



SILVERPOINT
CONSULTING LLC

September 5, 2017

Via Electronic Filing

Brinda Westbrook-Sedgwick
Commission Secretary
Public Service Commission of the District of Columbia
1325 G Street N.W., Suite 800
Washington, DC 20008

Re: Formal Case No. 1129
WGL Natural Gas Purchasing Management Audit Report – Public Version

Dear Ms. Westbrook-Sedgwick:

Transmitted for filing is the public version of the Final Report of the Management Audit of the Natural Gas Purchasing Processes and Policies of Washington Gas Light Company prepared by Silverpoint Consulting LLC.

Please do not hesitate to contact me if you have any questions.

Sincerely yours,

Stephanie L. Vavro
Principal, Silverpoint Consulting LLC
Vavro@Silverpointconsulting.com
610-530-7711

**Public Service Commission of the District of Columbia
Formal Case No. 1129**

**Management Audit of the Natural Gas
Purchasing Processes and Policies of
Washington Gas Light Company**

**Final Report
(Public Version)**

Submitted By:



September 5, 2017

Table of Contents

I. Executive Summary.....	1
A. Report Scope and Purpose	1
B. Summary of the Investigation	2
C. Structure of the Report	6
II. Organization and Staffing	7
A. Energy Acquisition Organization.....	7
B. Energy Acquisition Staffing.....	8
C. Conclusions	10
D. Recommendations	11
III. Load Forecasting.....	12
A. Introduction.....	12
B. Demand Forecasting.....	12
C. Design Day Forecasting	15
D. Long-term Sendout Forecasting.....	18
E. Conclusions	19
F. Recommendations.....	19
IV. Capacity Resource Portfolio Planning.....	20
A. Introduction.....	20
B. WGL's Current Portfolio	20
C. Capacity Resource Planning During the Audit Period.....	26
D. Future Planning Considerations	32
E. Conclusions	34
F. Recommendations.....	36
V. Natural Gas Planning and Procurement	37
A. Introduction.....	37
B. Gas Planning	37
C. Gas Purchasing.....	42
D. Risk Management and Hedging.....	44
E. Conclusions	49
F. Recommendations.....	49
VI. Asset Optimization and Revenue Sharing	50
A. Introduction.....	50
B. Primary Roles and Responsibilities.....	51
C. Policies and Procedures.....	53
D. Management Oversight and Controls	56
E. Asset Optimization Program Results.....	58
F. Revenue Sharing.....	60
G. Conclusions.....	61
H. Recommendations.....	62

Appendix A – Confidential Material

I. Executive Summary

A. Report Scope and Purpose

Washington Gas Light Company (WGL or Company) is a natural gas distribution company serving more than 1.1 million customers in Washington, D.C., Maryland, and Virginia. In addition to providing gas distribution service, WGL is the default provider of natural gas supply for those customers who have not selected a competitive supplier.¹ WGL is a subsidiary of WGL Holdings, Inc. (WGL Holdings), a public utility holding company with approximately \$5 billion in assets and \$2.7 billion in annual revenues. WGL Holdings has both regulated and non-regulated businesses, and is involved in natural gas distribution, pipelines, and storage, as well as retail energy marketing, midstream services, and commercial energy systems.

In its March 12, 2015 Order No. 17826, the Public Service Commission of the District of Columbia (Commission) opened an investigation into the default natural gas service that WGL supplies to customers through the Purchased Gas Charge (PGC). The Commission found that an independent audit of the PGC was warranted to ensure that rates being charged for default gas supply service are just and reasonable. In its subsequent May 13, 2015 Order No. 17878, the Commission proposed a scope of work for two distinct audits: (1) a management audit to review WGL's purchasing processes and policies for the acquisition of default gas supply, and (2) an agreed-upon procedures audit that would focus on the calculation of the PGC and of asset management costs and revenues.² The Company issued the approved Request for Proposal (RFP) for the audits in February, 2016.

The Commission's objectives for the management audit were set forth in the RFP scope of work:

- Determine whether the Company's purchasing policies and processes are sufficient to meet its natural gas supply requirements for default supply.
- Determine whether the Company's procurement planning is sufficient to ensure reliable supply for the default supply program at optimal prices that are fair, just, and reasonable.
- Determine whether the Company reviews its existing and potential supply plan for improvements and for consistency with its long-term strategic supply plan, and assess the effectiveness of that review process.
- Determine how the Company's natural gas purchasing process compares to the best practices of other natural gas distribution companies in the region.
- Gather and review data and information on the Company's asset management and revenue sharing practices across its entire network.

By Order No. 18640 dated December 16, 2016, Silverpoint Consulting LLC (Silverpoint) was selected to perform the management audit of natural gas purchasing policies and procedures.

¹ The 2016 Annual Report states that 16% of WGL's customers purchase gas from third party suppliers.

² Order No. 17878 was subsequently amended by Order No. 17951, dated August 28, 2015.

B. Summary of the Investigation

The Silverpoint team conducted a comprehensive audit of WGL's natural gas purchasing-related functions, including demand forecasting, natural gas procurement, and capacity resource planning. We also examined in considerable depth the Company's asset optimization program, and gathered information on net proceeds and revenue sharing levels during the five year audit period. The primary objective of our investigation was to ascertain whether WGL's planning and procurement practices are sufficient to ensure reliable supply for default gas customers at prices that are fair, just, and reasonable. In the course of our review, the team submitted over one hundred document requests and conducted more than a dozen in-depth interviews. We found Company personnel to be candid and forthright in their responses to our inquiries, and we appreciate their assistance and cooperation throughout the engagement.

The most unusual aspect of the Company's natural gas procurement function is its asset optimization program and relationship with Vega Energy Partners, Ltd. (Vega). The program has yielded considerable proceeds during the audit period, and is far more advantageous to ratepayers than typical asset management agreements, which are the current industry standard. Natural gas planning and procurement are in fact relatively static utility functions, with few opportunities for innovative approaches, WGL's asset optimization program being a notable exception. We hesitate, however, to label that program a "best practice," since it cannot be readily implemented by other utilities on a widespread basis.³ As we examined other procurement-related functions, Silverpoint considered whether WGL's processes and activities were consistent with good utility practice, ultimately concluding that they compared favorably with other utilities in the region. "Good utility practice" as we use that term in this report means standard practices that lead to good, solid, workmanlike results.

Silverpoint found that the Energy Acquisition group effectively plans for and procures natural gas for default service, and that its policies and processes are sufficient to meet the objectives of WGL's natural gas supply requirements. Group personnel proactively manage the Company's capacity resource portfolio, and effectively review existing and potential supply plans for improvements. Our primary concern during the audit had to do with the limited availability of supporting documentation for capacity resource and gas supply planning. The lack of written procedures, analysis, and similar documentation hampered our ability to evaluate past decisions in their proper context at the time. The culture within the Energy Acquisition group is to rely on institutional memory rather than create or retain work papers and formal documentation. This tendency is not unusual, however. While most utilities do a reasonably good job documenting decision-making in areas like operations or engineering, they are often less diligent with functions like gas supply. WGL's Energy Acquisition group is, however, responsible for roughly \$400 million of gas commodity purchases and nearly \$200 million of capacity resource demand charges each year. Given the importance of this group's activities, we strongly recommend the Company improve its documentation of capacity portfolio and gas planning analysis and decision-making.

³ The term "best practices" refers to leading-edge practices that, over time, become the new standard as they are more widely adopted. When conducting comprehensive reviews of utility operations, we generally expect to find a combination of good utility practices and best practices.

