	645,370	583,377	528,473	639,043	611,853	461,382	0	0	0	0	0
Projected - Design											
Design Heating Degree-Days[c]							65	65	65	65	65
Demand - Mcf[c]							708,951	710,306	711,339	712,018	712,939
Supply - Mcf											
Pipeline/Storage [d]							444,722	444,722	444,722	444,722	444,722
LNG (net)							264,229	265,584	266,617	267,296	268,217
Total							708,951	710,306	711,339	712,018	712,939

(a) Assumes no unbundling of services.

(b) For 2015-2019, SDS 7, In the Matter of Proposed Operating Budget FY 2020-21, Supporting Documentation - Gas Costs and Purchasing Plans, Volume I &II, February 2020. Total actual annual demand does not include Interruptible Gas Transportation Service customer Grays Ferry, which is not included in peak day planning.

(c) SDS 6, Page 3 of 4, In the Matter of Proposed Operating Budget FY 2020-21, Supporting Documentation - Gas Costs and Purchasing Plans, Volume I&II February. 2020.

(d) SDS 6, Page 4 of 4, In the Matter of Proposed Operating Budget FY 2020-21, Supporting Documentation - Gas Costs and Purchasing Plans, Volume I&II, February 2020.

Table 3 Annual Supply and Demand

Line No.	Description	2021	2022	2023	2024	2025
		Projected for Fiscal Year Ending August 31,				
		dt	dt	dt	dt	dt
	Normal Year - 3,962 Heating Degree-days					
	Requirements - Sales					
1	Firm Service	44,365,035	44,176,024	43,987,285	43,892,490	43,618,837
2	Cogeneration Service	13,409	13,409	13,409	13,408	13,409
3	Firm Transportation Service	7,017,947	7,085,704	7,154,473	7,220,697	7,287,073
4	LNG Sales	52,951	52,951	52,951	52,949	52,951
5	Interruptible Gas Transportation	14,423,211	14,423,211	14,423,211	14,449,770	14,423,211
6	Trigen	1,584,395	1,584,395	1,584,395	1,584,395	1,584,395
7	Grays Ferry	12,039,418	12,039,418	12,039,418	12,039,418	12,039,418
8	Subtotal Sales	79,496,366	79,375,112	79,255,142	79,253,127	79,019,294
9	Plant Use	139,179	159,712	160,997	163,230	162,579
10	Transport Fuel	1,111,587	1,105,111	1,093,113	1,091,771	1,077,101
11	Storage Fuel	336,164	332,575	327,436	334,638	327,548
12	Storage Injections	15,260,429	15,052,668	14,889,234	15,107,470	14,889,769
13	Liquefaction	1,901,652	1,852,722	1,891,222	1,926,431	1,904,222
14	Total Demand	98,245,377	97,877,900	97,617,144	97,876,667	97,380,513
	Supply					
15	Texas Eastern	32,477,818	32,079,683	32,138,191	31,964,819	32,046,119
16	Transco-Williams	20,821,921	21,025,511	20,779,628	20,820,364	20,528,175
17	Pipeline Subtotal	53,299,739	53,105,194	52,917,819	52,785,184	52,574,294
18	Texas Eastern	8,195,307	8,077,752	8,014,210	8,211,215	7,999,528
19	Transco-Williams	7,030,870	6,972,296	6,844,620	6,892,995	6,855,591
20	Storage Subtotal	15,226,178	15,050,047	14,858,830	15,104,210	14,855,120
21	Total Firm Gas Supply	68,525,917	68,155,241	67,776,649	67,889,394	67,429,413
22	LNG	1,672,436	1,675,634	1,793,470	1,913,690	1,904,075
23	Interruptible Transportation Supply	28,047,024	28,047,024	28,047,024	28,073,583	28,047,024
24	Total Supply	98,245,377	97,877,900	97,617,144	97,876,667	97,380,513
	Design Year - 5,280 Heating Degree-days					
25	**Requirements - Sales**					
26	Firm Service	55,308,313	55,073,532	54,839,243	54,728,766	54,382,573
27	Cogeneration Service	13,409	13,409	13,409	13,408	13,409
28	Gas Transportation Service	8,562,752	8,645,947	8,730,358	8,812,576	8,894,036
29	LNG Sales	52,951	52,951	52,951	52,949	52,951
30	Interruptible Gas Transportation	15,996,418	15,996,418	15,996,418	16,022,977	15,996,418
31	Trigen	1,584,395	1,584,395	1,584,395	1,584,395	1,584,395
32	Grays Ferry	12,039,418	12,039,418	12,039,418	12,039,418	12,039,418
33	Subtotal Sales	93,557,657	93,406,071	93,256,193	93,254,490	92,963,201
34	Plant Use	153,220	173,503	173,509	175,496	174,222
35	Transport Fuel	1,406,359	1,400,367	1,394,155	1,386,771	1,375,517
36	Storage Fuel	270,238	262,393	257,897	252,333	250,715
37	Storage Injections	12,347,899	11,967,002	11,506,742	11,423,273	11,297,175
38	Liquefaction	1,901,652	1,852,722	1,891,222	1,926,431	1,904,222
39	Total Demand	109,637,025	109,062,058	108,479,718	108,418,794	107,965,052
	Supply					
40	Texas Eastern	35,249,491	34,899,152	34,579,964	34,886,261	34,666,124
41	Transco-Williams	29,905,114	30,059,094	30,232,686	29,804,260	29,785,924
42	Pipeline Subtotal	65,154,605	64,958,246	64,812,650	64,690,522	64,452,047
43	Texas Eastern	6,134,104	6,092,579	5,834,563	6,122,520	6,092,805
44	Transco-Williams	6,186,533	5,864,103	5,646,512	5,288,135	5,177,143
45	Storage Subtotal	12,320,637	11,956,681	11,481,076	11,410,654	11,269,948
46	Total Firm Gas Supply	77,475,242	76,914,927	76,293,725	76,101,176	75,721,995
47	LNG	2,541,551	2,526,899	2,565,761	2,670,827	2,622,825
48	Interruptible Transportation Supply	29,620,232	29,620,232	29,620,232	29,646,791	29,620,232
49	Total Supply	109,637,025	109,062,058	108,479,718	108,418,794	107,965,052

Reference: SDS 4, In the Matter of Proposed Operating Budget FY 2020-21, Supporting Documentation - Gas Costs and Purchasing Plans, Volume I & II, February 2020.

6. Capital Improvement Program

PGW uses a formal process of evaluating capital needs and funding programs to meet those needs. This annual capital planning process is used to identify potential capital improvements at the departmental level based upon certain operating and economic assumptions, evaluate these requirements, and establish priorities considering available financial resources. Based upon this process, PGW formulated a CIP for a six-year period based upon the approved capital budget for fiscal year 2020 and the proposed capital budget for fiscal year 2021 and the forecast period fiscal years 2022 through 2025. For the large operating departments whose needs comprise the vast majority of PGW's capital requirements, the gas design load forecast is one of the key elements in determining their capital requirements. In addition to ensuring the continued safety of PGW's operations, reliability of service is a major concern when considering the need for capital resources. The Gas Processing Department addresses these concerns by providing and maintaining the necessary facilities to take delivery of pipeline supplies and provides supplemental gas to satisfy peak load requirements. The Distribution Department, in its capital budget process, is concerned with continuing to provide and properly maintain a distribution network and to safely deliver natural gas at adequate pressure to satisfy the requirements of the appliances and equipment of PGW's customers.

Also of major importance, is to ensure funding is available to provide facilities to support new load opportunities as identified in the Marketing Department's forecast of customer additions. This forecast drives budget requirements for the Distribution Department for main and service additions, and in Field Services to identify new meter installations that must be provided for in the Capital Budget. Additional systems and technology initiatives are also considered to improve both efficiency and customer service. Under the terms of the Management Agreement, PGW submits the annual CIP to the Director of Finance and the PGC for their review and recommendation to City Council for budget approval.

In keeping with PGW's philosophy of maintaining a safe and reliable infrastructure, all capital projects are assigned a priority. The highest priority projects (Priority 1 and Priority 2) relate to expenditures required for maintaining the safety and reliability of PGW's infrastructure. Priority 3 expenditures relate to enforced main relocations that are based on City, State, and Federal mandated underground infrastructure projects. Priority 4 expenditures relate to projects that will result in additional revenues from load growth opportunities, while Priority 5 are for those expenditures associated with business improvements that increase operational efficiencies and/or productivity.

Table 4 presents a summary of PGW's historical and forecasted CIP expenditures. Capital expenditures for the major departments are shown in the table. Capital expenditures for all departments other than Gas Processing, Distribution, Field Services, and Fleet Operations are grouped together under the general category "Other Departments".

Proposed capital expenditures over the five-year projection period, fiscal years 2021 through 2025, total $744.5 million (net of salvage, contributions, and reimbursement). For fiscal year 2021, PGW's budgeted capital expenditure of $154.1 million (net of salvage, contributions, reimbursement and including carryover projects) represents a $34.4 million increase from the estimated fiscal year

2020 capital expenditures of $119.7 million. The major contributing factor for this significant spending increase is associated with two major initiatives; Replacement of PGW's Customer Information System ("CIS") and implementation of PGW's Building Consolidation Initiative. Cast iron replacement spending in Distribution also contributed to this increase in fiscal year 2021. The majority of the fiscal year 2021 capital expenditures, $94.5 million or 61.3 percent, are committed to Distribution Department projects. Field Services and Fleet Operations have planned expenditures of about $9.0 million and $4.0 million, respectively, in fiscal year 2021. Gas Processing has planned expenditures of about $9.0 million, in fiscal year 2021. Other Department expenditures are $37.5 million, primarily the result of CIS and Building Consolidation. Over the five-year projected period, Distribution Department projects have planned expenditures of $511.0 million, which represents 68.6 percent of the total capital spending. The majority of the Distribution Department capital projects involve the replacement of gas services and ongoing and required main replacements for high pressure, intermediate and low-pressure mains identified in PGW's LTIIP. Based on our inspections of existing facilities in March of 2020 and under normal operating conditions, the proposed capital expenditures should be sufficient to maintain the system in good condition.

A listing of projects approved in the capital budget for the fiscal year 2021, by major department, is shown in Table 5. This table also shows the priority assigned to each project. In addition to the estimated $126.8 million as shown in Table 5 for fiscal year 2021, PGW anticipates completing $27.2 million of capital improvements carried over from the prior fiscal year.

6.1. GAS PROCESSING

As shown in Table 4, the budgeted capital spending for the Gas Processing Department is $9.0 million in fiscal year 2021 (including carryover projects). These capital expenditures are for normal additions and replacements necessary to maintain the safety and reliability of natural gas measurement and control facilities, plant buildings and grounds, and PGW's LNG supplemental gas capabilities. The more significant initiatives in fiscal year 2021 include: $1.1 million to Replace Meter & Regulator Heater and Generator, and $1.4 million to Replace the Hazard Detection System at Passyunk. Forecasted project spending is based upon the inventory of projects to be undertaken. For example, the forecast in fiscal years 2023 and 2025 includes a total of $3.6 million to Replace Heaters and Generators at two Meter and Regulator Stations, $6.4 million to be spent in fiscal years 2022 through 2024 to Replace LNG Switchgear at the Richmond Plant, $3.8 million in fiscal years 2024 through 2025 to Replace the Fiber Optics at Richmond and Passyunk Plants, and $5.0 million in fiscal year 2025 to Replace River Water Switchgear at Richmond. Also, the work pattern to complete a project will be a factor in the determination of the carryover spending from fiscal year to fiscal year. This affects the respective spending pattern related to the various projects.

6.2. DISTRIBUTION

The ongoing cast iron main replacement capital program is funded through base rates and the Distribution System Improvement Charge ("DSIC"). The base rate funded portion of the program for fiscal year 2021 is approximately $29.8 million which will support the removal of approximately 18 miles of cast iron mains. Cast iron pipe was generally used by natural gas utilities many decades ago and was quite common for low-pressure gas mains such as PGW's. While this pipe has performed well, as it ages the pipe becomes brittle and the joints deteriorate, thereby resulting in leaks. Over the last 20 years or so, natural gas utilities have been systematically replacing cast iron mains generally with plastic for low-pressure systems and sometimes wrapped and cathodically protected steel for higher pressure systems.

The estimated capital spending for fiscal year 2021 for the Distribution Department is $94.5 million. This level of capital spending in the Distribution Department is a continuation of increases which began in fiscal year 2013. The increase in Distribution Department spending is associated with the replacement of at-risk mains as currently sanctioned in PGW's LTIIP. This program provides the opportunity for PGW to implement a DSIC that will allow PGW to recover the annual cost for its accelerated replacement program on a pay-as-you-go basis, thus avoiding the need to issue additional debt financing to support the program.

Table 6 summarizes the miles of cast iron mains replaced, number of service lines replaced and the capital expenditures for mains and service line replacement for fiscal years 2000 through 2019. As shown in Table 6, the amount of cast iron mains replaced by PGW increased significantly beginning in fiscal year 2013, due to implementation of the DSIC. The decline in the number of service lines replaced is primarily a function of the number of service lines that are connected to the mains replaced and the fact that the total inventory of unprotected steel service lines declined.

The level of main replacement represents a balance among several factors including prioritizing replacements to areas of highest reported leaks, working within the constraints of a highly populated urban area, providing sufficient supervision and oversight by PGW of internal and external construction crews, and the level of rate or surcharge revenues approved by the PUC to fund the replacements. Approximately 18 miles of the current mains replacement program is covered by the current level of approved base rates (which is approximately $29.8 million per year). Additionally, an accelerated mains replacement program is funded by DSIC at $35 million per year. PGW received approval from the PUC to fund DSIC at 7.5 percent of the amount billed to customers starting in fiscal year 2016. This increase in the cap allows PGW to recover $35 million in DSIC for fiscal year 2019 (which, when combined with the level in base rates, results in approximately $64.8 million per year). To the extent that PGW and its regulators agree to further accelerate the level of annual mains (and related service lines) replacement, the preferred method of financing these capital improvements would be through the existing DSIC surcharge mechanism or, as an alternative, through increased base rates.

A significant expenditure, $18.5 million relates to the replacement of small diameter services (1.25 inches or less), which are necessary as a result of the distribution mains replacements as well as leaking services and collection activities, and implementation of PGW's main replacement program, both the 18-mile program as well as the accelerated replacement program.

6.3. FIELD SERVICES

The estimated capital spending for fiscal year 2021 for the Field Services Department is $9.0 million. PGW continues to realize benefits from the implementation of the automated meter reading system, including fewer estimated readings, increased reading accuracy, reduction in meter reading personnel and reduced customer complaints. The 2021 Capital Budget reflects continued implementation of PGW's Advanced Meter Infrastructure ("AMI") Program. This project is a real-time communications infrastructure that enables two-way communications between a data center and the customer's meter. The establishment of a fixed communications network will increase efficiency, particularly by elimination of mobile meter reading resources, and customers will benefit through improved service from on demand meter reading.

While replacing meters and AMR devices, PGW is testing its meters to comply with PUC requirements.

6.4. FLEET OPERATIONS

The Fleet Operations Department estimated capital expenditures are $4.0 million for fiscal year 2021. The majority of the estimated capital expenditures for this department are associated with vehicle and mobile equipment replacements. The majority of the vehicle replacements are targeted to support critical field operations activities. The fiscal year 2021 spending level in Fleet Operations is based upon PGW's normal replacement criteria. In any particular year, spending in this area is based upon the inventory of vehicles to be replaced. Vehicles are analyzed on an annual basis to determine their respective useful life.

6.5. OTHER DEPARTMENTS

The Other Departments category includes estimated capital expenditures for Facilities, Information Services, Customer Affairs, and other miscellaneous departments. For fiscal year 2021, the combined spending of these departments is estimated at $37.5 million. Two major initiatives are the driving force for this level of spending, replacement of PGW's CIS and implementation of PGW's Building Consolidation effort. PGW's current CIS System was implemented in 1999. It uses a dated and proprietary software architecture, which in the form deployed at PGW has not found broad market acceptance. PGW plans to replace its current CIS with a highly customizable and flexible modern CIS that leverages best practices of the utility industry and will provide a secure and reliable operating platform for the future. In conjunction with the CIS, PGW will update its Customer Experience Portal for service orders. This project is a multiyear initiative that will cost in total $32.7 million, of which $11.5 million will be spent in fiscal year 2021.

Building Consolidation is also a multiyear project, with a total budget authorization of $123.3 million. The project is intended to improve space utilization, reduce costs, improve service levels, and shrink PGW's physical and carbon footprint. To attain these benefits, PGW will sublease space for the location of a North Operations Center ("NOC"). Administrative functions will be consolidated into the existing 800 W. Montgomery facility and the Porter Street Station will be expanded. Finally, PGW will be in a position to exit five existing facilities. There are two components to this authorization request; authorization of $70.0 million to execute a lease transaction for a new NOC and $53.3 million of capital authorization to fit out the NOC, restack the 800 West Montgomery Avenue facility and expand the Porter Street Station. Of the above planned expenditures, $20.1 million will be spent in fiscal year 2021. The breakdown of these capital costs are as follows:

- North Operations Center Fit out - $24,254,000
- Expanded Porter Street Station - $11,227,000
- Restacking of 800 West Montgomery Avenue - $17,769,000

As for the $70.0 million sublease, this is included in the capital budget for transparency reasons, as this spending will be associated with a lease transaction to be separately approved by the Gas Commission and City Council. The lease structure assumes that the Philadelphia Municipal Authority ("PMA") will enter into the lease with the property owner; and that either PGW or the City will sub-lease the property from PMA.

The lease transaction will reflect the impact of GASB 87 – Lease Financing. To record the initial transaction, the net present value of all lease payments is calculated; this will be the recorded cost of the asset. This amount is recorded as a debit to fixed assets, and a credit to the capital lease liability account. As PGW or the City make sublease payments to the PMA, a portion of each payment is recorded as interest expense and the remainder as a reduction to the balance in the capital lease liability account. Eventually, this means that the balance in the capital lease liability account should be brought down to zero. Since an asset recorded through a capital lease is essentially the same as any other fixed asset, it must be depreciated in the normal manner; that is, PGW would debit depreciation expense and credit Fixed Assets (Buildings) for an identical amount. In summary, the lease is treated like debt. The initial transaction increases both the asset and liabilities halves of the balance sheet equally. The expense is recorded on the Income Statement as Depreciation and Interest. The asset is amortized over the life of the lease through depreciation. The lease is amortized over its life through payments (similar to the way bonds are amortized).