Findings and Conclusions

Organization and Staffing

Silverpoint's audit centered on the Energy Acquisition group, which plans for and procures natural gas for default service and manages WGL's portfolio of pipeline capacity, storage service, and peaking service contracts. During our discussions, we found group personnel to be very knowledgeable about natural gas industry dynamics, gas supply, and interstate pipelines, and to possess an in-depth understanding of the characteristics and operating requirements of WGL's distribution system. We believe the Energy Acquisition group possesses the appropriate skills to ably manage WGL's natural gas purchasing-related functions, including load forecasting, capacity resource portfolio planning, and natural gas planning and procurement.

Load Forecasting

Silverpoint examined the Company's procedures for developing demand and design day forecasts, which are critical inputs to the capacity resource portfolio planning process. We found that the Energy Acquisition group has a well-developed understanding of the assumptions underlying these forecasts, and effectively manages the development process. WGL utilizes suitable analytical techniques and appropriately sophisticated models to develop its forecasts. The Company's approach compares favorably with good utility practice, and its forecasting results have proven to be reasonably consistent and accurate over time.

Capacity Resource Portfolio Planning

Silverpoint found that the Company has a sound overall strategy for its capacity resource portfolio that appropriately balances reliability, flexibility, and cost minimization objectives. The Company maintains a diverse mix of contracts for long-haul pipeline capacity, storage, and peaking services, and takes advantage of seasonal options to help reduce excess capacity during non-winter months. Consistent with good utility practice, Energy Acquisition personnel are well-informed about industry supply and demand developments and actively engaged in tracking the continuously evolving natural gas market. Group personnel routinely review the Company's existing portfolio plan for possible improvements. During the audit period, WGL realigned the portfolio to take advantage of changing gas supply markets, and identified and acted upon appropriate open season opportunities that will enable the Company to meet future firm demand.

The Energy Acquisition group routinely collaborates with other WGL departments to assess the feasibility of available capacity portfolio alternatives. The detailed gas distribution system model maintained by WGL's system planning organization is an important and reliable tool in this analytical process. Beyond growing demand, WGL's capacity resource planning over the next few years will be influenced by the need for significant system expansion investments to maintain system integrity. Overall, the Silverpoint team concluded that the Energy Acquisition group has effective planning practices, although we felt it maintained inadequate documentation to support its analysis and decision-making process.

Natural Gas Planning and Procurement

Silverpoint found that the Energy Acquisition group utilizes appropriate methods and analytical tools to support daily and monthly forecasting and gas supply design activities, and its supply plans are quickly adaptable to changes in the market and in demand. Consistent with standard

• • ————— • •

industry practice, WGL provides default gas supply through winter season contracts, monthly base load contracts, daily purchases, and storage withdrawals, and it purchases most gas on an open exchange at market index-based prices. The Company's policy of utilizing storage gas to keep default gas supply cost relatively stable throughout the month is appropriate and consistent with overall cost minimization objectives. During the audit period, the Energy Acquisition group procured competitively priced, reliable default gas supply while maintaining a balanced, flexible, and diverse portfolio of suppliers. The Company also has comprehensive policies and procedures in place to effectively manage the credit and market risk associated with its gas procurement activities. We believe WGL's decision to suspend its hedging programs during the audit period was justifiable, given the relative stability in market prices. Overall, Silverpoint found WGL's natural gas planning and procurement policies and practices to be sufficient to ensure reliable default gas supply at a just and reasonable cost.

Asset Optimization and Revenue Sharing

WGL's asset optimization program has been extremely effective in generating significant benefits for ratepayers, with a tenfold increase in net proceeds over the last decade. The program allows WGL to take full advantage of Vega's expertise with natural gas markets to monetize its temporarily idle capacity resources. Silverpoint found the asset optimization program to be well designed and well managed. Sound, comprehensive policies, procedures, and controls are in place, and defined roles and responsibilities of corporate personnel and Vega ensure adequate segregation of duties. Protocols for communicating program entitlements are appropriate and enable Vega to be more proactive in identifying potential market opportunities.

In addition to working on behalf of WGL, Vega also serves as agent for assets owned by the Company's non-regulated affiliate, WGL Midstream, Inc. (WGL Midstream), and has equity interests in certain pipeline projects. During our review, Silverpoint confirmed that the Company has instituted adequate separation between the WGL and WGL Midstream asset optimization programs to safeguard against potential conflicts of interest. WGL Holdings recently implemented a yearly audit of Vega to monitor the adequacy of controls to ensure that Vega's transactions are at arm's length and that WGL Midstream assets are not given preferential treatment over those of WGL.

Recommendations

In this executive summary, we provide a brief overview of Silverpoint's key recommendations, which deal with improving documentation of capacity resource and gas supply analysis, formalizing Energy Acquisition group cross-training efforts, confirming the benefit of sole reliance on Vega for the asset optimization program, and reassessing the extent of WGL's no-notice storage service. We discuss the basis for these recommendations more fully in later chapters of this report.

Improve documentation of capacity portfolio planning analysis and decision-making. Silverpoint did not identify instances in which we believe that the Company made incorrect capacity portfolio planning decisions. However, in the absence of written analysis or similar documentation, we could not verify that decisions made were the best available at the time. In our view, the Energy Acquisition group relies too heavily on institutional memory. We were concerned by the lack of rudimentary documentation, and it was unclear when and how senior

• • ————— • •

management reviewed and approved key decisions. WGL also has no formal written guidelines, procedures, or policies that would provide a useful context for assessing management decisions or judging the thoroughness of its analysis. As a remedy, WGL should develop and implement guidelines for the maintenance of supporting documentation.

Develop written procedures for monthly and daily gas planning activities. While Silverpoint found that the Energy Acquisition group utilizes appropriate methods and analytical tools to support its daily and monthly forecasting and supply design activities, its procedures and practices are not formally documented. The effectiveness of WGL's gas planning therefore relies on the collective knowledge and learned experiences of Energy Acquisition personnel. Daily gas supply forecasting and planning are more art than science. Without written documentation such as guidelines, instructions, and checklists, it would be very difficult for a new WGL team member to learn the activities associated with daily and monthly gas planning.

Update the no-notice requirements study and reassess the level of no-notice storage service. The primary purpose of no-notice service is to avoid penalties from pipelines or gas suppliers for differences between daily gas nominations and actual requirements. With no-notice storage service, a utility is not required to submit a nomination for injections or withdrawals; this type of service is, however, typically more expensive than regular firm storage paired with transportation. Approximately 80 percent of the Company's current firm storage capacity is no-notice service, which, based on a study from 2012, is considerably more than the minimum necessary to serve firm customers. Given the continued growth in customer demand, WGL should update its no-notice requirements study and reevaluate the level of no-notice service.⁴

Formalize Energy Acquisition group cross-training and development efforts. Utilities invest considerable time and resources developing knowledgeable and capable employees, but most do not have an explicit strategy for maintaining institutional memory. WGL faces the same challenges with a graying workforce as other utilities in the region. Currently, there is a reasonably good overlap in skills among employees in the Energy Acquisition group, but cross-training efforts are rather informal. While additional cross-training may result in some redundancy, it is nonetheless worthwhile given the importance to WGL and its customers of maintaining efficient and effective gas supply functions.