Table 4 Historical and Proposed Capital Improvement Program Expenditures

(Thousands of Dollars)

	Fiscal Year Ending August 31,[a]											
	Actual					Estimate	Projected					Total
Category	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2021-2025
	$	$	$	$	$	$	$				$	$
Gas Processing	2,569	1,726	4,679	4,380	5,198	4,616	9,025	5,165	7,493	8,089	12,279	42,051
Distribution	65,220	82,592	80,799	105,778	91,126	84,675	94,517	101,535	103,424	104,985	106,586	511,047
Field Services	6,055	6,384	6,492	5,814	5,795	12,389	9,030	13,117	13,022	12,186	11,707	59,062
Fleet Operations	3,085	2,592	6,689	3,830	5,587	3,067	3,966	8,144	4,802	7,688	4,724	29,324
Other Departments [b]	8,570	7,039	3,595	3,625	2,278	14,926	37,546	46,516	16,950	971	995	102,978
Subtotal	85,499	100,333	102,254	123,427	109,984	119,673	154,084	174,477	145,691	133,919	136,291	744,462

(a) All figures are net of Salvage, Reimbursements, and Contributions.

(b) Includes Approved and Budgeted Program for Building Services, Customer Affairs, Information Technology, and Systems Technology.

Table 5 Capital Projects for Fiscal Year 2021

(Thousands of Dollars)

Category	Priority 1 Safety	Priority 2 Reliability	Priority 3 Enforced	Priority 4 New Rev.	Priority 5 Efficiency	Other	Total
	$	$	$	$	$	$	$
Gas Processing							
New Heater , Generator and Station Modifications	1,110	-	-	-	-	-	1,110
Replace Hazard Detection System - Passyunk	1,397	-	-	-	-	-	1,397
Replace Front Office Building Roof - Passyunk	817	-	-	-	-	-	817
Increase Water Line to LNG Control Room - Richmond	365	-	-	-	-	-	365
Renovate Two Areas for FSD Training Center - Passyunk	175	-	-	-	-	-	175
Replace Gas Piping Upstream of H-1 Heater fuel Line - Richmond	112	-	-	-	-	-	112
Replace ESD Panel for V-101 - Richmond	131	-	-	-	-	-	131
Replace Two Phase Power Systems - Passyunk	841	-	-	-	-	-	841
Miscellaneous Capital Additions & Replacements	419	-	-	-	-	-	419
Isolate Piping in #77 House Basement - Richmond	-	297	-	-	-	-	297
Total Gas Processing	5,367	297	-	-	-	-	5,664
Distribution							-
Prudent Main Replacements	15,405	-	-	-	-	-	15,405
LTIIP Accelerated Cast Iron Main Replacement	-	-	-	-	-	-	-
High Pressure Main Valves Replacements	511	-	-	-	-	-	511
Long Term Infrastructure Plan-Incremental Cast Iron	20,084	-	-	-	-	-	20,084
Renewal of Small Service-Incremental Cast Iron	-	-	-	-	-	-	-
Replacement/Rehabilitation of HP Main Valves	-	-	-	-	-	-	-
Large Diameter/High Pressure Main Replacement	-	-	-	-	-	-	-
Small Service Replacements	15,802	-	-	-	-	-	15,802
Large Service Replacements	1,037	-	-	-	-	-	1,037
Small Service Installations	-	-	-	6,829	-	-	6,829
Large Service Installations	-	-	-	2,310	-	-	2,310
Customer Metering & Regulator Installation	-	-	-	376	-	-	376
Installations For Ahead-Of-Paving and Addt'l Loads	-	-	-	2,742	-	-	2,742
Replace Pressure Regulating/Corrosion Control Facilities	-	444	-	-	-	-	444
Purchase Tools, Equipment	-	-	-	-	-	-	-
Pressure Force Paper Chart Upgrade Project	-	-	-	-	-	-	-
Replace Tools, Equipment	-	996	-	-	-	-	996
Enforced Relocations For System Pressure	-	-	7,710	-	-	-	7,710
Enforced Relocations I-95 Reconstruction	-	-	1,071	-	-	-	1,071
Local Mains to Supply New Houses/Increased Capacity	-	-	-	2,818	-	-	2,818
Reimbursements/Contributions	-	-	-	-	-	(6,007)	(6,007)
Total Distribution	52,839	1,440	8,781	15,075	-	(6,007)	72,128
Field Services							-
Regulator Purchases	64	-	-	-	-	-	64
Regulator Installations	-	-	-	89	-	-	89
Meter Installations	-	-	-	2,319	-	-	2,319
Shop Equipment	-	-	-	-	-	-	-
Training Equipment Replacements	-	-	-	-	-	-	-
Meters Purchases for Automatic Meter Reading	2,140	-	-	-	-	-	2,140
AMI	-	-	-	-	500	-	500
AMR Installations	-	-	-	-	227	-	227
AMR Replacements	-	-	-	-	2,577	-	2,577
BPS Metscan & LBS Metretek	1,073	-	-	-		-	1,073
Instrumentation Purchases and Installations	41	-	-	-	-	-	41
Total Field Services	3,318	-	-	2,408	3,304	-	9,030
Fleet Operations							-
Vehicle Replacements	-	2,999	-	-	-	-	2,999
Mobile Equipment Replacements	967	-	-	-	-	-	967
Mobile Equipment Additions	-	-	-	-	-	-	-
Shop Equipment	-	-	-	-	-	-	-
Salvage	-	-	-	-	-	-	-
Total Transportation	967	2,999	-	-	-	-	3,966
Other Departments							
Total Other Departments	804	13,051	-	-	22,200	-	36,055
Total FY 2021 Projects	63,295	17,787	8,781	17,483	25,504	(6,007)	126,843
Carryover from Years Prior to FY 2021	23,183	791	1,681	1,586	-	-	27,241
Total FY 2021 Expenditures (Net)	86,478	18,578	10,462	19,069	25,504	(6,007)	154,084

Table 6 Historical Cast Iron Main and Unprotected Steel Service Replacement

	Cast Iron Main Replacement		Services Removed from Inventory			
Fiscal Year Ending August 31,	Miles of CI Main Replaced	CI Mains Replacement Capital	Number of Unprotected - Bare	Number of Unprotected - Coated	Total	Services Replacement Capital
	(miles)	($000)				($000)
2000	7.81	$8,282	(17,888) [a]	9,960 [a]	(7,928)	$10,940
2001	18.45	$15,148	(8,211)	(164)	(8,375)	$12,010
2002	21.49	$16,108	(6,688)	(573)	(7,261)	$9,986
2003	22.57	$13,717	(7,011)	(142)	(7,153)	$13,641
2004	19.24	$20,393	(7,846)	(609)	(8,455)	$17,652
2005	19.01	$20,183	(40,477) [a]	(56)	(40,533)	$16,127
2006	18.93	$17,582	(8,046)	(76)	(8,122)	$17,232
2007	18.28	$20,180	(4,944)	(1,133)	(6,077)	$21,172
2008	17.98	$21,371	(5,280)	7,027 [a]	1,747	$20,743
2009	8.67	$18,385	(5,347)	(466)	(5,813)	$15,443
2010	17.98	$21,718	(2,794)	(509)	(3,303)	$15,793
2011	18.20	$19,278	(3,619)	(455)	(4,074)	$15,872
2012	18.35	$24,387	(3,093)	(437)	(3,530)	$16,247
2013	22.39	$30,680	(2,647)	(304)	(2,951)	$17,514
2014	28.09	$37,414	(3,215)	(255)	(3,470)	$16,576
2015	29.25	$38,751	(3,051)	(244)	(3,295)	$16,540
2016	31.50	$52,712	(3,084)	(173)	(3,257)	$15,854
2017	34.92	$57,711	(5,099)	(631)	(5,730)	$16,433
2018	33.95	$84,186	(4,417)	(485)	(4,902)	$18,320
2019	34.64	$61,094	(4,376)	(524)	(4,900)	$17,220

(a) Change in number of services reflects adjustments to inventory

7. Rates and Tariffs

7.1. PUC REGULATION HISTORY

Prior to July 2000, PGW's rates were regulated by the PGC. Commencing on July 1, 2000, PGW became regulated by the PUC pursuant to the Gas Choice Act which amended the Public Utility Code. Section 2212(b) of the Public Utility Code specifically transferred rate setting authority for PGW from the PGC to the PUC. Although the PGC continues to approve PGW's operating budget, and review and recommend the approval of PGW's capital budget, the PUC has the authority to approve the rates charged by PGW.[6] Since PGW became regulated under the PUC, the PUC has granted PGW base rate increases totaling approximately $213 million. PGW has also filed with the PUC on several occasions regarding revisions to its gas cost rate ("GCR"). The PUC has approved all of the GCRs filed by PGW. Black & Veatch is of the opinion that PGW has requested and received timely changes in its GCR. The following discussion in this section addresses major PUC regulatory milestones since 2008.

7.1.1. 2008 Extraordinary Rate Relief Filing

On November 14, 2008, PGW filed for extraordinary base rate relief of $60 million, effective January 1, 2009. The request was granted December 18, 2008. PGW filed the request primarily to cover the additional financing costs that PGW incurred to improve PGW's financial position so as to enhance its ability to access the financial markets and maintain its bond rating and to provide liquidity and financial flexibility in the tight credit markets. In granting the extraordinary relief, the PUC required PGW to file a base rate case no later than December 31, 2009.

7.1.2. 2009 General Rate Relief Filing

On December 18, 2009, PGW submitted a base rate case filing with the PUC requesting: 1) to maintain the $60 million base rate increase that the PUC granted in 2008; and 2) to provide PGW with a rider above the base rates that will fund PGW's previously booked other post-employment benefits ("OPEB") liability in the amount of $105 million over the 2011 through 2015 period and to fully fund, over 30 years, its unfunded actuarial accrued OPEB. PGW also moved to consolidate PGW's Demand Side Management Plan into the base rate filing. PGW filed the request to: 1) comply with the PUC's December 2008 order directing PGW to file a general rate case by the end of 2009; 2) maintain PGW's financial position; 3) maintain PGW's bond rating; 4) provide liquidity and financial flexibility in the then current tight credit markets; 5) better enable PGW to sell bonds to finance its capital program; and 6) enable PGW to provide funding for its OPEB liability.

On May 19, 2010 PGW, along with all active parties to the proceeding, submitted a Petition for Proposed Settlement of the proceeding (the "Settlement"). The PUC approved this Settlement in its Order dated July 29, 2010 (the "Order").

Under the 2010 Order, PGW is permitted to maintain virtually all of the extraordinary base rate relief, received an incremental rate increase of $16 million annually and was required to fund $18.5 million of the OPEB liability in each of the years 2011 through 2015 (the incremental rate increase

[6] Generally, the PUC is required to rule on an application for base rate relief within nine months of the utility's application.

of $16.0 million annually is related to an OPEB surcharge which was approved to continue beyond 2015 in PGW's 2015-2016 Cost Rate Proceeding; PGW also agreed to continue funding the OPEB liability at $18.5 million annually). The increase granted by the Order represented about 38 percent of the $42.5 million incremental rate increase as originally requested by PGW. The Order's uniform funding approach results in more uniform rates and creates a reasonable transition period from "pay-as-you-go" funding to the full funding of OPEBs.

The 2010 Order required the Net OPEB Obligation to be amortized over a thirty-year period. With the thirty-year amortization, $3.5 million is projected to be required annually to fund such amortization.

The 2010 Order authorized PGW to implement its proposed five-year Demand Side Management ("DSM") Phase I program generally as proposed, although PGW agreed to modifications to the program to address concerns raised by the active parties to the Settlement. PGW was permitted to establish an automatic adjustment clause mechanism to recover its costs of implementing its DSM program. Additional details regarding the DSM program are discussed further in *Section 7.6, Demand Side Management Plan*.

7.1.3. 2012 Pennsylvania General Assembly Act 11

The Pennsylvania General Assembly approved Act 11 on February 14, 2012. This legislation provides Pennsylvania utility companies with a supplemental recovery mechanism for costs related to incremental/accelerated distribution system repair, improvement and replacement. Act 11 permits gas utilities to recover, through a DSIC surcharge, up to 5 percent of their non-gas revenues (which for PGW will be approximately $22.0 million) and permits an increase, if the PUC so permits. In order for a utility company to establish such a recovery mechanism, it must submit, along with other requirements, a LTIIP and a DSIC petition to the PUC for review and approval. Accordingly, PGW filed its LTIIP on December 3, 2012 and filed its DSIC petition on January 18, 2013. The PUC approved PGW's original LTIIP petition for the period fiscal year 2013 - 2017 on April 4, 2013 and its initial DSIC petition on May 9, 2013. The PUC later approved an increase in the DSIC surcharge, up to 7.5%, on January 28, 2016. Additionally, the original LTIIP was modified by the PUC by order entered on July 6, 2016 and continued, by its terms, through August 31, 2017. PGW filed its second LTIIP petition on May 3, 2017 for the prospective period fiscal year 2018-2022. PGW's second LTIIP was approved by the PUC on August 31, 2017. Additional details regarding the LTIIP and DSIC are discussed further in *Section 7.7, Infrastructure Replacement*.

7.1.4. 2015 Management Audit

The PUC conducted a management audit of PGW's operations, via a third-party consultant, in fiscal year 2015. A final report regarding audit findings was issued in August 2015[7]. The audit's functional evaluation summary found all areas were generally functioning adequately and the audit produced 76 recommendations for minor to moderate improvement of varying priority. PGW accepted 62 recommendations completely, accepted 13 in-part, and rejected one. PGW submitted its Implementation Plan Progress Report to the PUC in October 2016 which details the progress on the actions being taken, the expected completion dates and the individuals responsible for

[7] PUC Docket No. D-2015-2468141, Final Stratified Management and Operations Audit Report, August 2015.

implementing each recommendation. The PUC had previously conducted a management audit of PGW's operations from October 2007 through September 2008.

7.1.5. 2017 General Rate Relief Filing

On February 27, 2017, PGW filed for an increase in its distribution base rates with the PUC. The filing sought a general rate increase calculated to produce $70 million (11.6 percent) in additional annual operating revenues based upon a 10-year normal weather assumption. The proposed increase sought to increase the fixed customer charge component, as well as the volumetric delivery charge component of base rates. Consistent with its budget process, the base rate increase requested in this filing was based on a fully projected future test year ("FPFTY") starting on September 1, 2017 and ending on August 31, 2018.

The primary issue in this proceeding is what level of base rate increase is supportable by applying PGW's required ratemaking methodology – the Cash Flow Method – and complying with Section 2212(e) and (f) of the Public Utility Code (regarding PGW's bond covenants), as well as the PUC's Policy Statement,[8] which explains the way in which the Commission intends to apply the PGW Cash Flow Method.

On July 21, 2017, PGW filed the Settlement Agreement for settlement of certain issues in the case[9]. The Settlement Agreement was approved by the PUC on November 8, 2017, authorizing a general rate increase of $42 million in annual operating revenues calculated using a 20-year average HDDs assumption.

7.1.6. 2020 General Rate Relief Filing

On February 28, 2020, PGW filed for an increase in its distribution base rates with the PUC. The filing sought a general rate increase calculated to produce $70 million (10.5 percent) in additional annual operating revenues based upon a 20-year normal weather assumption. The proposed increase seeks to increase the fixed customer charge component, as well as the volumetric delivery charge component of base rates. Consistent with its budget process, the base rate increase requested in this filing was based on a FPFTY starting on September 1, 2020 and ending on August 31, 2021.

The primary issue in this proceeding is what level of base rate increase is supportable by applying PGW's required ratemaking methodology – the Cash Flow Method – and complying with Section 2212(e) and (f) of the Public Utility Code (regarding PGW's bond covenants), as well as the PUC's

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[8] 52 Pa.Code §§ 69.2701 to 69.2703; *Petition of Philadelphia Gas Works for a Statement of Policy on the Application of Philadelphia Gas Works' Cash Flow Ratemaking Method*, PUC Docket No. P-2009-2136508, Order of December 30, 2009.

[9] The Joint Petitioners were the active parties in the proceeding: PGW, the Bureau of Investigation and Enforcement, the Office of Consumer Advocate, the Office of Small Business Advocate, the Retail Energy Supply Association, the Philadelphia Industrial and Commercial Gas users Group, the Coalition for Affordable Utility Services and Energy Efficiency in Pennsylvania, the tenant Union Representative Network and Action Alliance of Senior Citizens of Greater Philadelphia.

Policy Statement,[10] which explains the way in which the Commission intends to apply the PGW Cash Flow Method. The PUC is required to issue a decision by November 27, 2020. If PGW finds the general rate increase amount authorized by the PUC to be an inadequate result, PGW anticipates that it would make a subsequent general base rate filing within two years.

7.2. EXISTING RATES

The current tariff sets forth the rules and regulations for gas service and the rates PGW is allowed to charge for various types of service. Changes to this tariff must be approved by the PUC. Currently, PGW primarily provides service under three broad classifications: firm service, interruptible service, and transportation service. Table 7 summarizes PGW's existing rates and applicable surcharges (which does not reflect the Settlement Agreement). PGW's rates are presented as unbundled and include a customer charge, distribution charge, and GCR. The distribution charge includes a delivery charge, as well as any applicable surcharges. The GCR is not applicable to certain firm service customers who transport gas through a qualified natural gas supplier.

[10] 52 Pa.Code §§ 69.2701 to 69.2703; *Petition of Philadelphia Gas Works for a Statement of Policy on the Application of Philadelphia Gas Works' Cash Flow Ratemaking Method*, PUC Docket No. P-2009-2136508, Order of December 30, 2009.