Continue to monitor the industry for alternatives to the Vega relationship. Although the Vega relationship has been a highly successful one for WGL customers, the Corporate Asset Optimization group should nonetheless periodically investigate what other asset managers are participating in the market and explore whether they would have an interest in operating in a collaborative relationship. Only then can WGL assess and confirm that continuing the Vega relationship remains in the best interest of customers. It should be noted that its extensive history and intimate knowledge of the WGL assets play no small part in Vega's ability to maximize the portfolio's optimization value. If Vega were to be replaced, WGL and its customers would most certainly experience a reduction in net proceeds from the asset optimization program for some time.

⁴ As discussed further in Chapter IV, Silverpoint identified no immediate opportunities for savings.

C. Structure of the Report

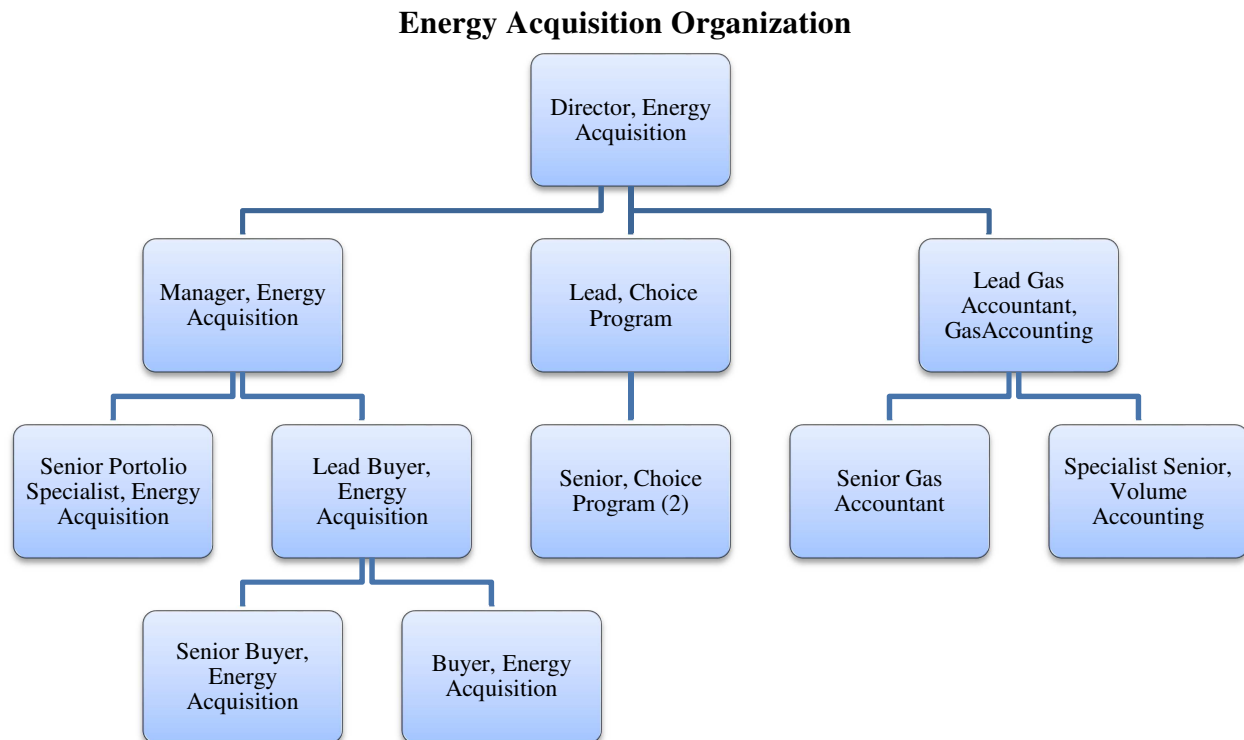
This report has six chapters. Chapter I provides an introduction and executive summary. In Chapter II, we provide an overview of the Energy Acquisition group, including current staffing and experience levels. Chapter III contains our assessment of the Company's load forecasting efforts, including development of demand and design day forecasts. The team discusses our evaluation of capacity resource planning in Chapter IV, and WGL's natural gas planning and procurement activities in Chapter V. In Chapter VI, we present a detailed discussion of WGL's asset optimization program and revenue sharing mechanism.

Our discussions in Chapters IV, V, and VI make reference to, but do not reveal, confidential information. All confidential information is contained in Appendix A, which has been redacted in its entirety in the public version of this report.

II. Organization and Staffing

A. Energy Acquisition Organization

The Energy Acquisition group plans for and procures natural gas for default service, and manages WGL's portfolio of pipeline capacity, storage service, and peaking service contracts. It is part of a broader Energy Acquisition organization that contains two other separate but related functional groups, Choice Program and Gas Accounting. The Choice Program group manages the WGL delivery service program and serves as the primary liaison with competitive service providers (CSPs). Gas Accounting administers back office functions for gas purchasing, transportation, and storage activities as well as physical asset optimization transactions. The chart below illustrates the current positions in the Energy Acquisition organization.⁵

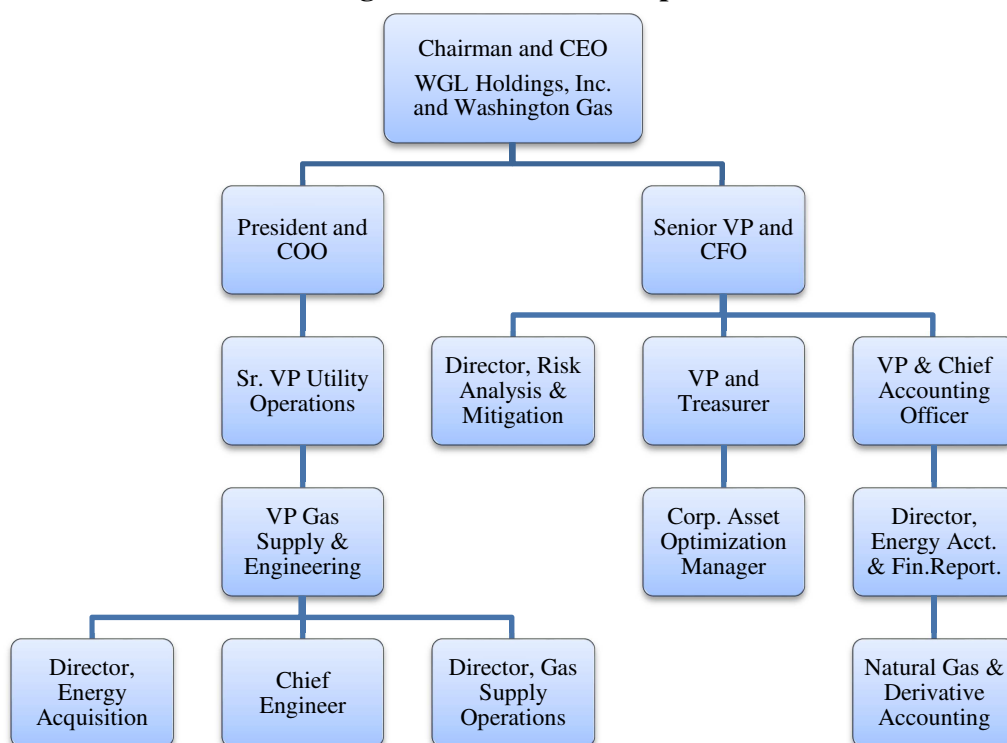


The Director of Energy Acquisition reports to the President and Chief Operations Officer (COO) through the Vice President of Gas Supply & Engineering and the Senior Vice President of Utility Operations. Beyond the utility operations organization, certain corporate finance departments have a key role in WGL's default gas supply function. The Corporate Asset Optimization group, which reports to the Senior Vice President and Chief Financial Officer (CFO) through the Vice President and Treasurer, manages WGL's asset optimization program and financial hedging activities. The Risk Analysis & Mitigation group, which reports directly to the CFO, manages the credit and market risk functions for WGL's capacity portfolio contracts, commodity