Table 7 Existing Tariff Rates

Tariff	Effective	Existing Tariff Charges [(a)]
FIRM SERVICE		
General Service - Rate GS		
Customer Charge - $/meter per month		
Residential and Public Housing Customers	12/1/17	13.75
Commercial and Municipal Customers	12/1/17	23.40
Industrial Customers	12/1/17	70.00
Supply Charge - $/Mcf[(b)]		
Gas Cost Rate (GCR) + Merchant Function Charge + Gas Procurement Charge		
Residential	3/1/20	4.0876
Public Housing Customers	3/1/20	3.9409
Commercial and Municipal Customers	3/1/20	3.9651
Industrial Customers	3/1/20	3.9561
Distribution Charge - $/Mcf		
Delivery Charge		
Residential	12/1/17	6.6967
Public Housing Customers	12/1/17	5.7105
Commercial and Municipal Customers	12/1/17	4.8651
Industrial Customers	12/1/17	4.7698
Surcharges		
Universal Service and Energy Conservation	3/1/20	1.1711
Restructuring and Consumer Education	9/1/19	0.0043
Efficiency Cost Recovery Surcharge		
Residential and Public Housing Customers	3/1/20	0.0035
Commercial Customers	3/1/20	0.0236
Industrial Customers	3/1/20	(0.0091)
Other Post Employment Benefits Surcharge	9/1/19	0.3362
Commodity Charge - $/Mcf		
Residential Customers		12.2994
Public Housing Customers		11.1665
Commercial and Municipal Customers		10.3654
Industrial Customers		10.2284
Distribution System Improvement Charge	1/1/20	7.50%
Customer Charge - $/meter per month		
Residential and Public Housing Customers		1.0313
Commercial and Municipal Customers		1.7550
Industrial Customers		5.2500
Commodity Charge - $/Mcf		
Residential Customers		0.6159
Public Housing Customers		0.5419
Commercial and Municipal Customers		0.4800
Industrial Customers		0.4704
Municipal Service - Rate MS		
Customer Charge - $/meter per month	12/1/17	23.40
Supply Charge - $/Mcf[(b)]	3/1/20	3.9409
Distribution Charge - $/Mcf		
Delivery Charge	12/1/17	4.2723
Surcharges		
Universal Service and Energy Conservation	3/1/20	1.1711
Restructuring and Consumer Education	9/1/19	0.0043
Efficiency Cost Recovery Surcharge		0.0000
Other Post Employment Benefits Surcharge	9/1/19	0.3362
Total Commodity Charge - $/Mcf		9.7248
Distribution System Improvement Charge	1/1/20	7.50%
Customer Charge - $/meter per month		1.7550
Commodity Charge - $/Mcf		0.4338
Philadelphia Housing Authority Service - Rate PHA		
Customer Charge - $/meter per month	12/1/17	23.40
Supply Charge - $/Mcf[(b)]	3/1/20	3.9409
Distribution Charge - $/Mcf		
Delivery Charge	12/1/17	5.0163
Surcharges		
Universal Service and Energy Conservation	3/1/20	1.1711
Restructuring and Consumer Education	9/1/19	0.0043
Efficiency Cost Recovery Surcharge	3/1/20	0.0236
Other Post Employment Benefits Surcharge	9/1/19	0.3362
Total Commodity Charge - $/Mcf		10.4924
Distribution System Improvement Charge	1/1/20	7.50%
Customer Charge - $/meter per month		1.7550
Commodity Charge - $/Mcf		0.4914

Table 7 (Continued) Existing Tariff Rates

Tariff	Effective	Existing Tariff Charges [a]
INTERRUPTIBLE SERVICE		
Gas Transportation Service - Rate GTS		
Customer Charge - $/meter per month	12/1/17	250.00
Commodity Charge[c] - $/Mcf		n/a
Cogeneration Service - Rate CG		
Customer Charge - $/meter per month	12/1/17	362.00
Commodity Charge[d] - $/Mcf	1/1/20	2.98
Developmental Natural Gas Vehicle Service, Firm Service - Rate NGVS		
Customer Charge - $/meter per month	12/1/17	35.00
Supply Charge - $/Mcf[b]	3/1/20	3.9409
Distribution Charge - $/Mcf		
Delivery Charge	12/1/17	1.3233
Surcharges		
Universal Service and Energy Conservation	3/1/20	1.1711
Restructuring and Consumer Education	9/1/19	0.0043
Other Post Employment Benefits Surcharge	9/1/19	0.3362
Total Commodity Charge - $/Mcf		6.7758
Distribution System Improvement Charge	1/1/20	7.50%
Customer Charge - $/meter per month		2.6250
Commodity Charge - $/Mcf		0.2126
Developmental Natural Gas Vehicle Service, Interruptible Service - Rate NGVS		
Customer Charge - $/meter per month	12/1/17	35.00
Commodity Charge - $/Mcf	3/1/20	3.96
TRANSPORTATION SERVICE		
Daily Balancing Service - Rate DB		
Administrative Charge - $/supply pool per month	12/1/17	150.00
Plus charges and/or credits related to balancing and Operational Flow Orders (OFOs)		
Interruptible Transportation - Rate IT	12/1/17	
IT-A - Contracts for not less than 2,500 Dth, maintain standby non-natural gas energy.		
IT-B - Contracts for not less than 5,000 Dth, maintain standby non-natural gas energy.		
IT-C - Contracts for not less than 10,000 Dth, maintain standby non-natural gas energy.		
IT-D - Contracts for not less than 25,000 Dth, maintain standby non-natural gas energy.		
IT-E - Contracts for not less than 80,000 Dth, maintain standby non-natural gas energy.		

Customer Charge - $/meter location per month		Transportation Charge - $/Dth delivered		
IT-A	152.16	IT-A	2.2885	maximum
IT-B	273.89	IT-B	1.1077	maximum
IT-C	273.89	IT-C	0.8643	maximum
IT-D	273.89	IT-D	0.7669	maximum
IT-E	426.06	IT-E	0.7426	maximum

(a) Reference: Philadelphia Gas Works, Gas Service Tariff, Pa P.U.C No 2.

(b) Sum of Gas Cost Rate (GCR), Merchant Function Charge (MFC), and Gas Procurement Charge (GPC).

(c) Commodity charge includes Delivery, Transportation, and Standby Service Charges, if applicable. There are no GTS customers at this time.

(d) Commodity charge based on cost of gas purchased and delivered to PGW gate stations.

7.2.1. Firm Service

PGW provides firm service under three rate schedules: General Service, Municipal Service, and Philadelphia Housing Authority ("PHA") Service. The vast majority of PGW's customers are served under the General Service Rate. During the 2020 fiscal year, approximately 95 percent of PGW's customers are estimated to be served under the General Service rate and these customers account for 97 percent of sales volumes (and 55 percent of total throughput). This rate is available to any residential, commercial, or industrial customer pursuant to the applicable rate provision. Monthly customer charges differ depending on whether the customer is classified as residential, commercial, or industrial customer. A different distribution charge applies to residential customers versus commercial and industrial customers. The General Service Rate contains special provisions for separately metered summer air conditioning and compressed natural gas ("CNG") vehicle service. Residential senior citizens may have previously qualified for a discount under this rate. (*See Section 7.10, Senior Citizen Discount Program*).

Table 8 presents a comparison of a typical peak winter month's residential gas bill for PGW and the other principal gas distribution utilities in Pennsylvania. Based on rates, surcharges, and costs of gas currently in effect, PGW's typical winter month residential bill is $56.37 higher than the group average of $160.11. One of PGW's surcharges, the Universal Service and Energy Conservation surcharge, includes the recovery of costs related to the CRP, the CRP Home Comfort program, and the Senior Citizen Discount Program[11]. PGW's Universal and Energy Conservation surcharge is currently $1.1711 per Mcf. For the typical peak winter month residential bill for 15 Mcf of consumption, the Universal Service Charge amounts to $17.57 of the $216.48 total. Black & Veatch understands that, in comparison to PGW, comparable social program related surcharges of other Pennsylvania utilities are significantly lower because the costs of these programs are not as high as they are in Philadelphia.

Table 8 Comparison of Residential Gas Bills

Pennsylvania Utilities Typical Peak Winter Month Residential Bills (15 Mcf)	
Utility	Monthly Bill[(a)(b)]
National Fuel Gas	$116.52
UGI Penn Natural Gas (formerly PG Energy)	$133.34
PECO Energy	$148.51
Peoples Natural Gas - Equitable	$149.03
Peoples Natural Gas	$154.99
UGI Corporation	$167.89
Columbia Gas of Pennsylvania	$194.12
Philadelphia Gas Works	$216.48

(a) PA. PUC Rate Comparison Report 4-15-19
(b) Contributing factors to differences in monthly bills include gas costs, DSIC, and Universal Service Charge. Gas Costs range from $3.23/Mcf to $6.80/Mcf

7.2.2. Interruptible Service

PGW provides interruptible sales service. Currently interruptible sales consist of LNG sales, which is priced at the LNG weighed average cost of gas plus the Sales Service Charge ("SSC") plus a negotiated margin, and Cogeneration sales service ("CG") which is priced at the average commodity cost plus $0.75/MCF.

7.2.3. Transportation Service

PGW currently provides transportation service to an estimated 25,187 customers. The increase in transportation customers from 3,716 in fiscal year 2015, as shown in Table 9, is primarily due to customers transferring from sales to transportation service. During the calendar year 2019, Grays Ferry and Trigen Cogeneration Facility accounted for approximately 36 percent of PGW's transportation throughput and 2.2 percent of PGW's transportation revenue. Service to these

[11] The Senior Citizen Discount provides eligible customers with a discounted payment plan. The total number of customers receiving the discount, as of August 31, 2018 and 2019, was approximately 13,000 and 11,100, respectively. The discount value was approximately $3.2 million for the year ended August 31, 2019. The discount program closed to new customers on September 1, 2003.

customers is provided through essentially dedicated facilities under a long-term negotiated contract. Under this contract, PGW receives approximately 8 cents per Mcf for each unit transported plus a service charge intended to cover PGW's cost of operating and maintaining the facilities required to serve these customers. The other customers are served under individually negotiated contracts. In some cases, transportation customers also take some service under the sales rate schedule for a portion of their load.

Although PGW has operated under its Restructuring Compliance Tariff with unbundled rates since September 1, 2003, many of PGW's customers continue to take fully bundled service from PGW. A fully bundled service is a service where the customer deals with one provider and pays for all services through a single charge. All of the separate services (gas supply, transportation, storage, and distribution) currently performed by PGW are packaged into one full-service rate.

Under PGW's restructured rates, customers have the option to continue taking the gas supply, transportation, and storage services from PGW or to choose a third-party supplier to provide these services. Whether the customer decides to have PGW provide these services or a third party, the customer continues to take and pay for distribution service from PGW. Under its current tariff, PGW assigns (with recall rights) portions of its pipeline transportation to firm service third party suppliers such that PGW and customers who take a fully bundled service will not be adversely impacted by having to pay for capacity that would otherwise be stranded by customers who choose a third-party supplier. PGW retains ownership to the transportation capacity because PGW continues to be the supplier of last resort. If a firm service third party supplier defaults or is no longer able to meet its commitments, PGW is able to recall the transportation capacity and serve the customers who had opted for service from this third-party supplier. PGW does not release storage capacity to firm service third party suppliers. PGW provides balancing services (reconciling customer gas deliveries with consumption) from storage as needed. Firm service third party suppliers are assessed a storage and peaking charge for storage balancing services provided by PGW during the winter operating season; firm service third party suppliers return volumes provided from PGW storages during the summer refill season.

Under the unbundled rates, PGW's margin[12] from firm customers is not materially impacted by whether a customer chooses a third-party supplier or elects to continue taking the fully bundled service. In effect, the unbundled rates and services make PGW indifferent as to which service a customer takes. Customers will continue to pay the distribution and customer charges no matter which service is taken. The GCR mechanism will keep PGW whole with regard to gas supply, transportation, and storage costs. PGW's ability to assign capacity to the third-party suppliers will not adversely impact customers who choose to take the fully bundled service.

PGW estimates for fiscal year 2020, approximately 33.0 Bcf of throughput, or 43.9 percent of total throughput for all customers, consists of gas supply and transportation from a third-party supplier. PGW projects transportation throughput will continue to grow annually, reaching 33.9 Bcf by fiscal year 2025 (*See Table 10*).

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[12] Margin (non-gas revenues) is total revenues excluding gas costs.

7.3. GAS COST RATE

As previously discussed, all changes in gas supply related costs are passed through to customers through the GCR. The specific components of PGW's current GCR are depicted in Figure 3. PGW's gas supply costs consist of purchased gas costs, transportation costs, and off-system storage costs. This cost is reduced by the cost directly paid by interruptible sales customers. Total gas supply costs are also adjusted to reflect changes in the inventory cost of off-system and LNG storage and the cost of power purchased for the LNG facilities. The change in inventory cost is attributable to changes in volume as well as the price paid for the gas put into storage.

These costs are divided by the total sales volumes less the volumes attributable to direct billed interruptible sales customers to determine the unit cost of fuel, or sales service charge as depicted in Figure 3. Various adjustments are then made to the sales service charge. An additional adjustment is made for the net over or under collection of natural gas during the previous fiscal year resulting from differences between values used to project the prior year's GCR and those actually experienced. The interest expense or credit on the over or under recovery is also applied to calculate the total adjustment. In addition, an interruptible revenue credit ("IRC") for margin realized from interruptible sales is made. In the aggregate, these components comprise the GCR. The GCR is typically adjusted quarterly although PGW has the ability, upon thirty days' notice to the PUC, to change it monthly.

Prior to the restructuring in 2003, PGW recovered certain non-fuel expenses in addition to gas supply costs through the GCR. These included discounts given to low income customers through the Customer Responsibility Program and funds provided to weatherize the homes for low-income customers through the Conservation Works Program. These costs are now recovered through surcharges which are not included as part of the GCR. By recovering these costs through surcharges, customers cannot avoid these costs by not purchasing gas from PGW.

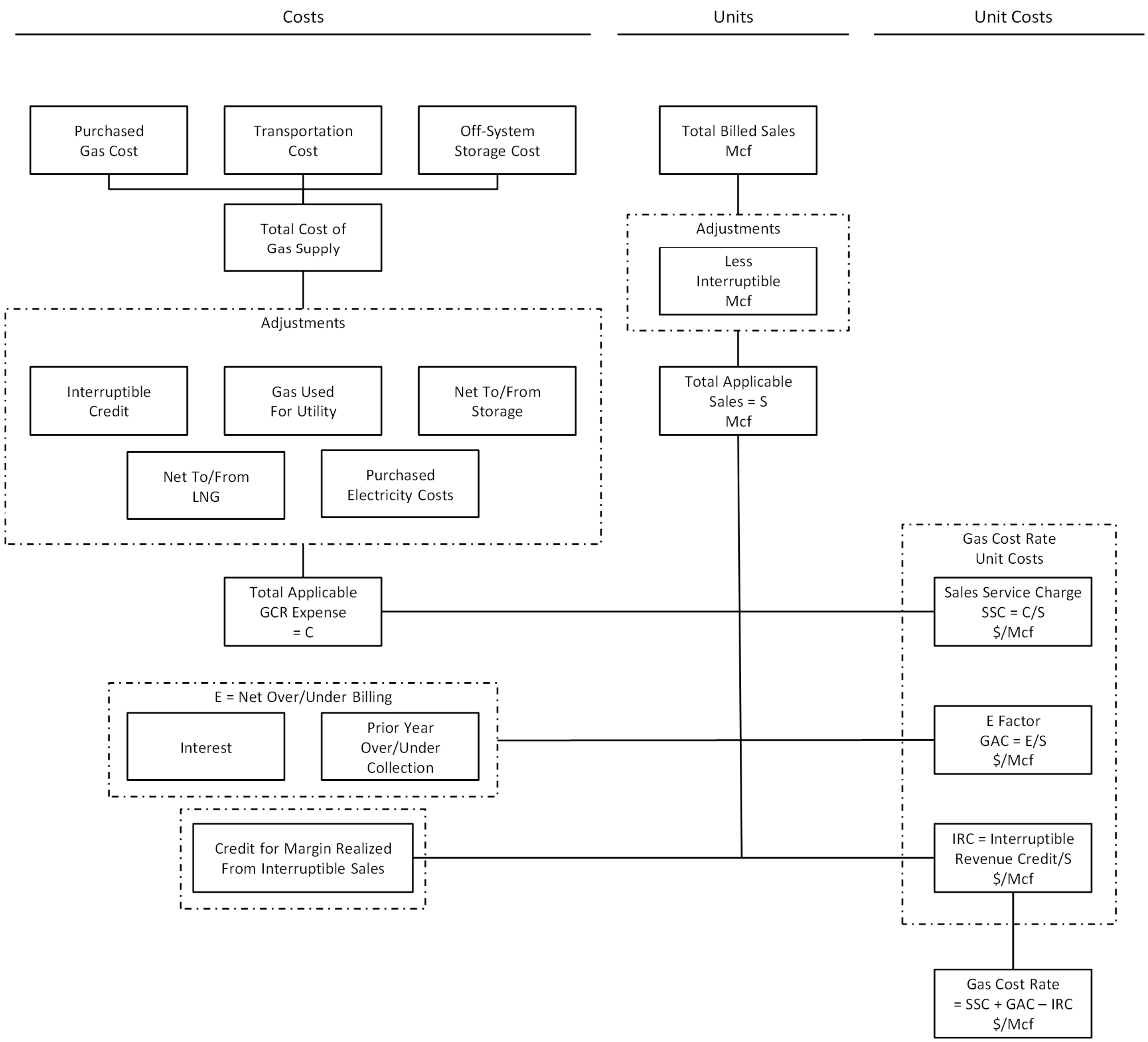

Figure 3 Components of PGW Gas Cost Rate

7.4. WEATHER NORMALIZATION ADJUSTMENT

Since 2002, PGW's Tariff has included a weather normalization adjustment ("WNA") clause. The benefit of a WNA is that it mitigates the single biggest risk to PGW of not recovering its approved margin due to warmer than normal weather during the winter season. PGW's approved commodity charges (exclusive of cost of gas) are derived using throughput (volumes) that is based on the assumption that weather will be normal. If conditions are warmer than normal, sales decline and in conjunction with that, margin declines. Several warmer than normal winters, including one of the warmest winters in PGW's history, created the circumstances that led to PGW's need to file for extraordinary rate relief in 2002.

The WNA is designed to adjust the customers' bills upwards or downwards to reflect differences between actual HDDs and normal HDDs. The benefits of a WNA include the following:

- Stabilizes earnings,
- Stabilizes cash flow during the winter heating season,
- Reduces the need to file rate cases, thereby lowering costs,
- Reduces the need for short-term financing, and
- Stabilizes customers' bills.

Heating customers were charged approximately $1.6 million as a result of the warmer than normal winter period in fiscal year 2019. PGW's WNA applies to customers served under its General Service, Municipal Service, and PHA rate schedules and is calculated for each customer bill rendered between October 1 and May 31.

The type of WNA that PGW implemented is referred to as a Type 1 WNA. This type of WNA adjusts the customer's bill to reflect conditions during the billing cycle covering that bill. This contrasts with a Type 2 WNA which is calculated on a seasonal basis. The advantage of the Type 1 WNA is that the calculation of the customers' bills and PGW's revenue recovery are concurrent with the current billing cycle. The adjustment is calculated as the ratio of the normal HDDs during the billing cycle divided by the actual HDDs during the cycle. For example, assume a residential customer uses 10 Mcf during the period November 16 through December 15, when the actual HDDs during this period are 750, and the normal HDDs during this period are 850. The customer's volumetric charge (exclusive of gas cost) would be calculated as 8 Mcf (10 Mcf minus 2 Mcf base load) times 841.5 HDDs (850 HDDs less 1 percent) divided by 750 HDDs times $6.0067 per Mcf which equals $65.93. Without a WNA, the customer's volumetric charge would have been $60.07 (10 Mcf times $6.0067 per Mcf). The WNA only applies if the actual HDDs deviate by more than 1 percent from the normal HDDs during the billing cycle. Therefore, if the actual HDDs during the cycle in the above example had been within the range of 842 to 859 HDDs, no adjustment would be made to the bill.

7.5. SURCHARGES

PGW's surcharges include a Restructuring and Consumer Education Surcharge, Universal Service and Energy Conservation Surcharge, Efficiency Cost Recovery Surcharge, OPEB Surcharge, and DSIC Surcharge. These surcharges are depicted in Figure 4. Gas utilities in Pennsylvania can recover the costs of social programs through what are generally referred to as universal service charges. The Universal Service and Energy Conservation Surcharge provides for the recovery of discounts to customers on the CRP, of discounts to customers receiving the Senior Citizen Discount, of the costs of the CRP Home Comfort program, and of past due arrearages forgiven to CRP customers entering CRP after September 1, 2003. The Universal Service and Energy Conservation Surcharge is applicable to all PGW customers, excluding interruptible customers, who are delivered natural gas through PGW's distribution system. PGW automatically adjusts the surcharge quarterly in connection with its GCR filing.

The Restructuring and Consumer Education Surcharge separately tracks and recovers costs associated with the transition to customer choice and what are generally referred to as PUC Chapter 56 (Customer Service) and Chapter 59 (Safety) costs. The restructuring costs include the recovery of PUC approved costs which PGW has or will incur to meet requirements of the Gas Choice Act and applicable PUC regulations, orders, and other regulatory requirements. The additional costs associated with Chapter 56 primarily relate to more frequent reading of indoor meters. The additional costs associated with Chapter 59 primarily relate to more frequent meter testing and indoor leak surveys.

The Efficiency Cost Recovery Surcharge recovers the program costs and the administrative costs of the energy efficiency programs (i.e. the demand side management programs) for the firm customer rate classes. The OPEB Surcharge recovers the amounts necessary for PGW's OPEB obligations. Revenues from the DSIC Surcharge are used to supplement PGW's 18-mile pipeline replacement program as part of PGW's LTIIP.

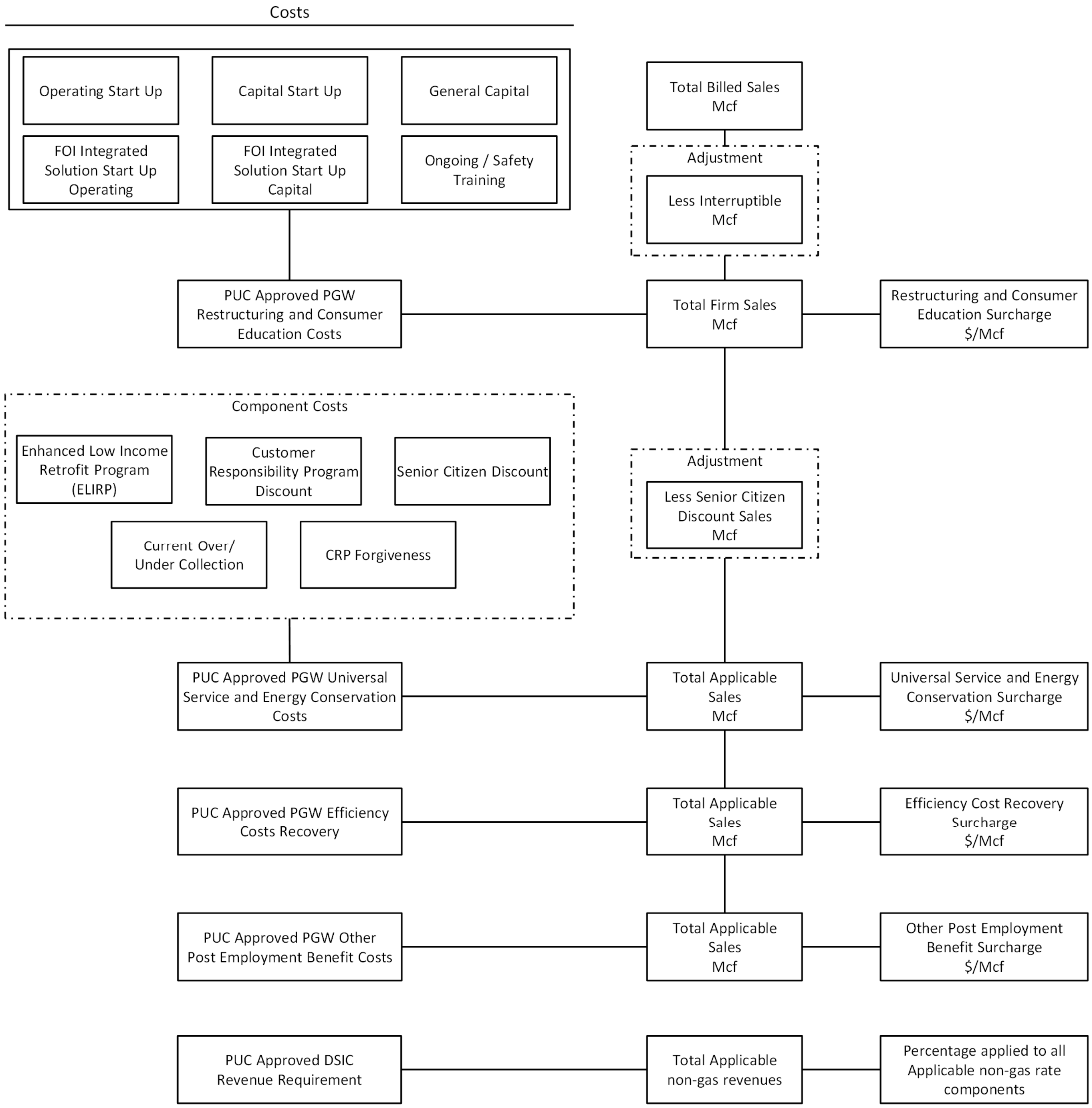

Figure 4 Components of PGW Surcharges

7.6. CONSERVATION PROGRAMS

7.6.1. Low Income Usage Reduction Program

PGW offers a PUC regulated low income usage reduction program ("LIURP") that provides natural gas conservation services to eligible residential customers, pursuant to 52 Pa. Code Chapter 58. PGW's LIURP for customers residing in single-family homes is called Home Comfort. It is offered to high usage CRP participants and other residential customers who have been identified as low income. PGW also operates a pilot program, launched in 2017 pursuant to PUC order, which provides natural gas conservation services for multifamily buildings. The pilot is called the Low Income Multifamily Efficiency ("LIME") program.

On November 1, 2016 the PUC issued a Final Order in the DSM Phase II proceeding that set the fiscal year 2017 LIURP budget at $5.9 million including the LIME program. The order referred the fiscal year 2018 through 2020 LIURP budgets to a PUC Universal Service and Energy Conservation Plan process for further review and modification. The Universal Service and Energy Conservation Plan modified spending to a calendar year basis, opened the program to non-CRP customers, and set the annual budget at $8 million for calendar years 2018, 2019 and 2020, which includes an annual spend of $120,000 for the LIME program. On October 3, 2019, the PUC extended PGW's current Plan by an additional two years – through December 31, 2022 and PGW has proposed a calendar year budget for 2021 and 2022 at $8 million annually. LIURP costs continue to be recovered through the Universal Services and Energy Conservation Surcharge.

PGW spent $14.6 million on its Home Comfort Program from September 1, 2017 through August 31, 2019. Over the expected useful life of the measures installed, the activity for this period is projected by PGW to achieve 2.02 Bcf of natural gas savings (reduced customer usage). Based on the Total Resource Cost test, net present value spending totaled $11.9 million, and the program achieved $14.2 million in present value savings for net customer savings of $2.3 million.

7.6.2. Demand Side Management Programs

PGW's DSM program, marketed as EnergySense, is a portfolio of conservation programs that PGW launched in fiscal year 2011 and was initially approved by the PUC for a 5-year term. On December 23, 2014, PGW filed a Petition for Approval of Demand Side Management Plan 2016-2020 ("DSM Phase II") with the PUC. The PUC subsequently approved a DSM Bridge Plan for an interim period effective September 1, 2015, through the earlier of the effective date of the Phase II Plan or August 31, 2016. On November 1, 2016 the PUC entered a Final Order that approved the continuation of five market rate DSM programs, at a budget of $10.57 million from fiscal year 2017 through 2020, and a fiscal year 2017 CRP Home Comfort budget of $5.9 million. Pursuant to that Final Order, PGW will discontinue the Home Rebates program in fiscal year 2017. The Final Order also required that the budget for PGW's CRP Home Comfort program beyond fiscal year 2017 be reviewed as part of the Universal Services and Energy Conservation Plan process. The Universal Service and Energy Conservation Plan modified spending to a calendar year basis, opened the program to non-CRP customers, and set the annual budget at approximately $8.0 million for calendar years 2018, 2019 and 2020, which includes an annual spend of $120,000 for a Low Income, Multi-family Efficiency program. On October 3, 2019, the PUC extended PGW's current plan by an additional two years –

through December 31, 2022 and PGW has proposed a calendar year budget for 2021 and 2022 at approximately $8.0 million annually.

PGW's costs associated with the market rate programs (non- low income) are recovered through the Efficiency Cost Recovery Surcharge. Costs for the Home Comfort program, PGW's Low Income Usage Reduction Program, are recovered through the Universal Services and Energy Conservation Surcharge.

By its approval of the Phase II Plan, the PUC authorized PGW to continue its DSM programs beyond fiscal year 2020, through the filing of triennial implementation plans. PGW's 2021 – 2023 DSM implementation plan will be filed in May 2020.

Fiscal year 2017 was the first year of Phase II, and followed the budget proposed for the first program year, which was initially to be fiscal year 2016. The projected annual budgets, excluding Home Comfort, for fiscal year 2017 through fiscal year 2020 range from $2.5 million to $2.8 million; Home Comfort budgets were switched to a calendar year basis by the PUC, and the budgets for calendar years 2018-2020 are $8.0 million annually.

PGW's DSM program, marketed as EnergySense, is a portfolio of four conservation programs offering grants and rebates to PGW's firm customers to assist them in conserving energy. The portfolio has five broad goals:

- Reduce customer bills.
- Maximize customer value.
- Contribute to the fulfillment of the City's sustainability plan.
- Reduce PGW cash flow requirements.
- Help the Commonwealth and the City reduce greenhouse gas emissions.

1. *Residential Equipment Rebates*

   Target Audience: Customers purchasing residential-sized heating equipment

   Description: Prescriptive incentives offered to PGW customers who purchase residential-sized, energy efficient gas appliances and heating equipment. This program targets the entire supply chain, providing incentives designed to cover 80 percent of incremental costs for high efficiency models.

2. *Commercial Equipment Rebates*

   Target Audience: Commercial and industrial customers purchasing commercial-scale gas equipment.

   Description: Prescriptive incentives offered to PGW customers who purchase commercial-scale, energy efficient gas appliances and heating equipment. This program targets the entire supply chain, providing incentives designed to cover 80 percent of incremental costs for high efficiency models.

3. *Efficient Construction Grants*

   Target Audience: Residential and commercial building builders and developers

   Description: Customized incentives offered to encourage the design and construction of new residential and commercial buildings that exceed energy code minimum requirements. This program provides incentives of up to $750 for single-family residential customers and up to $60,000 to multifamily and commercial customers based on the projected savings.

4. *Efficient Building Grants*

   Target Audience: Commercial, multifamily and industrial facility owners and operators

   Description: Technical assistance and customized incentives offered to PGW commercial and industrial customers to encourage them to complete comprehensive retrofit projects to their existing properties. This program provides incentives of up to $75,000 to cover up to 33 percent of the retrofit project costs.

During DSM Phase II from September 1, 2017 through August 31, 2019, PGW's EnergySense program spent $2.5 million. Over the expected useful life of the measures installed, the activity for this period is projected by PGW to achieve 1.2 Bcf of natural gas savings (reduced customer usage). Based on the Total Resource Cost test, net present value spending totaled $4.8 million, and the program achieved $7.7 million in present value savings over the useful life of the measures for net savings to customers of $2.8 million. EnergySense costs continue to be recovered through the Efficiency Cost Recovery Surcharge.

7.7. INFRASTRUCTURE REPLACEMENT

As discussed earlier in this Report in *Section 6, Capital Improvement Program*, PGW's base rates have historically provided approximately $20 million per year which has funded the replacement of approximately 18 miles of cast iron mains annually. This program was initiated by PGW based on risk assessment and benchmarking studies conducted for PGW. The cost of this program is being paid for by customers under the existing base rates. The 18-mile cast iron main replacement program is supplemented by an accelerated main replacement program as set forth in PGW's LTIIP.

PGW's original LTIIP was a five-year plan (fiscal years 2013 - 2017) for accelerated recovery for distribution facilities over and above PGW's base line replacement program (recovery for the base line program is already included in base rates). The original LTIIP accelerated the replacement cycle for PGW's large diameter cast iron mains (i.e. 12-inch and larger diameter high pressure main) and the more extensive smaller diameter cast iron mains (i.e. 8-inch and smaller, low/intermediate pressure main) replacement program. PGW filed its second LTIIP petition on May 3, 2017, covering the five-year period fiscal year 2018 through 2022. This petition was approved by the PUC on August 31, 2017. For forecasting purposes, PGW assumes that this accelerated replacement program will continue throughout the fiscal year 2022 forecasting period.

The original LTIIP included several key elements:

- The program of replacing 18 miles per year of small diameter, low/intermediate pressure cast iron main increased by approximately 3 miles per year; and
- Replacement of large diameter, high pressure, cast iron mains that have been identified as potential risks began in fiscal year 2013 related to:
  - 30-inch cast iron mains that have been identified as being in poor condition; and
  - 12-inch cast iron mains, similar to those that have been involved in two separate incidents in PGW's system; 12-inch cast iron mains were also involved in an incident within UGI Corporation's service territory.

On January 16, 2015, the PUC initiated an inquiry and analysis of PGW's pipeline replacement program, including the need for and any impediments to the expansion of the pipeline replacement program. This inquiry and analysis culminated in a report to the PUC by Commission Staff. On April 21, 2015, the PUC Commission Staff issued its report "Inquiry into Philadelphia Gas Works' Pipeline Replacement Program." In this report, the Staff indicated that it did not believe the current pipeline replacement rate to be aggressive enough. The Staff identified the following seven "areas of opportunity that PGW should explore to increase its mains replacement rate":

1. Increase the DSIC above the 5 percent cap (approved at that time)
2. Levelize and annualize DSIC eligible costs
3. Issue new debt
4. Improve cash management
5. Request that the City of Philadelphia waive all or a portion of the $18 million payment
6. Streamline corporate governance structure
7. Consolidate facilities

PGW met with the PUC to discuss the suggestions made in the PUC's April 2015 report. On September 1, 2015, at Docket No. P-2015-2501500, PGW proposed an increase in the DSIC from 5.0 percent to 7.5 percent of distribution revenues and to levelize and annualize the DSIC. The PUC issued an Opinion and Order granting PGW's request to increase its DSIC to 7.5 percent on January 28, 2016 ("January 28 Order"). The increase, from $22 million to $33 million per year, generated approximately $11 million in additional revenue to fund PGW's accelerated pipeline replacement program, which PGW is allowed to recover on a pay-as-you-go-basis through the DSIC surcharge. The DSIC is in addition to the amount funded through base rates for cast iron replacement. PGW has not issued any long-term debt to fund the accelerated replacement program. Funding on a pay-as-you-go basis benefits both the ratepayer and PGW because rates will not be impacted by any interest expense or debt service coverage requirements. PGW's debt to equity ratio will not increase as a result of the accelerated spending funded by a DSIC. Separate funding via a pay-as-you-go DSIC model for the accelerated program is also beneficial (versus a base rate case) because it can be approved on a timelier and more efficient basis. The January 28 Order also permits PGW to levelize and annualize DSIC recovery, which provides PGW with more predictable cash flow and helps mitigate over-and under-collections. PGW's increased DSIC charge of 7.5 percent became effective on February 1, 2016, for service rendered on or after January 1, 2016.

The DSIC surcharge applies to Residential and Public Housing, Commercial and Municipal, and Industrial customers. The surcharge is calculated as a percentage applied to the delivery charge, surcharges, and customer charge. The percentage is equal to the DSIC revenue requirement divided by the annual non-gas cost revenues of the above customers. This percentage is then applied equally to each of the non-gas rate components of those customers. As alluded to above, under the original DSIC mechanism, revenues were not fully collected in a given annual period.

On July 6, 2016, the PUC issued an Opinion and Order that permitted PGW to recover an additional $11.4 million in DSIC under-collections for the calendar year ending December 31, 2015, over the course of two years. This resulted in a temporary increase in the DSIC surcharge yielding additional annual revenues of $5.7 million a year for two years. Beginning on October 1, 2016, PGW temporarily increased its DSIC surcharge to 8.84 percent, as permitted by the PUC's July 6, 2016 Order. On January 1, 2017, PGW changed its DSIC surcharge percentage to 8.80 percent and again on January 1, 2018 to 8.70 percent where it remained until the temporary increase expired at the end of the two-year period on September 30, 2019. The temporary increase to the DSIC mechanism coupled with the levelized method of recovery has allowed PGW to reduce the under collection of DSIC surcharge revenues from $16.4 million at the end of fiscal year 2016 to $3.0 million at the end of fiscal year 2019.

PGW is currently evaluating future increases to the DSIC including the potential impacts to customers, the timeline for complete removal of cast iron mains, and PGW's ability to effectively implement higher levels of accelerated pipeline replacement.

7.8. CUSTOMER RESPONSIBILITY PROGRAM

In November 1993, the PGC adopted a low-income program known as the CRP. This program became effective in February 1994. The purpose of CRP is to increase the collection of revenues, provide an affordable payment plan for low-income customers, impress payment responsibility on the customer, reinforce the importance of conservation and increase grant assignment. The goals of the program are to increase cash flow to PGW and decrease accounts receivable.

Currently, CRP is open to any customer who is at or below 150 percent of the Federal Poverty Level ("FPL"). Monthly bills for CRP customers are based on income, so that they are affordable for low-income households. If a customer entering CRP has arrears, those arrears are forgiven at a rate of 1/36th per month. As part of their CRP agreement of fixed monthly bills and arrearage forgiveness, CRP customers are required to:

- Accept conservation measures offered to them in the CRP Home Comfort (now called Home Comfort);
- Make a $5 monthly co-payment toward their pre-program arrears, if they have any;
- Apply for LIHEAP, if eligible, and designate PGW as the grant recipient;
- Re-certify at least once per year (after 2 years for LIHEAP recipients and every 6 months for zero income customers), or when household size or income changes; and
- make payments on time and in full (CRP customers are considered in default when they are one full payment past due).

CRP is a customer assistance program that can help low-income residential customers who are at or below 150 percent of the poverty level to better afford their PGW bills and maintain their gas service. Participants receive a discount (reduced monthly bill) based on their gross household income. Applicants must apply by showing proof of income and identification cards for everyone in the household. There are three percentage of income agreement types, as set forth below. Further, there is an average bill type for customers whose budget bill is lower than the percentage of income bill.