⁵ Responses to Data Request #56 and Data Request #58. Until recently, the Choice Program group was called Capacity Administration, and the Gas Accounting group was called Back Office Administration.

procurement, and asset optimization activities. The following abridged organization chart illustrates the structure of the relevant utility operations and finance departments within WGL.⁶

WGL Organization – Select Departments



B. Energy Acquisition Staffing

Silverpoint reviewed the written job descriptions for the twelve members of the Energy Acquisition organization, and found the positions to be appropriately defined and well-detailed in terms of specific tasks and responsibilities.⁷ WGL recently changed the name of two groups in the Energy Acquisition organization and updated titles for most positions (*e.g.*, Supervisor of Sourcing and Optimization became Lead Buyer), but has not yet revised job descriptions to reflect these naming changes.

Job descriptions for the Director, Energy Acquisition and the five employees in the Energy Acquisition group in particular adequately encompass responsibilities of the utility gas supply function, which include the following:

- Oversight of the load forecasting process, including the design day forecast
- Long-term and short-term capacity and commodity planning, strategy, and management
- Negotiation and management of firm transportation, storage, and peaking contracts

⁶ Response to Data Request #1.

⁷ Responses to Data Request #56 and Data Request #58.

- Short-term (*e.g.*, monthly, daily) forecasting
- Procurement functions including trading, nominating, balancing, and scheduling
- Coordinating supply operations with Corporate Asset Optimization and WGL's agent
- Updates to the five-year portfolio plan
- Coordination with the gas control and dispatch functions to forecast system requirements
- Planning and execution of physical storage hedging strategies
- Management of problem resolution with interstate pipelines.

Although comprehensive, most job descriptions should be updated. Many refer to the selling of gas, which is no longer performed by the Energy Acquisition group.⁸ Effective October 2015, oversight of the gas control function to ensure 24/7 monitoring of the distribution system and associated facilities shifted from the Director of the Energy Acquisition organization to the Director of Gas Supply Operations, a fact not reflected in the former's job description.⁹ Also, until recently, the staffing of the Energy Acquisition group included a vacant analyst position. Due to budget limitations, WGL eliminated the position and divided those responsibilities among remaining employees.¹⁰ Job profiles have not been updated to reflect these changes.

Silverpoint reviewed the qualifications, prior experience, and educational background of the twelve current members of the Energy Acquisition organization, summarized in the following table, and found the skills and abilities to be consistent with the requirements of each position.¹¹

Energy Acquisition Organization

Position Title	Years of Experience		Degrees
	WGL	Industry	
Director, Energy Acquisition	31	31	B.A.
Manager, Energy Acquisition	6	13	B.S.; MBA
Senior Portfolio Specialist	16	16	
Lead Buyer	26	26	B.A.; MBA
Senior Buyer	15	15	
Buyer	1	6	B.A.
Lead, Choice Program	6	11	B.S., M.S.
Senior, Choice Program	5	13	B.S.; M.S.; MBA
Senior, Choice Program	12	12	B.S.
Lead Gas Accountant	9	24	B.A.
Senior Gas Accountant	13	23	B.S.
Specialist, Volume Accounting	14	14	B.S.

⁸ As noted in Chapter VI, the Energy Acquisition group no longer engages in off-system sales; as such, any reference to selling gas in Lead Buyer, Senior Buyer, and Buyer job descriptions is obsolete.

⁹ Responses to Data Request #56 and Data Request #105.

¹⁰ Interview #5.

¹¹ Responses to Data Request #57 and Data Request #59.

The last audit of the Energy Acquisition organization by the Company's Internal Audit group was performed in 2012. The stated purpose of that audit was to assess business risks and internal controls for certain processes, policies, and procedures related to capacity planning, sourcing and optimization, Vega contract compliance, and capacity administration, as well as the accuracy of various back office administrative and accounting functions. The Internal Audit group determined that controls were adequate to manage significant business risks, and identified a few relatively minor areas for improvement.¹²

Silverpoint's audit does not encompass the entire department but rather centers on procurement-related functions performed primarily by the Energy Acquisition group. During the conduct of the investigation, the Silverpoint team found group personnel to be very knowledgeable about interstate pipelines and natural gas supply, as well as the dynamics of the natural gas industry as a whole. We found employees to possess the appropriate skills to perform everyday activities such as daily planning and purchasing of swing gas, as well as longer-term predictive functions such as load forecasting and capacity portfolio planning. Also, since three members came from the gas control organization, the Energy Acquisition group has a sophisticated understanding of the operating characteristics of WGL's distribution system and the requirements of its customers.

The Energy Acquisition organization has process flow diagrams for certain activities like commodity and capacity purchasing, but like most utilities relies primarily on institutional knowledge.¹³ WGL faces the same challenges with a graying workforce that other utilities do—nearly 65 percent of its workforce is eligible for retirement within four years.¹⁴ Promoting knowledge transfer through cross-training, where in effect no one person is solely responsible for anything, is particularly important in the event of the loss of any employee due to retirement, transfer, or resignation. Currently, there is a reasonably good overlap in skills among employees in the Energy Acquisition group, and cross-training efforts are rather informal.¹⁵

C. Conclusions

1. The staffing and experience level of the Energy Acquisition group are sufficient and consistent with its role and functional responsibilities.

Consistent with other utilities, related gas supply functions such as forecasting, gas procurement, and capacity resource planning are managed within the same WGL department. Silverpoint found the Energy Acquisition group to be well organized and staffed by individuals with appropriate utility and subject matter background and expertise.

¹² Response to Data Request #19. Audits are performed based on the Company's annual risk assessment, but generally every three to five years at a minimum. The Energy Acquisition group is currently being audited by both internal and external auditors.

¹³ Response to Data Request #52. Other Energy Acquisition organization procedures include volume confirmation and balancing, invoice processing for natural gas, pipeline, peaking, and hexane purchases, capacity administration, and month-end closing.

¹⁴ Interview #4.

¹⁵ Response to Data Request #60.

D. Recommendations

II-1 Update job descriptions and related documents to reflect current titles and responsibilities.

Many job descriptions have not been updated in quite some time. Some refer to functions and responsibilities that are no longer relevant, or may not reflect current responsibilities after the Energy Acquisition group was downsized. WGL also recently revised employee titles and group names in the Energy Acquisition organization that appear in corporate policies and similar documents, which should also be updated.

II-2 Formalize employee cross-training and development efforts.

Utilities invest a lot of time and resources developing knowledgeable and capable employees, but typically do not have an explicit strategy for capturing, recording, and maintaining institutional memory. The Energy Acquisition group is responsible for roughly \$400 million of gas commodity purchases per year and nearly \$200 million per year of capacity resource demand charges. While cross-training may result in some redundancy, it is nonetheless worthwhile given the importance to WGL and its customers of maintaining efficient and effective gas supply functions.

III. Load Forecasting

A. Introduction

Dependable and accurate predictions of customer demand are critical to a utility's planning process. The amount and timing of customer usage throughout the year drives a utility's strategy for its capacity resource portfolio and, to a lesser extent, its strategy for commodity procurement. Demand forecasts provide two key inputs—number of customers and usage per customer per degree day—that are necessary to develop dependable design day estimates. The design day forecast, in turn, informs a utility how much pipeline, storage, and peaking capability are required to reliably serve customers during a twenty-four hour period of extremely high demand.