PGW Annual Bill	Household Income
8% of income	0-50% FPL
9% of income	51-100% FPL
10% of income	101-150% FPL

The minimum payment under a CRP agreement is $25 per month. Customers with pre-program arrears must make a $5 monthly co-payment toward the arrears, in addition to the CRP budget amount.

Approximately 55,069 customers were enrolled in CRP as of January 2020. The main costs associated with the CRP program are the discounts that customers receive (revenue shortfall) and their arrearage forgiveness.

The CRP revenue shortfall is currently recovered in the Universal Service Surcharge. In the past five fiscal years, these amounts were approximately $54.5 million for 2015, $34.3 million for 2016, $39.1 million for 2017, $46.3 million for 2018, and $40.4 million for 2019. Shortfall fluctuation can be primarily attributed to the cost of natural gas supply and participation levels.

PGW forgives 1/36th of CRP pre-program arrears each month, provided that a bill is paid in full. During the past five fiscal years, PGW has forgiven pre-program arrears in the approximate amounts of $6.4 million in 2015, $8.8 million in 2016; $8.1 million in 2017; $9.2 million in 2018; and $8.8 million in 2019.

On October 5, 2017, the PUC approved PGW's 2017-2020 Universal Service and Energy Conservation Plan. On October 3, 2019, the PUC extended PGW's current Plan by an additional two years – through December 31, 2022 and required a letter indicating how PGW would meet PUC low income program policy changes. On February 6, 2020, the PUC required PGW to file a Petition indicating low income program changes.

7.9. SENIOR CITIZEN DISCOUNT PROGRAM

The senior citizen discount program is a closed program. Since September 1, 2003, the program has not been available to new participants. However, PGW has approximately 10,400 participants as of January 2020 in its senior citizen discount program. All participants currently in the program were "grandfathered" in when the PUC discontinued it in September 2003. In 2004 there were approximately 70,000 "grandfathered" participants in the program. The senior citizen discount amounts to a 20 percent reduction on the participant's total gas bill each month.

7.10. OTHER PROGRAMS AND GRANTS

In addition to the programs described above, PGW also participates in or partially funds several other assistance programs that are intended to increase cash flow and reduce accounts receivable.

7.10.1. Low-Income Home Energy Assistance Program

The Federally funded LIHEAP provides funds to households to ensure continued utility service. The City's low-income residential gas consumers may apply for assistance through the Pennsylvania Department of Human Services (formerly the Department of Public Welfare). PGW district offices and many community organizations throughout Philadelphia offer assistance with the application process. The LIHEAP program consists of two grant components: cash grants and crisis grants. The main difference between the two grant types is that crisis grants are offered only to eligible customers whose utility service is off or in danger of having services terminated. Funds obtained are paid directly to PGW for crediting to the customer's account.

LIHEAP is an important source of low-income assistance funding for PGW and has ranged over the last five years (2015-2019) from a low of $15.2 million in 2016 to a high of $19.8 million in 2017 for cash grants. PGW's share of LIHEAP cash grant funds allocated by the Commonwealth of Pennsylvania has ranged from approximately 12.7 to 21.9 percent from 2015-2019. These levels have been achieved through a vigorous educational and outreach program by PGW to encourage its low-income residential population to apply for the grants. Funding levels vary based on Federal allocation and program design by state (*see Table 12*).

Since 1996, the Commonwealth of Pennsylvania has had the flexibility to change the customer eligibility criteria for LIHEAP participation from 210 percent of the FPL to 110 percent of the FPL. During the 2019-2020 grant season, the program capped eligibility at 150 percent of the FPL.

In 2015-2016, Pennsylvania received approximately $202.5 million in LIHEAP funding by the Federal Government; approximately $174.4 million of which was used for grants. In 2016-2017, Pennsylvania received approximately $185.5 million; approximately $152.8 million of which was used for grants. In 2017-2018, Pennsylvania received approximately $214.8 million; approximately $174.1 million was to be used for grants. In 2018-2019, Pennsylvania received approximately $206.5 million, approximately $162.2 million was to be used for grants.

7.10.2. Vendor Payment Program

PGW continues to support a Vendor Payment Program for a group of customers known as Scattered Site Tenants of the PHA. The customers occupy dwellings, usually single-family homes, owned by the PHA, for which the Federal Government provides rent subsidies. Under agreement with the PHA and the Scattered Site Tenants, the Federal Government's Department of Housing and Urban Development provides funding for a utility allowance to PHA, on behalf of the tenant. There are two groups of PHA tenants: one for which utility payments are received by PGW directly from PHA, and a second group, which is responsible for paying their own utility bills.

7.10.3. Utility Emergency Services Fund

PGW also participates in the Utility Emergency Services Fund ("UESF"), which is a private fuel fund set up with the assistance of the City, the Water Department, PECO Energy, individual contributions, and private foundations. Under this program, customers at or below 175 percent of the FPL may combine a LIHEAP grant with a UESF grant and matching grant from PGW, and their own payment, if necessary, to zero-out all arrearages to avoid termination or restore service. CRP customers only have to zero-out CRP arrearages, not pre-program arrearages. Except for possible special grant programs, the maximum UESF grant and PGW matching grant is $750 each (for a total of $1,500). To be eligible for a UESF grant, the customer must have a termination notice or already have service terminated. The customer must also apply for LIHEAP and must zero out their account (non-CRP). If the total arrearage is not satisfied by the combination of LIHEAP, UESF, and the matching PGW grant, then the customer must pay the balance that would remain prior to being approved for the UESF grant and matching utility grant. Also, customers are limited to one UESF grant every two years.

7.10.4. Dollar Plus Program

PGW also continues to support the Dollar Plus Program, wherein PGW's customers are asked to add $1.00 or more to their gas bill payments as a donation to the Utility Emergency Services Fund.

7.10.5. Payment Plans

PGW maintains a number of residential customer payment plans that are tailored to the customer's ability to pay in order to allow the customer the opportunity to pay down past arrearages and budget future usage and payments.

7.11. BILLING AND COLLECTIONS

To strengthen its financial condition, PGW utilizes a number of programs designed to improve collections and increase operational efficiencies. These programs are as follows:

***Soft-off monitoring*.** PGW automated many of the services associated with soft-off monitoring. Previously, when a customer moved, PGW deployed a field service representative to shut off service. Many times, the field service representative would be unable to gain access to the meter and the service would remain on and continue to bill the out-going customer resulting in additional uncollectible receivables. PGW now final bills a customer's account, transfers the future usage expense responsibility to PGW and monitors the premises closely to avoid any excess usage or theft of service. In addition to decreasing the uncollectible receivables as a result of a failed shut off attempt, the soft-off program allows Operations to redirect field employees to other jobs resulting in a more efficient use of resources.

The soft-off monitoring benefits reflect the cost of having the program in place versus not having the program. The goal is for the cost of the program to be 25 percent less than the cost of not having a program.

Landlord Cooperation Program ("LCP"). The LCP allows landlords of residential properties to work collaboratively with PGW in a manner that improves PGW's ability to collect from residential tenants (landlords provide access to the meter) and minimize tenant delinquencies in exchange for not filing a lien on the landlord's property for a tenant's unpaid balance. When a landlord fails to cooperate or enroll in the program, the property is subject to liens. As of November 2019, LCP had approximately 72,848 registered premises.

Commercial Lien Notification Program ("CLNP"). The CLNP allows landlords of commercial properties to work collaboratively with PGW in a manner that improves PGW's ability to collect from commercial tenants (landlords provide access to the meter) and minimize tenant delinquencies in exchange for an additional advance notice of the intended filing of a lien. Regardless of enrollment in the program, a property remains subject to liens. As of November 2019, CLNP had approximately 469 registered premises.

Write-off reactivation. PGW ensures that prior written-off balances are immediately identified and appropriately transferred when the same customer re-applies for service, and when an applicant lived at the property during the time the debt was incurred.

Liens. PGW employs a largely automated lien process which facilitates the docketing of liens on eligible properties if there are account arrearages.

PGW has reported that several formal complaints filed by a landlord and related entities were filed with the PUC challenging the lawfulness of PGW's billing methodology regarding the application of partial payments, and the assessment of late payment charges for amounts of unpaid PGW debt liened under the Municipal Lien Act. The complaints were consolidated into several discrete groups for adjudication and disposition purposes owing to the numerous transactions involved and common questions of law and fact presented.

On September 17, 2015, the assigned Administrative Law Judge issued an Initial Decision with respect to the first group ("First Initial Decision") of the consolidated complaints, in response to which PGW filed Exceptions on October 7, 2015. On December 8, 2016, the PUC issued an Order and Opinion, granting in part and denying in part the PGW Exceptions. Accordingly, the PUC adopted the First Initial Decision as modified consistent with the discussion contained in the Opinion and Order as summarized below.

Per the Order and Opinion, the PUC found that PGW improperly assessed late payment charges on arrearages that had been liened under the Municipal Lien Act. Under the PUC's analysis, the primary legal effect of the City's having docketed municipal liens on the subject accounts was to remove the late payment charges for the unpaid utility bills from the PUC's jurisdiction. Following that line of reasoning, the PUC opined that it lacked jurisdiction to determine what, if any, was the appropriate rate of interest that PGW could charge for such arrearages. The PUC did conclude however that once a lien was filed by PGW it no longer had the authority to charge late payment charges on the arrearage pursuant to its approved tariff.

In response, PGW filed appeals with the Pennsylvania Commonwealth Court from the PUC's decision in each group of complaints. Oral argument took place on November 12, 2019.

On December 9, 2019, the Pennsylvania Commonwealth Court reversed the orders of the PUC related to amounts owed by SBG Management Services, Inc. to PGW that, inter alia, were subject to late payment charges by PGW.[13] The Court found that (i) the PUC committed an error of law in holding that it lacked jurisdiction over gas charges subject to docketed liens, (ii) the PUC committed an error of law in holding that PGW could not continue to impose late fees of 1.5% per month on delinquent accounts once the City dockets a lien, and (iii) the PUC erred in imposing penalties, ordering refunds of previously imposed late fees, and directing billing changes relating to charges subject to docketed liens.

On January 8, 2020 the landlord and related entities petitioned the Pennsylvania Supreme Court to reverse the decision of the Commonwealth Court. PGW responded to this petition and opposes a reversal. The Pennsylvania Supreme Court has not yet responded to SBG's petition and so it is unknown at this time whether the opinion of the Commonwealth Court could be reversed.

At this time, PGW cannot predict the impact on PGW's collections and collections practices if late payment charges could not be assessed on monthly bills with respect to arrearages that are liened.

Risk-based collections. PGW utilizes a risk-based collection strategy. Customers' past payment patterns are analyzed, and each customer is assigned a "score" based on the age of the receivable, amount of the receivable, and risk of their receivable going to write off. Actual write-off occurs 90 days after the shut-off for accounts when there are no payments against the final bill. Based on a customer's score, PGW determines an appropriate collection path. If a customer has a high score, they are selected for the physical shut off path, however if a customer has a lower score, more frequent customer communications may be sufficient to ensure payment.

Public Utility Law and Collections. PGW continues to abide by all regulations with respect to collections. On November 30, 2004, the Pennsylvania General Assembly passed, and the Governor

[13] PGW did not appeal the decision of the PUC regarding partial payment application. This matter was independently resolved per a settlement agreement reached with the Office of Consumer Advocate, and approved by the PUC on June 13, 2019, as part of PGW's last base rate case. Per the settlement, PGW agreed to modify its partial payment allocation practices so that no priority is given to the satisfaction of late payment charges.

signed Act 201, entitled the "Responsible Utility Customer Protection Act" (now codified in the Pennsylvania Public Utility Code and referred to hereafter as "Chapter 14").

Chapter 14 provides a number of tools to help PGW collect payment, including but not limited to confirmation that termination of service following shut off notification may occur up to 60 days after notice; shut off with notice is permitted for things such as failure to meet the terms of a payment agreement; shut off without notice is permitted for things such as theft of service, obtaining service through fraud, tampering with a gas meter; winter termination (December 1 – March 31) without PUC prior approval for customers whose household income exceeds 250 percent of the federal poverty level; and winter termination (January 1 – March 31) without PUC prior approval (under specified conditions) for customers whose household income exceeds 150 percent but does not exceed 250 percent of the federal poverty level.

Chapter 14 was scheduled to expire on December 31, 2014, but the law was extended and amended effective December 21, 2014. Amendments include (among other things) a change in the deposit interest rate and elimination of a 24 month hold maximum for security deposits. In addition, Chapter 14 is now scheduled to expire December 31, 2024.

In addition to its collection efforts, PGW continues to offer customers many options to pay their bills in order to avoid collection activity.

Customer Service Centers ("CSC"). A CSC or District Office is a remote office owned or leased by PGW that accepts payments for all PGW services. PGW has five CSCs located throughout Philadelphia. Due to staffing requirements, only three CSCs are operational per day.

Authorized Agents for walk–in payments. Customers can make payments at authorized agent locations. These locations are "In Person Payment" centers or have BuyPay or Americash Checkfree, and Retail Cash service. An authorized agent is an establishment that accepts payments from PGW customers and remits the total to PGW.

Pay by Phone. Credit card or check payments are accepted through the Interactive Voice Response ("IVR") system using a 3rd party vendor and by PGW customer service representatives through a desktop application maintained by the same vendor.

Web Payments. Customers may pay their bill by credit card or check on PGW's website which is processed through a third-party vendor's web portal.

Auto Payments. Customers may sign up to have monthly payments automatically deducted from their bank account on their bill due date.

7.12. COMPETITION

PGW's customer, volume, and revenue mix is heavily weighted towards the residential and smaller commercial markets. PGW currently holds in excess of 85 percent of the home heating market in the City with fuel oil and electric heat pumps constituting most of the remaining market. This high market share, combined with a service territory that is not growing, limits PGW's ability to increase its customer base. For residential and small commercial customers, the cost of changing energy sources is generally cost prohibitive without some kind of incentive to switch appliances (rebates or financing of appliances, for example). While not totally immune from competition, the residential and small to medium-sized commercial markets are quite stable. The opportunities to increase market share are limited without incentive programs that subsidize capital or operation costs. Despite the limited opportunities for growth within PGW's service territory, the gentrification of neighborhoods and the continuation of residential new construction, allows PGW to maintain a strong presence among builders and developers within Philadelphia.

Generally, competition in the larger commercial and industrial markets is common. PGW customers utilizing the interruptible transportation rate (known as "IT") have the ability to switch between alternate fuels (oil, electric or steam). If the equivalent price of natural gas is lower than alternative fuel, customers will opt to use natural gas. In addition, regulations of the Clean Air Act will at times cause dual fuel commercial and industrial consumers to use natural gas (instead of fuel oil) in order to meet stringent air emission operation permits.

As a means to reduce operational cost while increasing reliability, PGW encourages its commercial customers to utilize CHP. On-site CHP provides the customer with the capability to reduce their electric demand from the grid while capturing the waste heat from the CHP unit for heating or cooling needs. CHP projects provide an increasing revenue stream for PGW but are subject to high upfront capital costs for the customer. The success of CHP has encouraged PGW to explore micro-CHP, a small-scale version of CHP for small commercial customers. This type of technology is currently being promoted to architects, engineers and other stake holders who would benefit from the energy savings in their small commercial projects. However, because this technology is new to small commercial customers, funding from the utility, state and local government will be necessary to successfully launch this product.

PGW is promoting the utilization of Natural Gas Vehicles ("NGVs") internally and externally. Its internal fleet consists of approximately 24 sedans with plans to expand the fleet with utility trucks. From an external perspective the City of Philadelphia has acquired grants, with the guidance of PGW, to purchase a fleet of refuse trucks.

Finally, the commodity price of natural gas has decreased with predictions of low stable prices for the foreseeable future. The spread between natural gas and alternative energy sources has resulted in more CHP projects that add resiliency and reliability to a large group of commercial and industrial customers.

8. Financial Feasibility of the Sixteenth Series Bonds

The financial data used in the analyses presented herein were obtained from the historical financial records of PGW, PUC GCR filings, and proposed operating and capital budgets for fiscal years 2021 through 2025. PGW's financial statements are audited annually. The most recently available audited financial statement is for fiscal year 2019 and may be viewed at www.pgworks.com. PGW's financial statements are maintained in conformity with U.S. Generally Accepted Accounting Principles (U.S. GAAP), and are in accordance with City reporting requirements.

8.1. PROJECTED REVENUES

Operating revenues for PGW consist principally of revenues from the sale and transportation of natural gas to residents of the City. Non-operating revenues include interest income and miscellaneous other revenues from non-operating sources.

8.1.1. Projected Average Number of Customers

PGW has experienced a relatively constant customer base for many years, fluctuating by less than 1 percent. Table 9 summarizes projected average number of customers. Historical average number of customers (for fiscal years 2015 through 2019) has increased approximately 1.8 percent. The total average number of customers served is projected to decrease from approximately 509,904 in fiscal year 2020 to about 506,314 in fiscal year 2025, a total decrease of about 0.7 percent over five years[14].

It is estimated that for fiscal year 2020, 25,187 customers, or 4.9 percent of total customers, will take gas supply, transportation and storage services from a third-party supplier. For purposes of this Report, it is assumed that the number of customers migrating to transportation service will continue to grow annually, reaching 38,096, or 7.5 percent of total customers, by fiscal year 2025.

The principal difference between customers taking sales versus transportation service is that PGW does not buy the natural gas commodity for the transportation customers. However, PGW charges customers taking transportation service for the delivery of gas through its distribution system. This charge for transportation service should not differ appreciably from the charge (less gas cost) that would apply to sales service customers. Therefore, PGW is unlikely to experience a material reduction in margin (gross revenues less cost of gas) due to customers migrating to transportation service. While it is difficult to predict with certainty the actual number of customers who will migrate and the timing of such a migration, PGW's projection of interruptible customers transferring to transportation service appears to be reasonable. If the rates for transportation service are properly designed, the margin realized by PGW will not be materially sensitive to whether customers take sales or transportation service, or both.

[14] PGW's Marketing Department produces an annual load forecast detailing load growth by rate class based upon forecasted sales data and five years of actual data. The Gas Planning Department references this load forecast to project customer count data.

Table 9 Historical and Projected Average Number of Customers

Line		Fiscal Year Ending August 31,										
		Actual					Estimate	Budget	Projected[a]			
No.	Description	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
1	**Gas Sales Customers**											
2	**Non-Heating Customers**											
3	***Firm***											
4	Residential	22,730	20,814	19,004	18,029	16,549	14,722	12,616	10,572	8,529	6,486	4,443
5	CRP Residential	258	197	150	203	406	0	0	0	0	0	0
6	Commercial	4,138	3,745	3,372	3,327	3,261	470	502	534	567	599	631
7	Commercial A/C	0	1	1	1	1	3,276	3,327	3,378	3,429	3,480	3,531
8	Industrial	142	120	106	105	103	1	1	1	1	1	1
9	Municipal	104	86	80	81	80	99	97	96	94	93	91
10	Municipal A/C	0	2	2	2	1	81	81	81	81	81	81
11	Housing Authority	0	0	0	0	0	1	1	1	1	1	1
12	NGV Firm	4	3	3	3	3	3	3	3	3	3	3
13	Total Average Firm Non-Heating	27,377	24,967	22,719	21,751	20,402	18,654	16,628	14,667	12,705	10,744	8,782
14	***Interruptible***											
15	LNG - Direct	2	0	0	0	0	1	1	1	1	1	1
16	Other Interruptible	3	4	3	3	3	2	2	2	2	2	2
17	Total Average Interruptible	5	4	3	3	3	3	3	3	3	3	3
18	**Total Average Non-Heating Customers**	**27,382**	**24,972**	**22,722**	**21,754**	**20,405**	**18,657**	**16,631**	**14,670**	**12,708**	**10,747**	**8,785**
19	**Heating Customers**											
20	Residential	386,902	395,816	405,807	407,360	396,959	389,872	383,535	378,254	372,972	367,690	362,408
21	CRP Residential	60,848	55,339	48,366	48,468	51,808	55,155	58,923	62,691	66,458	70,226	73,994
22	PHA/GS	1,835	1,950	2,015	1,953	2,011	2,011	2,011	2,011	2,011	2,011	2,011
23	Commercial	17,141	17,343	17,731	17,849	17,858	18,027	18,432	18,835	19,238	19,641	20,044
24	Commercial A/C	1	0	0	0	0	0	0	0	0	0	0
25	Industrial	393	399	401	391	381	374	371	367	363	359	355
26	Municipal	378	388	393	401	400	401	401	401	401	401	401
27	Housing Authority	877	360	186	264	220	220	220	220	220	220	220
28	**Total Average Heating Customers**	**468,374**	**471,594**	**474,899**	**476,685**	**469,638**	**466,060**	**463,893**	**462,778**	**461,663**	**460,548**	**459,433**
29	**Total Average Sales Customers**	**495,756**	**496,566**	**497,621**	**498,439**	**490,043**	**484,717**	**480,524**	**477,448**	**474,371**	**471,295**	**468,218**
30	**Transportation**											
31	Firm Transportation	3,285	4,086	4,487	6,421	17,989	24,758	28,337	30,669	33,001	35,333	37,667
32	Interruptible Transportation	431	427	427	427	425	429	429	429	429	429	429
33	**Total Average Transportation Customers[b]**	**3,716**	**4,513**	**4,914**	**6,848**	**18,414**	**25,187**	**28,766**	**31,098**	**33,430**	**35,762**	**38,096**
34	**Total Average Number of Customers**	**499,472**	**501,079**	**502,535**	**505,287**	**508,457**	**509,904**	**509,290**	**508,546**	**507,802**	**507,057**	**506,314**

(a) Projected figures are based on budgeted department figures.

(b) Increase in transportation customers is due to the transfer of interruptible customers to GTS service and firm sales customers to firm transportation service. No firm customers are assumed to transfer to GTS service.

8.1.2. Historical and Projected Gas Sales and Throughput

Historical throughput (sales plus transportation volumes) for the 2015 through 2019 fiscal years and estimated or projected throughput for the 2020 through 2025 fiscal years are summarized in Table 10.

The decrease in projected total throughput during fiscal years 2020 through 2025 is consistent with the projected decrease in the average number of customers. The projection for residential and commercial throughput generally reflects a constant use per customer. The projection for firm transportation customers reflects a decline in use per customer due to the migration of residential customers to firm transportation service.

As residential customers migrate to transportation service, sales volumes attributable to residential customers also decline as transportation volumes increase. As stated previously, if transportation rates are designed properly, the migration of customers and volumes from firm or interruptible sales service to transportation service should not translate into a material change in margin.

Table 10 Historical and Projected Sales and Throughput

		Fiscal Year Ending August 31,										
Line		Actual[a]					Estimate	Budget	Projected			
No.	Description	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
		MMcf	MMcf	MMcf	MMcf	MMcf	MMcf	MMcf	MMcf	MMcf	MMcf	MMcf
1	**Gas Sales Volumes**											
2	**Non-heating**											
3	***Firm***											
4	Residential	487	412	388	419	401	343	289	242	195	148	101
5	CRP Residential	16	13	10	16	27	0	0	0	0	0	0
6	Commercial	1,161	952	896	931	972	30	32	34	36	38	40
7	Commercial A/C	4	5	5	3	0	998	993	989	986	982	979
8	Industrial	110	83	108	119	114	0	0	0	0	0	0
9	Municipal	127	99	97	100	103	97	94	92	89	88	85
10	Municipal A/C	2	2	2	2	1	101	101	101	101	101	101
11	Housing Authority	0	0	0	0	0	1	1	1	1	1	1
12	NGV Firm	4	1	2	2	1	1	1	1	1	1	1
13	Total Average Firm Non-Heating	1,911	1,569	1,508	1,594	1,619	1,570	1,510	1,460	1,409	1,359	1,308
14	***Interruptible***											
15	LNG - Direct	499	10	7	135	2	50	50	50	50	50	50
16	Other Interruptible	15	28	12	31	203	461	13	13	13	13	13
17	Total Interruptible	514	38	19	166	205	511	63	63	63	63	63
18	**Total Non-Heating**	**2,425**	**1,606**	**1,527**	**1,760**	**1,824**	**2,081**	**1,573**	**1,522**	**1,471**	**1,422**	**1,370**
19	**Heating**											
20	Residential	30,563	24,194	26,526	29,589	28,202	27,211	26,627	26,202	25,776	25,391	24,925
21	CRP Residential	7,766	5,823	5,343	5,956	5,983	5,835	6,219	6,597	6,975	7,375	7,734
22	PHA/GS	194	162	177	187	187	178	178	178	178	178	178
23	Commercial	6,496	5,149	5,651	6,264	6,300	6,044	5,985	5,918	5,851	5,808	5,721
24	Commercial A/C	0	0	0	0	0	0	0	0	0	0	0
25	Industrial	363	250	261	357	394	361	349	337	325	314	302
26	Municipal	525	417	465	521	486	458	458	458	458	458	458
27	Housing Authority	597	121	42	52	52	45	45	45	45	45	45
28	**Total Heating**	**46,504**	**36,115**	**38,464**	**42,926**	**41,604**	**40,132**	**39,860**	**39,733**	**39,607**	**39,568**	**39,363**
29	**Total Sales Volumes**	**48,929**	**37,722**	**39,991**	**44,685**	**43,428**	**42,213**	**41,433**	**41,256**	**41,078**	**40,990**	**40,733**
30	**Transportation**											
31	Firm Transportation	4,294	4,123	4,457	4,907	5,969	6,562	6,615	6,679	6,743	6,805	6,867
32	Interruptible Transportation	26,004	24,101	24,244	25,760	26,994	26,430	27,072	27,072	27,072	27,098	27,072
33	**Total Transportation[b]**	**30,298**	**28,224**	**28,701**	**30,667**	**32,963**	**32,992**	**33,688**	**33,751**	**33,816**	**33,903**	**33,940**
34	**Total Throughput**	**79,227**	**65,946**	**68,692**	**75,352**	**76,391**	**75,205**	**75,121**	**75,007**	**74,894**	**74,893**	**74,673**

(a) PGW historical data. CRP volumes are included in appropriate residential figure.

(b) Increase in transportation sales is due to the transfer of interruptible customers to GTS service and firm sales customers to firm transportation service. No firm customers are assumed to transfer to GTS service.

8.1.3. Sales and Transportation Revenues

Historical revenues (sales plus transportation service) for the 2015 through 2019 fiscal years and estimated or projected revenues for the 2020 through 2025 fiscal years are summarized in Table 11. The revenue figures shown in Table 11 are based on application of PGW's existing rates to the projected number of customers, projected normal sales and transported volumes, the gas cost assumptions discussed in *Section 8.3.1, Gas Costs*, DSIC surcharge revenue, the $70.0 million of base rate relief revenue proposed in PGW's ongoing rate case. The revenue projections reflect the same adjustments made to sales and throughput (migration of customers to transportation). Black & Veatch assumes, consistent with PGW's existing GCR, that changes in the gas cost recovery portion of revenues will equal changes in gas costs.

In this Report, the revenue projections reflect currently effective rates and a 96 percent collection factor on billed revenues (*See Table 13*). This Report reflects the base rates which were established in July 21, 2017 Settlement Agreement in PGW's 2017 rate case and authorized by the November 8, 2017 PUC Order. This Report assumes that PGW will realize a net increase in base rate revenues of $70.0 million (based on 20-year normal weather) in fiscal year 2021 as discussed in *Section 7.1.6,* 2020 General Rate Relief Filing of this Report, and that PGW will realize a net increase in base rate revenues of $35.0 million in fiscal year 2024 in a future rate case. However, there can be no assurance that such increases will be approved in their entirety by the PUC. We have assumed for the purpose of this Report that the PUC will follow its Policy Statement which reaffirmed: 1) the use of the cash flow method to determine PGW's allowable revenue requirement, and 2) the PUC's obligation to establish rate levels adequate to permit PGW to satisfy its bond ordinance covenants. If revenues are less than the projections reflected in this Report or costs increase to levels above those reflected in this Report, PGW may have to file for additional rate relief (or PGW will have to achieve an equivalent combination of permanent revenue enhancements or cost savings).

The level of revenues projected for fiscal years 2020 through 2025 is based on 20-year normal weather conditions. As discussed in *Section 7.4, Weather Normalization Adjustment*, the WNA essentially removes the single biggest risk to PGW of recovering its approved margin during periods of warmer than normal weather during the winter season as long as it remains in effect. Because PGW's WNA tariff has no sunset provision, the WNA will continue in place unless the PUC issues an order directing that it be discontinued. Black & Veatch assumes for the purposes of this Report that the WNA will remain in effect through the projected period.

As with the projected volume and number of customers, as interruptible sales volumes and customers migrate to interruptible transportation service, so do revenues. Total transportation revenues also increase due to the previously discussed forecasted increase in customers migrating from firm sales to firm transportation service. As stated previously, if transportation rates are designed properly, this migration should not translate into a material reduction in net contribution margin and hence, net cash flow and income should not be materially affected.

Table 11 Historical and Projected Revenues

(Thousands of Dollars)

Line No.	Description	Fiscal Year Ending August 31, Actual[a] 2015	2016	2017	2018	2019	Estimate 2020	Budget 2021	Projected 2022	2023	2024	2025
		$	$	$	$	$	$	$	$	$	$	$
	Gas Sales Revenues											
	Non-heating											
	Firm											
1	Residential	9,943	7,883	7,688	8,486	8,312	6,838	5,780	4,851	3,938	3,021	2,084
2	CRP Residential[b]						468	498	531	567	606	644
3	CRP Shortfall	(60)	(58)	(56)	(108)	(164)	(102)	(108)	(117)	(128)	(140)	(153)
4	Commercial	14,439	10,322	10,565	11,164	11,620	11,901	11,815	11,820	11,911	12,048	12,162
5	Industrial	1,351	896	1,241	1,394	1,317	1,132	1,099	1,081	1,060	1,054	1,034
6	Municipal	1,368	879	954	1,075	1,091	1,069	1,061	1,064	1,076	1,093	1,107
7	Housing Authority	0	0	0	0	0	0	0	0	0	0	0
8	NGV	30	8	11	10	6	7	7	7	7	7	7
9	Total Firm Non-heating	27,071	19,930	20,403	22,021	22,182	21,313	20,152	19,237	18,431	17,689	16,885
	Interruptible											
10	LNG - Direct	3,032	49	26	600	995	238	236	232	231	231	233
11	Other Interruptible	640	297	351	460	330	1,538	51	51	52	53	54
12	Total Interruptible	3,672	346	377	1,060	1,325	1,776	287	283	283	284	287
13	**Subtotal Non-Heating**	**30,743**	**20,276**	**20,780**	**23,081**	**23,507**	**23,089**	**20,439**	**19,520**	**18,714**	**17,973**	**17,172**
14	Cost of Gas Increase	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
15	Prior Year's Gas Cost Recovery	(511)	762	(270)	(919)	412	(82)	3	(1)	(1)	0	(1)
16	**Total Non-Heating**	**30,232**	**21,038**	**20,510**	**22,162**	**23,919**	**23,007**	**20,442**	**19,519**	**18,713**	**17,973**	**17,171**
	Heating											
17	Residential	575,202	406,286	461,141	536,158	516,868	414,394	404,711	399,507	396,666	395,398	392,422
18	CRP Residential[c]						84,678	89,927	95,604	101,955	109,023	115,509
19	CRP Shortfall	(54,425)	(34,175)	(39,047)	(46,179)	(40,211)	(29,287)	(30,977)	(33,101)	(35,614)	(38,816)	(41,434)
20	Commercial	79,958	54,853	65,677	74,634	74,517	71,548	70,767	70,315	70,386	70,976	70,926
21	Industrial	4,439	2,724	3,068	4,256	4,593	4,234	4,092	3,971	3,879	3,804	3,707
22	Municipal	5,601	3,677	4,557	5,546	5,151	4,856	4,821	4,834	4,889	4,966	5,029
23	Housing Authority	6,884	1,328	481	653	643	2,981	2,969	2,976	3,002	3,039	3,070
24	**Subtotal Heating**	**617,659**	**434,693**	**495,877**	**575,068**	**561,561**	**553,404**	**546,310**	**544,106**	**545,163**	**548,390**	**549,229**
25	Cost of Gas Increase	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
26	Prior Year's Gas Cost Recovery	(12,124)	17,424	(4,768)	(23,933)	11,040	(2,086)	73	(21)	(24)	(19)	(30)
27	**Total Heating**	**605,535**	**452,117**	**491,109**	**551,135**	**572,601**	**551,318**	**546,383**	**544,085**	**545,139**	**548,371**	**549,199**
28	WNA Adjustment - Heating	(10,372)	39,021	27,749	(3,847)	1,347	91	0	0	0	0	0
29	**Total Adjusted Heating**	**595,163**	**491,138**	**518,858**	**547,288**	**573,948**	**551,409**	**546,383**	**544,085**	**545,139**	**548,371**	**549,199**
30	**Total Sales Revenues**	**625,395**	**512,176**	**539,368**	**569,450**	**597,867**	**574,416**	**566,825**	**563,604**	**563,852**	**566,344**	**566,370**
31	**Total Transportation[d]**	**39,293**	**36,962**	**40,007**	**48,668**	**59,990**	**62,834**	**63,914**	**65,101**	**66,348**	**67,680**	**68,945**
32	WNA Adjustment - Transportation	(374)	2,458	1,846	42	249	1	0	0	0	0	0
33	**Total Adjusted Transportation**	**38,919**	**39,420**	**41,853**	**48,710**	**60,239**	**62,835**	**63,914**	**65,101**	**66,348**	**67,680**	**68,945**
34	**Total Weather Normalization Adjustment**	**(10,746)**	**41,479**	**29,595**	**(3,805)**	**1,596**	**92**	**-**	**-**	**-**	**-**	**-**
35	**Total Revenues[e]**	**664,314**	**551,596**	**581,221**	**618,160**	**658,106**	**637,251**	**630,739**	**628,705**	**630,200**	**634,024**	**635,315**
36	DSIC Surcharge	13,817	22,581	35,014	41,832	35,640	32,901	34,912	36,928	36,945	36,968	36,982
37	Net Revenue Increase[f]	0	0	0	0	0	0	70,000	70,000	70,000	105,000	105,000
38	**Adjusted Total Gas Revenues[e]**	**678,131**	**574,177**	**616,235**	**659,992**	**693,746**	**670,152**	**735,651**	**735,633**	**737,145**	**775,992**	**777,297**

(a) PGW historical data.
(b) Actual revenues for fiscal years 2015 through 2019 included in Residential, Line 1.
(c) Actual revenues for fiscal years 2015 through 2019 included in Residential, Line 17.
(d) Increase in transportation revenues is due to the transfer of interruptible customers to GTS service. No firm customers are assumed to transfer to GTS service.
(e) Total Revenues does not include Unbilled Gas Adjustment.
(f) Revenue enhancement, cost savings and/or base rate increase. Assumes $70 million net revenue increase beginning in fiscal year 2021, and an additional $35 million beginning in fiscal year 2024.

8.1.4. Other Operating Revenues

Other operating revenues are projected to increase from approximately $19.2 in fiscal year 2020 to $24.0 million in fiscal year 2025 (Table 17, Line 10). These revenues consist of sales of energy-related appliance services, finance charges realized on overdue accounts, field collection charges, margin on LNG sales and other miscellaneous sources.

8.1.5. Assistance Programs

As part of PGW's proactive approach to managing accounts receivable balances, PGW has continued to develop programs targeted at assisting customers with meeting their energy costs. Table 12 details PGW's LIHEAP participation in recent years and provides an estimate for fiscal year 2020. Assistance programs are estimated to contribute $13.8 million in revenues in fiscal year 2020 and projected to contribute $17.0 million in fiscal year 2021.

8.1.6. Accounts Receivable

Table 13 summarizes historical and projected accounts receivable and account write-offs. As shown in Table 13, net accounts receivables were relatively consistent, ranging from a high of $86.9 million in fiscal year 2015 to a low of $73.6 million in fiscal year 2016. Between fiscal years 2020 and 2025, net accounts receivables are projected to decrease 10.8 percent primarily due to a projected decline in receivables as a percentage of billed revenues. If actual gas costs increase, accounts receivable and bad debts may increase. Conversely, if gas costs are less than these levels, accounts receivable and bad debts may decrease.

Realized bad debt expense as a percent of billed gas revenues is projected to remain consistent in a range between 4.6 and 4.4 percent from fiscal years 2020 to 2025. Table 13 also shows PGW's historical and projected average collection rate. PGW's collection rate has averaged 96.5 percent over the fiscal years 2015 through 2019, reaching as high as 98.4 percent in fiscal year 2016. A collection rate of 96 percent is projected during the fiscal years 2020 through 2025 period.

If there is an economic downturn, and/or the commodity price of natural gas increases significantly, then billing and collections could be adversely affected, and a corresponding decrease in the collection rate and increase in receivables beyond those levels assumed in our projections could result. No consideration has been given in these assumptions as to the effect, if any, of the COVID-19 pandemic.