During its review, Silverpoint compared WGL's forecasting practices to those of other utilities in the region. Unlike other activities, there is considerable publicly available information about utility demand and design day forecasting. Many utilities routinely submit gas supply cost filings or long-range supply plans to regulators that describe their forecasting methodologies in some detail.¹⁶ Good utility practice for demand forecasting requires the use of econometric modeling to develop predictions of customer growth and customer usage patterns based on historical data for each rate class. Models based solely on past behavior are usually insufficient, however. Demand forecasts should also reflect prospective changes in local economic or demographic factors, as well as the effects of third party suppliers, energy efficiency, and conservation initiatives. In a similar vein, good utility practice for design day forecasting dictates the use of regression models to develop a dependable estimate of peak sendout requirements based on historical weather data, adjusted to reflect current customer and usage levels. Demand and design day models should both be subjected to statistical testing and back-tested to actual experience, where possible, to ensure good predictive value.

B. Demand Forecasting

Due to residential and commercial real estate development, WGL continues to see significant yearly demand growth.¹⁷ In each of the last several years, the utility has added roughly 12,000 new customer meters; growth during fiscal year 2016 is summarized on the following table.¹⁸

New Customer Meters - Year Ended September 30, 2016

Jurisdiction	Residential	Commercial and Interruptible	Group Metered Apartments	Total
District of Columbia	524	150	41	715
Maryland	6,147	346	13	6,506
Virginia	4,613	380	7	5,000
	11,284	876	61	12,221

¹⁶ Management audit reports required by statute in NY, NJ, and PA can also provide further insights. Some practices are prescribed by regulators and are not necessarily requirements of good utility practice.

¹⁷ Interview #3.

¹⁸ WGL Holdings, Inc., 2016 Annual Report.

The demand growth has been tempered, however, as a result of a reduction in usage per customer; over the years, that rate has been dropping due to energy conservation initiatives (*e.g.*, insulated windows and better insulation) and more energy efficient customer equipment.

The Energy Acquisition group is responsible for managing the load forecasting process. While WGL's planning activities continue year round, the demand forecasting portion of the process starts in April, when WGL's marketing group updates its retail meter projections. Around the same time, the Company's consulting firm begins to update its demand and design day models, delivering forecasts in June for review and input from WGL. These forecasts are finalized in September, by which time the Energy Acquisition group has finished its capacity resource plan for the upcoming winter season. The Company's five-year portfolio plan is subsequently completed and filed with the Commission in early December.¹⁹

For over twenty years, WGL has employed the consulting firm Energytools, LLC (Energytools) to perform the econometric modeling associated with its forecasting activities. The firm's model uses a separate regression analysis to determine demand for each rate class in WGL's three jurisdictions (*e.g.*, thirteen in the District of Columbia). The demand for each rate class reflects all customers, including those served by competitive providers. Each regression uses historical data to develop a five-year annual demand forecast, by month, based on "normal" weather.²⁰ Normal weather conditions are based on a thirty-year average of actual weather data.²¹ The source of the data is WGL's normal weather study, updated every quarter, which reflects customer and consumption data such as number of bills, actual consumption, and degree days. Since the effects of energy efficiency and conservation are reflected in the historical data, they are ultimately reflected in the monthly forecasts.²²

The Energytools customer usage analysis emphasizes weather and its effects on demand. Temperature is the primary model weather variable, as the firm has found no way to reliably reflect in the model factors such cloud cover or wind. A WGL customer's usage per degree day changes based on month, and this characteristic is reflected in the model's equations for each rate class. Demand for some rate classes can be represented by a different usage level each month, for example, while others are represented by a monthly base level of usage plus an additional amount that varies during non-summer months.²³

When market prices for gas were higher and more unpredictable, the WGL model included gas variables to measure price elasticity. This dimension was added to the model by Energytools in the early 2000s in response to Wall Street's desire to see the effect on demand of the price of gas. Now that current price forecasts are relatively flat, these variables have an inconsequential effect

¹⁹ Interview #8.

²⁰ Interview #13. Demand forecasts are based on WGL's fiscal year ending in September.

²¹ Interview #3 and response to Data Request #31. Normal weather for District of Columbia rate classes is based on a static 30-year average value as required by the Commission; for Virginia and Maryland rate classes, the model derives the average using a regression that incorporates a trend variable.

²² Interview #13.

²³ Interview #13.

on results and have mostly dropped out of model equations.²⁴ While some gas utilities in the region model more than one group of customers in a given rate class (*i.e.*, large versus small customers), ostensibly to create a better fit to actual demand, such distinctions are not relevant for WGL. Its commercial rate classes already reflect size, and while there were once separate residential rate classes based on size in some jurisdictions, they have now been recombined.²⁵

Gas utilities in states such as New York, Massachusetts, Rhode Island, and Ohio incorporate demographic and/or economic data into their demand forecasting models (*e.g.*, Moody's data on household income and housing stocks). Economic factors can be particularly important for predicting growth of industrial rate classes. Unlike most of these utilities, however, WGL has no large electric generating plants in its service territory, and the only true industrial customers are the University of Maryland and the National Institutes of Health.²⁶ Rather than modeling economic factors for its residential and commercial rate classes, WGL routinely solicits insight on the local and regional economy from its long-time advisor, Dr. Stephen Fuller of George Mason University; the Company's marketing group then fine tunes the model forecast of growth to reflect actual trends in WGL's service territory. The revised forecast therefore mirrors what the WGL marketing department believes it can accomplish in terms of customer growth, although the difference between the two forecasts is relatively small.²⁷

The WGL demand model has evolved over time, and Energytools continues to evaluate opportunities to improve it.²⁸ Energytools ensures the accuracy of its forecast using statistical tests, and believes that its regression model has proven to be very reliable and highly predictive, with high R-squared values for each rate class. During the audit, Silverpoint examined sample model outputs from the most recent forecast cycle and reviewed the results of various types of statistical tests performed for each rate class result, such as the Durbin-Watson statistic to test for auto-correlation, for which the model corrects.²⁹

In terms of back-testing, Energytools compares actual customer billing numbers to its estimate of number of customers, and has found its model to be fairly accurate. The firm also compares predicted usage per customer to actual usage. Although this comparison is less useful because of the inherent variation in weather, Energytools found there was no inherent bias in the variation between predicted and actual values.³⁰ WGL marketing and finance groups also evaluate the accuracy of forecasts by comparing them to actual experience.³¹

²⁴ Interview #3 and Interview #13. Many utilities in the region still incorporate energy or gas prices in their demand analysis.

²⁵ Interview #13.

²⁶ Interview #3.

²⁷ Interview #13. The model forecast is first converted from number of customers to number of customer meters, which is the format used by the marketing department.

²⁸ Interview #13.

²⁹ Interview #13 and response to Data Request #94.

³⁰ Interview #13.

³¹ Interview #3.

C. Design Day Forecasting

The concept of a design day forecast for gas utilities—the maximum volume of gas a system would have to send out in a twenty-four hour period under extreme weather conditions—is similar to reliability standards for electric utilities.³² The planning criteria for a gas utility are considerably more stringent, however, given the considerable cost of re-lighting customers in the event of a service disruption.³³ WGL’s design day represents the maximum anticipated demand on the system during a 24-hour period assuming a five degree Fahrenheit average daily temperature, 60 heating degree days (HDDs), and an average wind speed of 17 miles per hour.³⁴ These are the coldest conditions that WGL expects to occur in the Washington D.C. region, based on historical weather data in its service territory.³⁵ To predict what its sendout requirements would be at design day conditions, WGL’s consultant, Energytools, performs a regression analysis. As input to this analysis, WGL assembles data on the top 25 sendout days that the utility has experienced in its history.³⁶ Interestingly, the Company’s most recent design day—January 19, 1994 with 60 HDDs—is no longer among these top 25 days because of system growth.³⁷

The Energytools design day forecast model utilizes data such as the number of customer meters, average daily base load, and daily high and low temperatures during WGL’s 25 peak sendout days to predict what sendout requirements will be at design day conditions.³⁸ The delta between the high and low temperature of the day is an important variable, since customers behave differently on days with significant temperature spreads compared to those of consistent cold.³⁹ The regression model adjusts historical sendout data to reflect current demand forecasts for number of meters and usage to derive design day sendout requirements.⁴⁰ The model adjusts the

³² Resource adequacy under the North American Electricity Reliability Corporation (NERC) reliability standards for electric utilities is determined based on ‘one day in ten year’ loss of load criteria.

³³ For example, in a long-range resource and requirements plan filed in Massachusetts, a utility estimated potential re-light costs at \$1,069 per customer based on its experience in outage restoration. That estimate did not take into account potential customer costs of disruption such as repair of freeze-up damage or loss of business.

³⁴ A heating degree day is the number of degrees that a day’s average temperature is below 65 degrees Fahrenheit.

³⁵ Design days within recent history were January 17, 1982 and January 19, 1994.

³⁶ A sendout day is defined at 10 a.m. to 10 a.m. the next day. The oldest of the top twenty-five days is in 2004. The top 25 sendout days are not necessarily the top 25 coldest days, although there is considerable overlap.

³⁷ WGL’s sendout on January 19, 1994 for slightly less than one million customers was 1.341 million dekatherms; by contrast, total sendout on the greatest throughput day last winter, January 18, 2016, was 1.572 million dekatherms.

³⁸ Average daily base load is defined as the average of daily usage during June, July, and August.

³⁹ Interview #13.

⁴⁰ Energytools utilizes the current customer meter forecast that was updated by WGL’s marketing group.

historical data to remove the effects of conservation and reflect the impact of more energy efficient homes that requires lower capacity heating equipment for the same design conditions.⁴¹

The most recent design day forecast, reflected in the 2017-2021 Portfolio Plan, is summarized in the following table.⁴²

Design Day Forecast (Dth)		
Heating Season	Total System Demand	Absolute Growth
2016-17	1,986,000	25,000
2017-18	2,002,000	16,000
2018-19	2,019,000	17,000
2019-20	2,036,000	17,000
2020-21	2,054,000	18,000

Design day requirements represent total firm demand, including default gas supply, as well as gas supplied to firm choice customers. The Energy Acquisition group also produces a ten-year version of the design day forecast that it uses for longer-term capacity resource planning.⁴³

Energytools performs a type of Monte Carlo analysis on the results of its design day modeling to evaluate the effect of the inherent uncertainty associated with certain model assumptions.⁴⁴ The most recent analysis predicted that design day demand for the 2016-17 heating season would be between 1.852 and 2.084 million dekatherms with a 95 percent degree of confidence—consistent with the 1.986 million dekatherm design day forecast. The analysis supports the 5 to 6.5 percent reserve margin that WGL applies to its design day capacity as required by the Maryland Commission.⁴⁵ Energytools also performs a sensitivity analysis of variables that affect design day—average daily temperature, base load, number of meters, and conservation factor—and models the impact of a ten percent increase in each.⁴⁶

⁴¹ Response to Data Request #95. In its annual gas cost review in North Carolina, Piedmont Natural Gas noted that the industry has seen no evidence that conservation occurs during design day conditions. The forecast is more conservative with the effects of conservation removed.

⁴² Response to Data Request #5.

⁴³ Interview #3. The Energy Acquisition group uses the growth rate in the last year of the five-year forecast to project later year demand levels.

⁴⁴ Monte Carlo simulation performs risk analysis by substituting a probability distribution of values for any factor that has inherent uncertainty. It calculates results using values sampled at random from input probability distributions. The results of thousands of iterations form a probability distribution of possible outcomes.

⁴⁵ Interview #3. The reserve margin in the 2017-2012 Plan is 5 percent of design day requirements of 1.986 million dekatherms, or 99,300 dekatherms.

⁴⁶ Interview #3. The analysis is required by the Maryland Commission and included in the District of Columbia Portfolio Plan for informational purposes.

After finalizing the design day study, Energytools makes a formal presentation to WGL personnel, summarizing primary assumptions and current approach, and reviewing the impact of relevant variables in its regression analysis. It discusses the current design day estimate and the reliability of results based on its statistical testing, and compares results to prior year estimates.⁴⁷ Energytools performs no explicit after-the-fact testing of the design day model. The firm does, however, reconcile the current five-year design day forecast to the prior year's model, and the differences are generally quite small.⁴⁸ A comparison of the five-year design day forecasts during the audit period is summarized in the following table.⁴⁹

Comparison of Five Year Design Day Forecasts

<i>Fiscal Year</i>	<i>2013-2017 Plan</i>	<i>2014-2018 Plan</i>	<i>2015-2019 Plan</i>	<i>2016-2020 Plan</i>	<i>2017-2021 Plan</i>
2012-13	1,855,000				
2013-14	1,872,000	1,880,000			
2014-15	1,890,000	1,901,000	1,938,000		
2015-16	1,908,000	1,923,000	1,964,000	1,961,000	
2016-17	1,926,000	1,944,000	1,991,000	1,987,000	1,986,000
2017-18		1,966,000	2,017,000	2,012,000	2,002,000
2018-19			2,044,000	2,038,000	2,019,000
2019-20				2,064,000	2,036,000
2020-21					2,054,000

After the winter season, WGL's system planning personnel perform a bottoms-up analysis using a gas distribution system model to predict what design day would have been, and benchmarks those results against model outcomes; the two have proven to be very consistent.⁵⁰

While the principles behind design day forecasting are well established throughout the industry, there are considerable differences in methodology from utility to utility.⁵¹ Historical data for certain variables may be important in one service territory but not in another. Duke Ohio and Columbia Gas of Pennsylvania, for example, found that HDDs on the day before the peak was an important factor in its forecast model. Alternatively, National Grid in Massachusetts, which instead of HDDs uses effective degree days that reflect both temperature and wind speed, found that weather conditions two days before the peak were more relevant. Similarly, there is no consensus among utilities on the relevancy of back-testing design day forecasts; many utilities have concluded that if the design day did not occur, there is arguably nothing to compare. While

⁴⁷ Interview #8 and response to Data Request #61.

⁴⁸ Interview #13.

⁴⁹ Responses to Data Request #5 and Data Request #36.

⁵⁰ Interview #3 and Interview #12. For example, there was a 2.1% difference between the two estimates for the 2014-15 fiscal year and a 0.3% difference for the 2015-16 fiscal year.

⁵¹ For example, Peoples Gas in Pennsylvania performs a regression based on daily sendout for the most recent 48 months, which includes the 2014-15 winter season, its coldest winter season in the last 37 years.

approaches among utilities may differ, their ultimate purpose for the design day forecast is the same, *i.e.*, to determine a “worst-case” scenario for planning purposes.