Table 12 Historical and Budgeted Assistance Programs

	Historical										Estimate		Budget	
Description	2015		2016		2017		2018		2019		2020		2021	
Grant Money Available	**$149,051,201**		**$159,500,539**		**$124,373,396**		**$135,610,995**		**$134,937,642**		**$160,442,399**		**$156,000,000**	
Cash	$94,822,769	63.6%	$119,674,070	75.0%	$90,600,998	72.8%	$90,121,772	66.5%	$90,879,764	67.3%	$106,961,599	66.7%	$107,000,000	68.6%
Crisis	$54,228,432	36.4%	$39,826,469	25.0%	$33,772,398	27.2%	$45,489,223	33.5%	$44,057,878	32.7%	$53,480,800	33.3%	$49,000,000	31.4%
Number of Grants														
State of PA														
Cash	390,121	75.0%	345,246	76.0%	348,680	77.3%	344,000	72.7%	328,714	74.4%	366,307	72.7%	367,200	74.5%
Crisis	130,349	25.0%	108,993	24.0%	102,197	22.7%	129,054	27.3%	113,327	25.6%	137,483	27.3%	125,600	25.5%
Total State of PA	520,470	100.0%	454,239	100.0%	450,877	100.0%	473,054	100.0%	442,041	100.0%	503,790	100.0%	492,800	100.0%
PGW Share of Total PA														
Cash	60,103	15.4%	47,447	13.7%	60,962	17.5%	58,151	16.9%	57,516	17.5%	44,669	12.2%	58,900	16.0%
Crisis	14,060	10.8%	19,131	17.6%	8,054	7.9%	8,466	6.6%	15,092	13.3%	3,113	2.3%	10,500	8.4%
Total PGW Share of Total PA	74,163	14.2%	66,578	14.7%	69,016	15.3%	66,617	14.1%	72,608	16.4%	47,782	9.5%	69,400	14.1%
Total Funding - Final														
State of PA														
Cash	$94,822,769		$119,674,070		$90,600,998		$90,121,772		$90,879,764		$106,961,599		$107,000,000	
Crisis	$54,228,432		$39,826,469		$33,772,398		$45,489,223		$44,057,878		$53,480,800		$49,000,000	
Total State of PA	$149,051,201		$159,500,539		$124,373,396		$135,610,995		$134,937,642		$160,442,399		$156,000,000	
PGW Share of Total PA														
PGW - Cash	$15,249,011	16.1%	$15,239,849	12.7%	$19,829,190	21.9%	$18,713,016	20.8%	$16,099,217	17.7%	$12,610,350	11.8%	$14,000,000	13.1%
PGW - Crisis	$4,178,706	7.7%	$4,861,736	12.2%	$2,511,312	7.4%	$2,977,194	6.5%	$5,141,828	11.7%	$1,202,037	2.2%	$3,000,000	6.1%
Total PGW Share of Total PA	$19,427,717	13.0%	$20,101,585	12.6%	$22,340,502	18.0%	$21,690,210	16.0%	$21,241,045	15.7%	$13,812,387	8.6%	$17,000,000	10.9%
Value of Grants, per customer														
State of PA														
Cash	$243		$347		$260		$262		$276		$292		$291	
Crisis	$416		$365		$330		$352		$389		$389		$390	
PGW														
Cash	$254		$321		$325		$322		$280		$282		$238	
Crisis	$297		$254		$312		$352		$341		$386		$286	

Table 13 Historical and Projected Accounts Receivable and Write-offs

Description	Fiscal Year Ending August 31,										
	Historical					Estimate	Budget	Projected			
	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
Billed Gas Revenues ($000) [a]	690,766	555,991	621,273	684,844	682,294	672,320	735,575	735,655	737,170	776,011	777,328
Accounts Receivable ($000)	188,882	147,849	147,152	148,938	152,740	151,613	147,745	144,653	141,594	138,374	135,173
Less: Reserve for Bad Debt	(102,029)	(74,286)	(65,124)	(66,328)	(66,751)	(67,015)	(65,565)	(64,142)	(62,713)	(61,230)	(59,742)
Net Accounts Receivable	86,853	73,563	82,028	82,610	85,989	84,598	82,180	80,511	78,881	77,144	75,430
Bad Debt Reserve/Accounts Receivable	54.0%	50.2%	44.3%	44.5%	43.7%	44.2%	44.4%	44.3%	44.3%	44.2%	44.2%
Net Write-Offs ($000)	40,153	54,876	39,154	29,623	29,559	31,570	34,501	33,742	33,814	35,577	35,640
Receivable/Billed Gas Revenues	27.3%	26.6%	23.7%	21.7%	22.4%	22.6%	20.1%	19.7%	19.2%	17.8%	17.4%
Bad Debt ($000)	34,833	27,133	29,992	30,826	29,983	30,927	33,101	32,369	32,435	34,144	34,202
Bad Debt/Billed Gas Revenues	5.0%	4.9%	4.8%	4.5%	4.4%	4.6%	4.5%	4.4%	4.4%	4.4%	4.4%
Bad Debt/Accounts Receivable	18.4%	18.4%	20.4%	20.7%	19.6%	20.4%	22.4%	22.4%	22.9%	24.7%	25.3%
Total Customer Receipts ($000)	700,933	571,544	613,239	685,057	685,608	673,485	736,031	736,187	737,762	776,217	777,599
Total Customer Billings ($000)	721,833	581,053	647,414	712,964	709,940	701,547	766,699	766,862	768,502	808,560	809,999
Collection Factor	97.10%	98.36%	94.72%	96.09%	96.57%	96.00%	96.00%	96.00%	96.00%	96.00%	96.00%

Five-Year Average Collection Factor (fiscal years 2015-2019) = 96.54%

(a) Adjusted Total Revenues (Table 11, Line 38) less Prior Year's Gas Cost Recovery (Table 11, Lines 26 and 15)

8.2. CAPITAL IMPROVEMENT PROGRAM FINANCING

The CIP described earlier (*See Section 6, Capital Improvement Program*) will be paid for by PGW through a combination of internally generated funds and bond proceeds. Also, in financial support of PGW's LTIIP for the Distribution Department, approximately $35 to $37 million in annual DSIC proceeds are projected to fund the DSIC portion of the CIP through the projection period.

PGW expects to use the proceeds of the Sixteenth Series Bonds to, among other things, finance a portion of the CIP.

The budget and projected CIP expenditures for the five-year period ending August 31, 2025, are shown on Line 13 of Table 14 and total approximately $744.5 million. Lines 1 through 10 outline the sources available to meet the CIP financing requirements. Line 1 in fiscal year 2020 shows approximately $68.6 million available in the Capital Improvement Fund as of August 31, 2019. Lines 2 through 5 show the net proceeds from bond sales, Lines 7 through 10 show other sources of funds including the amounts projected to be available from the DSIC surcharge and internally generated funds, and Line 12 presents the total funds available. Planned fund uses are summarized on Lines 13 through 15 of Table 14.

Table 14 Capital Improvement Fund

(Thousands of Dollars)

		Fiscal Year Ending August 31,						
Line		Actual	Estimate	Budget	Projected			
No.	Description	2019	2020	2021	2022	2023	2024	2025
		$	$	$	$	$	$	$
1	Balance from Previous Year	111,815	68,634	245,417	169,798	83,327	10,125	162,857
2	Bond Proceeds @ Par	0	260,000	0	0	0	235,000	0
3	Less Discount & Issuance Costs	0	(2,600)	0	0	0	(2,350)	0
4	Less Deposit to Sinking Fund Reserve[(a)]	0	(17,100)	0	0	0	(15,600)	0
5	Net Bond Proceeds	0	240,300	0	0	0	217,050	0
6	Other Sources of Funds							
7	Distribution System Improvement Charge	35,641	33,000	35,000	37,000	37,000	37,000	37,000
8	Capital Restricted Fund	0	0	0	0	0	0	0
9	Twelfth Series (Notes)	0	0	0	0	0	0	0
10	Internally Generated Funds	29,341	21,664	41,000	49,300	34,652	30,500	31,400
11	Total Other Sources of Funds	64,982	54,664	76,000	86,300	71,652	67,500	68,400
12	Total Sources of Funds	176,797	363,598	321,417	256,098	154,979	294,675	231,257
13	Capital Expenditures	109,984	119,673	154,084	174,477	145,691	133,919	136,291
14	Interest Earned	(1,821)	(1,492)	(2,465)	(1,706)	(837)	(2,100)	(1,636)
15	Withdrawal of Interest Received	0	0	0	0	0	0	0
16	Total Uses of Funds	108,163	118,181	151,619	172,771	144,854	131,819	134,655
17	Net Balance - End of Year	68,634	245,417	169,798	83,327	10,125	162,857	96,601

(a) Deposit to Sinking Fund Reserve is for the Sixteenth Series

As presented in Table 14, revenue bond issuance proceeds in fiscal years 2020 and 2024, coupled with $424.5 million from other funding sources (DSIC surcharge and internally generated funds) in fiscal years 2020 through 2025 are expected to provide sufficient funding for PGW to complete its planned CIP.

8.3. PROJECTED REVENUE REQUIREMENTS

PGW's rates are developed to provide sufficient levels of revenue to meet cost of gas, all operation and maintenance expenses of the System, debt service requirements on obligations issued for the System, capital improvement expenditures to be funded from current revenues, and other specific bond ordinance and revenue requirements. This section provides a discussion of the components that make up PGW's revenue requirements.

8.3.1. Gas Costs

Table 15, Line 1 presents PGW's historical and projected natural gas costs. The unit gas costs assumed by PGW and relied upon in this Report are projected to increase from approximately $4.62 per Mcf in fiscal year 2021 to $4.81 per Mcf in fiscal year 2025. PGW gas cost assumptions are based on pricing input from the futures prices from the New York Mercantile Exchange. PGW purchases its gas supplies under a portfolio approach as discussed in *Section 5.1, Supply Services*. As a result of the GCR, changes in the cost of gas result in equal changes in revenues. The mechanism by which PGW recovers its gas supply costs is discussed in *Section 7.3, Gas Cost Rate*.

Starting in May 2019, PGW started purchasing gas through long-term gas supply opportunities. As of fiscal year 2020, PGW has completed six prepaid gas transaction agreements. Each of the long-term gas supply opportunities has a term of 25 to 30 years. A major benefit with these prepaid purchase agreements relates to PGW's ability to take advantage of gas supplies purchased at discounts ranging from $0.29 to $0.40 per Dth from the specified spot market index. All of the long-term transactions are completed through an authorized public authority. In the winter seasons of 2020 – 2021, PGW will receive approximately 34,000 Dth per day from the prepaid transactions. In the summer season of 2021, PGW will receive approximately 18,000 Dth per day from the prepaid transactions. These gas supply purchase opportunities will provide approximately 20 percent of PGW's annual gas supply and will save approximately $3 million in gas costs. Once PGW has fully executed all the planned transactions, PGW will save approximately $100 million over the term of the pre-paid gas supply contracts.

8.3.2. Operation and Maintenance Expenses

Table 15 presents PGW's historical and projected operation and maintenance expense. The audited expenses for fiscal year 2019 serve as a base for the projected years. Pension fund and health insurance costs are based on PGW's fiscal year 2020 operating budget filing and have been updated with the most current information from PGW for the projected period through fiscal year 2025. The number of employees is assumed to be 1,637 throughout the projected period.

Table 15 Historical and Projected Operation and Maintenance Expenses

(Thousands of Dollars)

		Fiscal Year Ending August 31,										
Line		Historical					Estimate	Budget	Projected			
No.	Description	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
		$	$	$	$	$	$	$	$	$	$	$
	Operating Expenses											
1	Natural Gas	252,158	146,515	179,222	186,254	206,801	195,397	191,548	189,544	191,040	194,269	196,115
2	Other Raw Materials	11	9	8	11	24	10	10	10	10	10	10
3	Subtotal Fuel	252,169	146,524	179,230	186,265	206,825	195,407	191,558	189,554	191,050	194,279	196,125
4	Gas Processing	18,180	17,948	16,789	21,644	22,028	22,512	21,740	22,918	22,291	22,917	23,545
5	Field Operations	75,503	73,449	79,033	87,053	79,341	85,188	86,412	88,554	90,765	93,041	95,367
6	Collection	3,457	3,341	3,348	4,097	4,212	4,383	4,430	4,541	4,654	4,771	4,889
7	Customer Services	12,262	12,432	13,230	13,904	13,983	15,248	15,751	16,145	16,549	16,962	17,385
8	Customer Accounting	7,735	7,571	7,852	7,878	8,277	9,206	9,245	9,476	9,712	9,954	10,202
9	Marketing	6,956	3,671	3,644	3,751	4,232	4,999	4,916	5,040	5,167	5,297	5,430
10	Administrative & General	60,253	67,139	62,550	69,179	69,631	84,074	86,167	85,521	86,768	90,163	90,559
11	Health Insurance	51,051	53,370	20,882	22,242	22,080	25,340	27,151	29,091	31,171	33,402	35,794
12	Environmental Expenses	0	0	0	0	0	792	1,059	2,862	1,012	972	993
13	Capitalized Fringe Benefits	(8,860)	(10,077)	(10,999)	(10,767)	(9,786)	(13,716)	(8,969)	(9,546)	(9,921)	(10,347)	(10,200)
14	Capitalized Admin. Charges	(9,097)	(10,778)	(13,062)	(16,396)	(14,276)	(16,793)	(22,707)	(21,788)	(20,247)	(19,722)	(20,129)
15	Pensions	43,748	62,336	54,826	43,159	30,268	29,844	23,577	25,808	30,287	28,655	27,429
16	Taxes	7,823	7,521	7,890	8,758	8,705	9,280	9,435	9,539	9,731	9,925	9,856
17	Other Post Employee Benefits	6,726	9,929	28,062	32,889	28,351	24,732	25,422	31,592	20,795	24,446	22,197
18	Proposed Bond Refunding Savings	0	0	0	0	0	(1,437)	(589)	(588)	(590)	(588)	(220)
19	Cost Savings/Productivity Improvements	0	0	0	0	0	144	(164)	0	0	0	0
20	**Total Other Operating Expenses**	275,737	297,852	274,045	287,391	267,046	283,796	282,876	299,165	298,144	309,848	313,097
21	**Total Operating Expenses**	**527,906**	**444,376**	**453,275**	**473,656**	**473,871**	**479,203**	**474,434**	**488,719**	**489,194**	**504,127**	**509,222**
22	Depreciation	46,474	47,894	49,634	57,583	63,686	65,602	67,934	73,264	76,516	71,157	71,142
23	Cost of Removal	2,897	3,785	4,713	6,387	4,500	4,500	4,500	4,500	4,500	4,500	4,500
24	Less: Clearing Account Depreciation	(5,584)	(6,231)	(6,770)	(7,516)	0	0	0	0	0	0	0
25	Net Depreciation	43,787	45,448	47,577	56,454	68,186	70,102	72,434	77,764	81,016	75,657	75,642
26	**Total Operating Expense & Depreciation**	**571,693**	**489,824**	**500,852**	**530,110**	**542,057**	**549,305**	**546,868**	**566,483**	**570,210**	**579,784**	**584,864**

8.3.3. Debt Service Requirements

Table 16 presents a summary of the existing and proposed long-term debt service requirements for the five-year projection period assuming there is no refunding. In addition to the $260 million Sixteenth Series issuance in fiscal year 2020, there is a $235 million bond issuance expected to occur in fiscal year 2024.

The assumed all-in interest rates for the Sixteenth Series and anticipated fiscal year 2024 bonds are as follows:

Issuance	All-in Interest Rate
Sixteenth Series	5.0%
2024 Bond Issuance	5.0%

Table 16 Projected Long-Term Debt Service Requirements

(Thousands of Dollars)

Line		Fiscal Year Ending August 31,					
No.	Description	2020	2021	2022	2023	2024	2025
		$	$	$	$	$	$
	Revenue Bonds under 1998 Ordinance						
	Senior Debt						
1	A-2 Fifth Series Variable	600	600	600	600	600	600
2	Eighth Series	4,513	4,513	4,513	4,513	4,513	24,914
3	Ninth Series	6,815	6,629	6,659	6,616	6,637	2,244
4	Tenth Series	5,275	5,054	1,915	3,620	2,915	2,216
5	Thirteenth Series	25,405	24,619	27,547	26,086	25,286	23,761
6	Fourteenth Series	37,531	36,375	32,387	32,939	33,910	16,991
7	Fifteenth Series	17,395	17,216	17,166	17,153	17,143	17,125
8	Sixteenth Series	3,250	11,784	16,931	16,925	16,920	16,914
9	New Bond Issue - 2024	0	0	0	0	5,875	15,426
10	Total Senior Debt	100,784	106,790	107,718	108,452	113,799	120,191
11	*Subordinate Debt*						
12	Twelfth Series (Notes)	0	0	0	0	0	0
13	Total Subordinate Debt	0	0	0	0	0	0
14	Total 1998 Ordinance Debt	100,784	106,790	107,718	108,452	113,799	120,191
15	Total Long-Term Debt Service[a]	100,784	106,790	107,718	108,452	113,799	120,191

(a) Assumes no refunding transaction

8.3.4. Payments to City

In accordance with the Management Agreement and the Gas Choice Act, PGW makes an annual base payment of $18.0 million to the City. In fiscal year 2019, PGW paid $18.0 million to the City. For fiscal year 2020 and throughout the projected period, PGW is projected to pay $18.0 million annually to the City.

8.4. ADEQUACY OF PROJECTED REVENUES TO MEET RATE COVENANT REQUIREMENTS UNDER THE 1998 GENERAL ORDINANCE

Table 17 presents a pro forma statement developed from the revenue and expense projections for fiscal years 2020 through 2025. This table is presented in conjunction with Table 18, which presents a statement of cash flows, provides an indication of the adequacy of PGW's revenues, and shows the financial feasibility of the proposed Sixteenth Series Bonds.

The operating revenue projections presented earlier in Table 11, Line 35 are summarized in Lines 1 through 3 of Table 17. Revenues from Other Sales projections, which include back-up service charges, technology and economic development rider revenue, and unbilled gas adjustments, are shown on Line 4 of Table 17. These projected revenues are based on PGW's currently effective rate schedules. The DSIC revenue is projected to be $32.9 million in fiscal year 2020 and between $34.9 million and $37.0 million for the fiscal year 2021 through 2025 projected period, as shown on Line 6 of Table 17. As discussed in *Section 8.1.3, Sales and Transportation Revenues*, PGW's collection factor is projected to be approximately 96 percent of billed revenues for fiscal years 2020 through 2025. The associated appropriation for uncollectible reserve is projected to range from negative $30.9 million in fiscal year 2020 to negative $34.2 million in fiscal year 2025 (in prior reports, the appropriation for uncollectible reserve was presented as an expense item for bad debts). The higher level of uncollectibles for PGW relative to other gas utilities is consistent with the higher level of costs associated with social programs for PGW. The projected base rate increase in fiscal year 2021 of $70.0 million is shown on Line 8, as well as an additional base rate increase of $35 million beginning in fiscal year 2024. As previously discussed, the $70.0 million additional revenue in fiscal year 2021 and the $35.0 million of revenue enhancements, cost savings, or base rate increases in fiscal year 2024 are required to achieve the net income levels shown in Table 17. However, there can be no assurance that such increases will be approved in their entirety by the PUC.

Other Operating Revenues presented on Table 17, Line 10 include revenues from sales of energy-related appliance services, field collection charges, and margin from LNG sales. Projected Other Income presented on Table 17, Line 31 includes interest earnings from the different reserve funds.