Design Week

The Energy Acquisition group also prepares a design week forecast that represents a longer period of near design day conditions. Design week weather conditions are based on the seven consecutive day period with the highest cumulative HDDs in roughly seventy years, which was January 15-21, 1994 at 354 HDDs. This design week forecast defines the shape of load during peak winter conditions and is therefore useful to WGL in designing and operating on-system peak shaving resources and for subscribing to third party-provided peak shaving services. For the sake of comparison, the Company also prepares a forecast for a typically cold week as experienced in recent years of 290 HDDs.⁵²

Other utilities in the region do not prepare design week forecasts but some, primarily in the New England area, perform what they refer to as a cold snap analysis, which is a very similar in concept. These utilities test the adequacy and flexibility of their existing resource portfolio during a longer period—typically ten or fourteen days—of near design day conditions.

D. Long-term Sendout Forecasting

Each year, the Energy Acquisition group produces a five-year annual sendout forecast by month based on three winter weather scenarios—normal, most severe, and least severe—utilizing the updated demand forecasts. To develop a forecast of normal weather for each month, WGL runs a regression analysis based on 140 years of data to derive HDDs for each month of the forecast. WGL bases the most severe weather forecast on the winter heating season in 1962-63, adjusted for the usage per meter and number of meters in the current demand forecast. The least severe weather forecast is based on actual data from 2011-12, the mildest winter season (*i.e.*, November 1 to March 31) on record.⁵³ These forecasts, for both the entire year and for the five month heating season, are included in WGL’s Portfolio Plan.

Silverpoint compared the firm sendout portion of the annual forecast from the five most recent Portfolio Plans, as summarized on the following table, noting that the forecast for the same future year changed from one plan to the next, sometimes higher and sometimes lower.⁵⁴

⁵² Interview #3 and response to Data Request #45.

⁵³ Interview #3.

⁵⁴ Responses to Data Request #5 and Data Request #36.

**Comparison of Five-Year Sendout Forecasts
Total Firm Sendout (Dth)**

<i>Fiscal Year</i>	<i>2013-2017 Plan</i>	<i>2014-2018 Plan</i>	<i>2015-2019 Plan</i>	<i>2016-2020 Plan</i>	<i>2017-2021 Plan</i>
2013	138,249,500				
2014	139,027,900	137,692,000			
2015	139,914,800	139,008,200	142,045,400		
2016	140,640,300	139,552,100	144,150,100	147,854,500	
2017	142,322,200	140,373,000	146,675,500	150,601,100	150,847,200
2018		141,406,500	149,539,300	153,618,300	154,173,100
2019			152,749,200	156,995,900	157,209,400
2020				160,647,100	160,340,500
2021					163,479,000

In some instances new building projects reflected in demand forecasts are ultimately delayed or cancelled, and thus WGL must revise subsequent forecasts of actual meters downward. Also, in recent years the WGL marketing group has provided the Energy Acquisition group with a conservative meter growth estimate while actually having a more aggressive marketing program underway (*e.g.*, 1.8 percent versus 1.1 percent projected growth). In that case, real growth was higher than initially modeled, so WGL adjusted the next forecast upward to reflect actual experience.⁵⁵

E. Conclusions

1. WGL's load forecasting process is rigorous and yields reliable results.

WGL uses reasonable analytical techniques and appropriately sophisticated regression models to forecast system-wide demand and design day requirements. The Company's forecasting methods adequately incorporate the effects of demand response and energy efficiency, as well as prospective changes in local and regional economic conditions. The utility devotes adequate resources to the forecasting efforts, and utilizes an established, knowledgeable consulting firm to perform required econometric modeling. The Company and its consultant conduct adequate testing, and forecasting results have proven to be reasonably consistent and accurate over time.

F. Recommendations

Silverpoint has no recommendations in this area.

⁵⁵ Interview #8. According to WGL, modest changes in forecasts for future years do not affect the core components of its capacity resource portfolio.

IV. Capacity Resource Portfolio Planning

A. Introduction

To meet the demand requirements of firm customers under design day conditions, a utility must maintain an adequate portfolio of pipeline transportation, storage, and peaking resources. Capacity resource portfolio planning involves much more than merely satisfying design day requirements, however. A utility must also consider how well a particular portfolio supports its ability to supply gas at a stable and reasonable cost year round. Evaluating capacity portfolio options involves balancing factors such as price, security, deliverability, and diversity of supply. While the near-term aim of planning is to remedy immediate shortfalls in capacity, the greater objective is to develop a coherent strategy for meeting customer demand over a longer time horizon by building a reliable, flexible, and cost minimizing capacity resource portfolio.

In this audit, Silverpoint reviewed WGL's current portfolio of capacity resources, focusing in particular on the utility's analysis of open season opportunities and justification for recent major capacity additions. We evaluated the Company's overall strategy for maintaining a balanced, yet flexible portfolio. To that end, the team examined whether WGL has an adequate mix of pipeline contracts of differing terms that provide access to diverse supply basins and liquid trading points in the market. We assessed whether WGL makes sufficient use of on- and off-system gas storage and peaking resources to provide operational flexibility and assure reliability during peak demand. Also, given the large disparity between the Company's two million dekatherm design day requirement and its average daily sendout, we examined whether WGL takes advantage of seasonal portfolio options to the extent possible.

Silverpoint examined the effectiveness of the Company's planning process and practices, including its collaboration with other departments like system planning to analyze the feasibility of available alternatives. A capacity resource portfolio should evolve over time to reflect new industry dynamics and opportunities, and Silverpoint gauged the extent to which WGL realigned its portfolio during the audit period to take advantage of changing gas supply markets. Although we reviewed WGL's resource planning to meet current design day and winter season requirements, we focused more intently on the utility's longer-term planning perspective. As part of that assessment, we identified issues that will impact WGL's portfolio planning process in the near future.

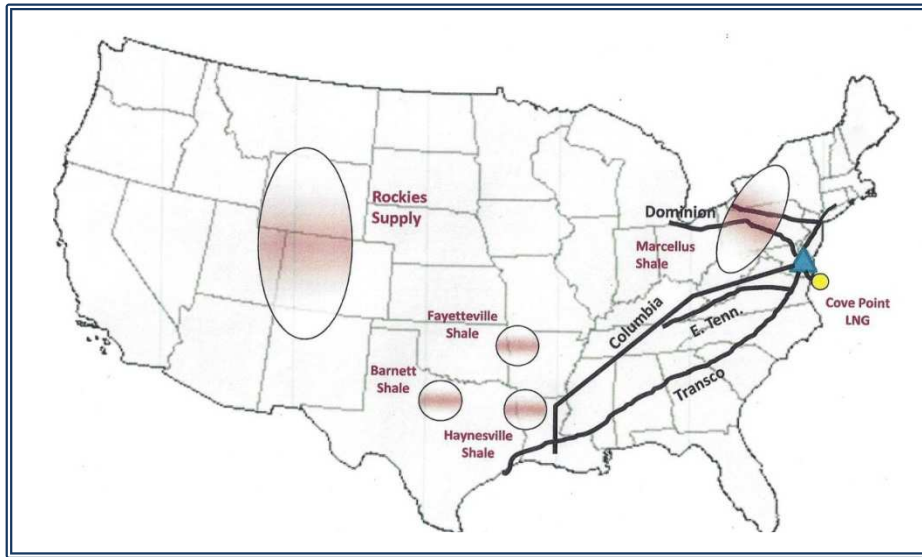
B. WGL's Current Portfolio

WGL has access to three major interstate pipeline systems: Columbia Gas Transmission Company (Columbia), Transcontinental Gas Pipe Line Corporation (Transco), and Dominion Transportation Incorporated (Dominion). It is also connected to the Cove Point liquefied natural gas (LNG) facility via the Dominion Cove Point, LNG, LP (Dominion Cove Point) pipeline.⁵⁶

⁵⁶ Response to Data Request #6.