The projected operation and maintenance expenses shown on Table 17, Lines 12 through 29 are from Table 15. PGW's projected Net Operating Income before interest is summarized on Line 32 of Table 17. Interest expense on existing Bonds and proposed Bonds is presented on Line 33, and the minimum maintenance fee for the Capital Project Notes (for which there are no draws or outstanding balances forecasted) is shown on Line 34. Other interest costs, the loss from refunded debt, and the allowance for funds used during construction ("AFUDC") are shown on Lines 35 through 37. PGW's projected net income is shown on Line 39 of the table and ranges from $72.0 million in fiscal year 2020 to $139.8 million in fiscal year 2025.

Table 17 Projected Statement of Income

(Thousands of Dollars)

Line No.	Description	Fiscal Year Ending August 31, 2020	2021	2022	2023	2024	2025
		$	$	$	$	$	$
	Projected Revenues						
1	Non-Heating	23,007	20,442	19,519	18,713	17,973	17,171
2	Heating	551,409	546,383	544,085	545,139	548,371	549,199
3	Gas Transport Service	62,835	63,914	65,101	66,348	67,680	68,945
4	Other Sales	887	364	506	676	805	960
5	Total Gas Revenues - Existing Rates	638,138	631,103	629,211	630,876	634,829	636,275
6	DSIC Revenue	32,901	34,912	36,928	36,945	36,968	36,982
7	Appropriation for Uncollectible Reserve	(30,927)	(33,101)	(32,369)	(32,435)	(34,144)	(34,202)
8	Net Revenue Increase[(a)]	0	70,000	70,000	70,000	105,000	105,000
9	Total Gas Revenues	640,112	702,914	703,770	705,386	742,653	744,055
10	Other Operating Revenues	19,174	20,125	20,206	21,859	22,944	24,046
11	**Total Operating Revenues**	659,286	723,039	723,976	727,245	765,597	768,101
	Operating Expenses						
12	Natural Gas	195,397	191,548	189,544	191,040	194,269	196,115
13	Other Raw Materials	10	10	10	10	10	10
14	Total Fuel	195,407	191,558	189,554	191,050	194,279	196,125
15	Gas Processing	22,512	21,740	22,918	22,291	22,917	23,545
16	Field Operations	85,188	86,412	88,554	90,765	93,041	95,367
17	Collection	4,383	4,430	4,541	4,654	4,771	4,889
18	Customer Services	15,248	15,751	16,145	16,549	16,962	17,385
19	Customer Accounting	9,206	9,245	9,476	9,712	9,954	10,202
20	Health Insurance	25,340	27,151	29,091	31,171	33,402	35,794
21	Pensions	29,844	23,577	25,808	30,287	28,655	27,429
22	Other Post Employee Benefits	24,732	25,422	31,592	20,795	24,446	22,197
23	A&G and Other Expenses	67,343	69,148	71,040	71,920	75,700	76,289
24	Total Non-Fuel O&M	283,796	282,876	299,165	298,144	309,848	313,097
25	Depreciation	65,602	67,934	73,264	76,516	71,157	71,142
26	Cost of Removal	4,500	4,500	4,500	4,500	4,500	4,500
27	Less: Clearing Accounts	0	0	0	0	0	0
28	**Net Depreciation**	70,102	72,434	77,764	81,016	75,657	75,642
29	**Total Operating Expenses**	**549,305**	**546,868**	**566,483**	**570,210**	**579,784**	**584,864**
30	**Net Operating Income**	**109,981**	**176,171**	**157,493**	**157,035**	**185,813**	**183,238**
31	Other Income	4,369	7,400	6,706	5,897	7,473	7,098
32	**Net Income Before Interest Charges**	**114,350**	**183,571**	**164,199**	**162,932**	**193,286**	**190,335**
	Interest						
33	Long Term Debt	50,520	54,442	51,549	48,512	57,937	54,824
34	Capital Project Notes [(b)]	420	420	420	420	420	420
35	Other	(11,757)	(10,032)	(7,400)	(1,963)	(6,110)	(5,700)
36	Loss From Refunded Debt	4,845	4,460	4,047	3,615	3,348	2,972
37	AFUDC	(1,718)	(2,212)	(2,504)	(2,091)	(1,922)	(1,956)
38	Total Interest	42,310	47,078	46,112	48,493	53,673	50,560
39	**Net Income**[(c)]	**72,040**	**136,493**	**118,087**	**114,439**	**139,613**	**139,775**

(a) Revenue enhancement, cost savings and/or base rate increase. (*See Section 7.1.6*)

(b) Includes assumed cost of Capital Project Notes assuming a minimum annual maintenance fee of $420,000.

(c) Net Income is net of all payments to the City excluding the $18 million Payment to City/Distribution of Earnings.

Table 18, Line 1 presents PGW's cash balance as of September 1 for each fiscal year. From this starting point, the net income line from Table 17 is combined with non-cash adjustments (such as depreciation and amortization) expensed on the Income Statement. External sources of funds are summarized on Lines 9 through 13 and include revenue bond proceeds, and drawdowns on the capital improvement fund. The total for all sources of funds is shown on Line 14 of Table 18.

Uses of funds are summarized on Lines 15 through 23 of Table 18. Line 15 represents the principal payments made on long-term debt. CIP requirements are shown on Line 17, and payments to the City are shown on Line 18. Deposits to CIP Fund are shown on Line 19. Changes in non-cash working capital items, including changes in accounts payable and accounts receivable, are shown on Line 22.

The net increase or decrease in available cash for each fiscal year is shown on Line 23 of Table 18. The ending cash balance for the year, which is the sum of Lines 1 and 23, is shown on Line 24. The ending cash balance for fiscal year 2020 represents approximately 18.7 weeks of operation and maintenance expense (excluding the cost of gas) and the ending cash balances for fiscal years 2021 through 2025 represent from approximately 18.9 to 25.8 weeks of operation and maintenance expense (excluding the cost of gas). These projected year-end cash balances for fiscal years 2021 through 2025 should be sufficient for PGW to accommodate normal fluctuations in expenditures for utility operations.

A detailed calculation of debt service coverage requirements under the 1998 General Ordinance is presented in Table 19. The results presented in the table indicate that, provided the assumptions made herein are realized, PGW will meet the requirements of the 1998 General Ordinance for all years in the projection period.

Table 18 Projected Statement of Cash Flows

(Thousands of Dollars)

Line No.	Description	2020	2021	2022	2023	2024	2025
		Fiscal Year Ending August 31,					
		$	$	$	$	$	$
1	**Beginning Cash Balance**	**124,146**	**101,805**	**113,276**	**108,576**	**122,604**	**142,203**
	Sources of Funds						
	Internal Sources						
2	Net Income	72,040	136,493	118,087	114,439	139,613	139,775
3	Depreciation	65,602	67,934	73,264	76,516	71,157	71,142
4	Amortized Costs[(a)]	(5,206)	(4,855)	(4,456)	(4,043)	(3,757)	(3,584)
5	Earnings on Restricted Funds	(3,491)	(4,708)	(3,988)	(3,159)	(4,715)	(4,320)
6	Bond Proceeds to Pay Issuance Cost	2,600	0	0	0	2,350	0
7	Increased/(Decreased) Other Liabilities	(27,609)	(37,907)	(26,891)	(21,985)	(35,039)	(39,027)
8	Total Internal Sources	103,935	156,957	156,016	161,768	169,609	163,985
	External Sources						
9	Net Revenue Bond Proceeds	240,300	0	0	0	217,050	0
10	Capital Improvement Fund Drawdown	65,009	78,084	88,177	74,039	66,419	67,891
11	Release of Excess Sinking Fund Money	0	0	0	0	0	0
12	Notes	0	0	0	0	0	0
13	Total External Sources	305,309	78,084	88,177	74,039	283,469	67,891
14	**Total Sources of Funds**	**409,244**	**235,041**	**244,193**	**235,807**	**453,077**	**231,877**
	Uses of Funds						
15	Debt Reduction paid on all Bonds	52,870	54,956	55,433	59,165	61,253	64,756
16	Debt Reduction Funding	0	0	0	0	0	0
17	CIP Requirements	119,673	154,084	174,477	145,691	133,919	136,291
18	Payment to City/Distribution of Earnings	18,000	18,000	18,000	18,000	18,000	18,000
19	Deposit to CIP Fund[(b)]	240,300	0	0	0	217,050	0
20	Repayment of Prior Bonds	0	0	0	0	0	0
21	Change in Non-Cash Working Capital[(b)]	742	(3,470)	983	(1,077)	3,258	(80)
22	**Total Uses of Funds**	**431,585**	**223,570**	**248,893**	**221,779**	**433,479**	**218,968**
23	Increase/(Decrease) in Cash	(22,341)	11,471	(4,700)	14,028	19,598	12,909
24	**Ending Cash Balance**	**101,805**	**113,276**	**108,576**	**122,604**	**142,203**	**155,112**

(a) Includes amortization on bond issuance costs and extraordinary losses.

(b) Includes changes in Accounts Payable, Accounts Receivable, and Materials and Supplies.

Table 19 Projected Debt Service Coverage

(Thousands of Dollars)

Line No.	Description	Fiscal Year Ending August 31, 2020	2021	2022	2023	2024	2025
		$	$	$	$	$	$
	SOURCES OF FUNDS						
1	Total Gas Revenues	640,112	702,914	703,770	705,386	742,653	744,055
2	Other Operating Revenues	19,174	20,125	20,206	21,859	22,944	24,046
3	Total Operating Revenues	659,286	723,039	723,976	727,245	765,597	768,101
4	Other Income	2,596	4,904	5,222	4,829	4,680	4,733
5	**Total Sources of Funds**	661,882	727,943	729,198	732,074	770,277	772,835
	USES OF FUNDS						
6	Fuel Costs	195,407	191,558	189,554	191,050	194,279	196,125
7	Other Operating Costs	353,898	355,310	376,929	379,160	385,505	388,739
8	Total Operating Expenses	549,305	546,868	566,483	570,210	579,784	584,864
9	Less: Non-Cash Expenses	(73,083)	(69,157)	(76,765)	(84,545)	(77,603)	(76,412)
10	**Total Uses of Funds**	476,222	477,711	489,718	485,666	502,181	508,452
11	**Funds Available for Debt Service**	**185,660**	**250,231**	**239,480**	**246,409**	**268,096**	**264,383**
12	1998 Ordinance Bonds Debt Service[a]	100,784	106,790	107,718	108,452	113,799	120,191
13	1998 Ordinance Subordinate Debt Service - Twelfth Series	0	0	0	0	0	0
14	**Total Debt Service**	**100,784**	**106,790**	**107,718**	**108,452**	**113,799**	**120,191**
15	**Debt Service Coverage**	**1.84**	**2.34**	**2.22**	**2.27**	**2.36**	**2.20**

(a) Assumes no refunding transaction

9. Potential LNG Plant Expansion

PGW is actively negotiating to add liquefaction to its Passyunk Plant and exploring the expansion of liquefaction capacity of its Richmond Plant. With respect to development at the Passyunk Plant, a term sheet outlining the terms and conditions of a proposed public-private partnership was approved by the Philadelphia Gas Commission and City Council, and PGW is engaged in dialogue with Passyunk Energy Center, LLC and others to finalize binding agreements. The key terms of the proposed relationship with Passyunk Energy Center, LLC may be found as part of the authorizing legislation (City of Philadelphia, Ordinance #181063-A).

There is no assurance that the development at either the Passyunk Plant or the Richmond Plant will be undertaken in the near term, or that the proposed transaction structure will not change. However, PGW does not anticipate a project for which it would incur debt or any incremental capital costs or incur expenses in excess of the revenue PGW estimates it will receive from the LNG expansion. This Report does not consider any potential expansion of the LNG facilities.

10. Assumptions and Opinions

In developing the information which Black & Veatch utilized for preparing the projections presented herein, Black & Veatch relied on PGW's financial planning model and PGW's assumptions contained within that model with several exceptions as noted in this Report. The analyses summarized in this Report are based on assumptions that have been provided by or reviewed by PGW and others and relied on currently available information and present circumstances. Black & Veatch has not conducted verification tests of this information. While Black & Veatch believes that these data and the underlying assumptions are reasonable, actual results may materially differ from those projected, as influenced by the conditions, events and circumstances that actually occur that are unknown at this time and/or which are beyond the control of Black & Veatch. Such factors may include, but are not limited to, PGW's ability to execute the capital improvement plan as scheduled and within budget, regional climate and weather conditions affecting the demand for gas, PGW's ability to obtain the full amount of increased revenue proposed in the 2020 general rate relief filing, PGW's ability to obtain the revenue enhancements, cost savings, or base rate increases in fiscal year 2024 as assumed herein, adverse legislative, regulatory or legal decisions (including environmental laws and regulations) affecting PGW's ability to operate the System, and public health crises such as the COVID-19 pandemic.

10.1. CONSIDERATIONS AND PRINCIPAL ASSUMPTIONS

The following, while not all inclusive, is a list of critical assumptions used in the development of the projections presented herein. Black & Veatch assumes that:

1. The Sixteenth Series Bonds will be issued in one or more series with the proceeds assumed for the purposes of this Report to be used primarily to finance various elements of PGW's ongoing CIP and to potentially refund a portion of PGW's outstanding Gas Works Revenue Bonds (1998 General Ordinance) and terminate the amount of swaps related to the refunded bonds.

2. PGW will continue to operate and maintain the System as described in this Report.

Revenues

1. As set forth by the PUC in its order dated February 22, 2001, the PUC will comply with its statutory obligations pursuant to the Gas Choice Act as it amends the provisions of the Public Utility Code (66 Pa C.S.A. §2212(b)) requiring that the PUC, in determining PGW's revenue requirement and approving overall rates and charges, "follow the same rate-making methodology and requirements that were applicable to [PGW] prior to the assumption of jurisdiction by the [PUC]" and permit PGW to "impose, charge and collect rates or charges as necessary to permit…PGW to comply with its covenants to the holders of any approved bonds." The PUC affirmed this intention in a Policy Statement issued on April 19, 2010.

2. The throughput and revenue figures assume normal weather as established in PGW's general rate order. To the extent that weather is warmer than normal, the resulting contribution to margin revenue will be maintained to the extent that the WNA remains in effect.

3. Projected revenue figures are based on the assumption that PGW will recover, in a timely manner, 100 percent of all gas supply costs (including upstream transportation, upstream storage, and LNG related costs) and 100 percent of the costs (or discounted revenues) attributed to the Customer Responsibility Program, Customer Works Program, Senior Citizen

Discount Program, restructuring transition costs, and costs attributable to PUC mandated programs such as those indicated in Chapters 56 and 59 of the Public Utility Code (less certain avoided costs).

4. PGW's annual appropriation for uncollectible reserve (formerly bad debt expense) will range from negative $30.9 (minimum)to negative $34.2 million (maximum), and PGW's collection factor on billed revenues are assumed be 96 percent, on average, during the projected fiscal year 2020 through 2025 period.

5. If PGW were unable to meet the rate covenant required under the 1998 General Ordinance, PGW would then have to reduce expenditures, develop other sources of Gas Works Revenues, and/or file for and receive timely rate relief.

6. If lost margins resulting from customers' reducing usage due to DSM programs are significant, PGW will file for additional base rate increases.

7. PGW's current DSIC surcharge will allow the recovery of $32.9 million to $37.0 million in annual revenues to fund annual capital improvements in such amount associated with the LTIIP. The Pennsylvania PUC will continue to provide either rate increases or surcharges to fund these expenditures. If the PUC determines that PGW's cast iron main replacement should be accelerated above current levels, the PUC will also provide rate increases or surcharges to fund the additional expenditures.

8. PGW will realize $70.0 million in base rate increases on a levelized annual basis beginning in fiscal year 2021.

9. PGW will realize $35.0 million in revenue enhancements, cost savings, or base rate increases on a levelized annual basis beginning in fiscal year 2024.

Debt Service

1. The debt service and interest costs do not reflect refunding of any outstanding bonds and include a new bond issue of $235 million in fiscal year 2024. If PGW refunds bonds, it is assumed that such refunding will result in a reduction in interest costs and annual debt service from the levels reflected in this Report.

Capital Improvement Program (fiscal years 2021 – 2025)

1. The planned capital improvements will be completed at the levels budgeted, for the projects currently planned and within the timeframe projected. Any additional capital improvements required to meet future regulatory requirements will be made to comply with those regulatory requirements.

2. Projected levels of capital improvements that are paid for by internally generated funds are assumed to comply with PGW's internal policies for financing capital improvements with other funding sources.

City of Philadelphia

1. PGW will make an annual payment to the City in fiscal years 2020 through 2025 of $18.0 million.

10.2. OPINIONS

Based on these analyses and the assumptions set forth or referred to in this Report, Black & Veatch offers the following opinions to indicate PGW's conformance with specific requirements which must be met for the issuance of the Sixteenth Series Bonds, as provided in the 1998 General Ordinance:

1. PGW is a competently managed and operated gas distribution utility. PGW and the System are organized, operated, and maintained at a level equal to, or in excess of, regulatory requirements and generally accepted industry practices. The System is in good operating condition.
2. Based upon Black & Veatch's evaluation of financial projections and certain assumptions with respect to the System which Black & Veatch believes to be reasonable, and on the basis of actual and estimated future annual financial operations of the System, the System should yield Gas Works Revenues (which are pledged under the 1998 General Ordinance) over the amortization periods of the Bonds issued under the 1998 General Ordinance which will be sufficient to: (a) meet all expenses of operation, maintenance, repair and replacement of the System, (b) meet all reserve or special funds required to be established under the 1998 General Ordinance, (c) meet the principal of and interest on all Bonds issued under the 1998 General Ordinance, as the same shall become due and payable, and (d) provide such surplus requirements as are contained in the rate covenant of the 1998 General Ordinance. The Gas Works Revenues forming the basis of this opinion comply with the requirements of the definition of Project Revenues contained in Section 2 of the First Class City Revenue Bond Act.
3. The Gas Works Revenues which are pledged as security for the Bonds issued under the 1998 General Ordinance are currently, and are projected to be, sufficient to comply with the rate covenant set forth in Section 4.03(b) of the 1998 General Ordinance.
4. The capital improvements proposed during the projection period, September 1, 2020, through August 31, 2025, should, along with continued good operation and maintenance practices, enable PGW to maintain the System in good operating condition. Review of present management practices indicates that good operation and maintenance is likely to continue.
5. Contracted PGW gas supplies plus: (a) spot market purchases, (b) anticipated additional contracted supplies plus supplemental gas capacities, as well as, (c) the pipeline transport capacity to move these supplies to PGW, appear adequate to meet PGW's projected demand on a day of maximum demand (a "design peak day"), in an hour of maximum demand (a "design peak hour"), and during a year of maximum demand (a "design peak year").