The Company currently has multiple firm transportation contracts on each on these four pipelines, which are illustrated on the following map.⁵⁷

WGL Interstate Pipeline Access



In addition to approximately 600,000 dekatherms per day of capacity in firm transportation contracts, WGL maintains a 1.5 million dekatherm portfolio of storage and peaking resources as follows:

- Firm Storage – Storage on Columbia, Dominion, and Transco pipelines, and at an underground facility owned by Hardy Storage Company, LLC (Hardy) on Columbia
- On-system Peaking – WGL propane peaking plants at Rockville and Ravensworth
- Off-system Commodity Peaking – Saltville Storage and Pine Needle LNG, both on Transco, and Cove Point LNG on Dominion Cove Point;⁵⁸ also gas from the underground storage field owned by affiliate Hampshire Gas Company on Columbia⁵⁹
- Off-system Peak Shaving – A contract with Panda, a small natural gas generating facility that can provide peaking service by switching to alternative fuel, and seasonal short-term contracts with several suppliers for delivery on the Transco and Dominion pipelines.

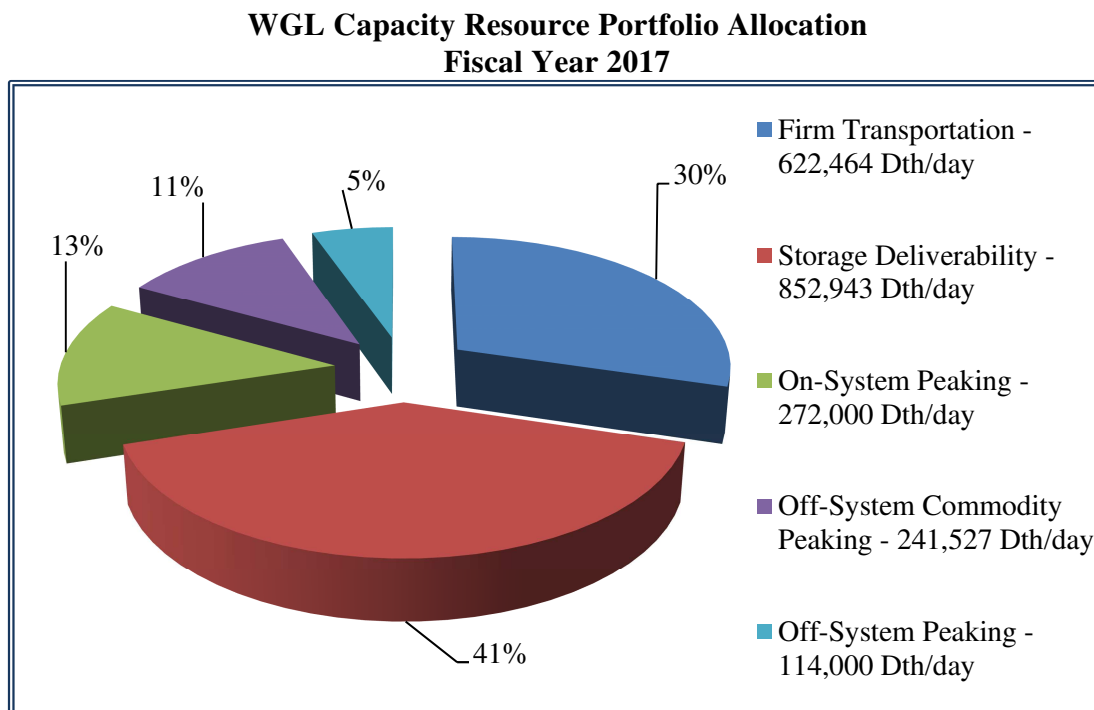
WGL's total portfolio capability of 2.1 million dekatherms was sufficient to meet forecasted design day sendout requirements of 1.986 million dekatherms for the 2016-17 winter season with

⁵⁷ Response to Data Request #6.

⁵⁸ WGL has a natural gas conditioning (hexane injection) facility at a gate station in Prince George's County; conditioning is required to compensate for unblended vaporized LNG delivered into the system from Cove Point.

⁵⁹ Hampshire Gas Company owns full and partial interests in, and operates, the facility in Hampshire County, West Virginia. Its cost of service is approved the Federal Energy Regulatory Commission (FERC).

an additional margin of 5.9 percent. The allocation of WGL’s portfolio is illustrated in the following chart.⁶⁰



Only a very small portion of WGL’s firm transportation capacity, approximately 16,000 dekatherms per day, is provided by CSPs. Most CSPs take a “slice of the system” rather than secure their own firm transmission, as they typically cannot obtain lower-cost options.⁶¹

The Energy Acquisition group is responsible for planning WGL’s portfolio and managing the associated transportation, storage, and peaking resource contracts. The Company currently has eight storage agreements. The Hardy and Dominion contracts are year-to-year agreements that automatically roll over for another year unless one party gives notice not to renew; all Columbia contracts are right-of-first-refusal contracts, which require the Company to take affirmative action to renew them. Only Transco storage agreements include transportation; for all others, WGL must provide for delivery to its gate stations with separate firm transportation contracts. The Company’s current storage contracts are summarized in the following table.⁶²

⁶⁰ Response to Data Request #5. The firm transportation total corrects an arithmetic error in the 2017-2021 Portfolio Plan.

⁶¹ Interview #4 and Interview #8. CSPs pay an average monthly price for firm transmission, which discourages them from gaming the system by moving gas on less expensive pipelines. CSPs are required to deliver gas to WGL during the summer as a “virtual injection” to refill their share of storage utilized during the prior winter, and are billed for any peaking resources that were needed to meet their customers’ demand above what was forecast.

⁶² Responses to Data Request #62 and Data Request #64.

Current WGL Firm Storage Contracts

Pipeline	Contract Number	Daily Demand (Dth)	Expiration
Columbia	4409	99,162	03/2018
Columbia	4409	99,162	03/2020
Columbia	4409	125,637 *	03/2023
Columbia	4409	99,162	03/2024
Columbia	6802	50,000	03/2024
Columbia	7600	60,000	03/2024
Transco	100868	53,303	03/2023
Dominion	300103	46,776	03/2024
Dominion	300161	40,000	10/2026
Dominion	300193	100,000 **	11/2029
Hardy	28308	79,742	03/2023
Total		852,944	

* Figure reflects the addition of 26,473 dekatherms during the audit period.

** New storage capacity added during the audit period.

Approximately 673,000 dekatherms of WGL's storage capacity is listed as no-notice service.⁶³ The most recent no-notice requirements study, prepared in 2012, indicates that the Company's system requires a minimum of 400,000 dekatherms per day of this service.⁶⁴

WGL has over twenty pipeline agreements that provide for more than two million dekatherms per day in capacity. Many of these contracts cover delivery of purchased or stored gas or peaking supply to WGL's city gates, while others provide upstream transportation. Transportation capacity associated with upstream delivery, storage, and peaking is not counted toward firm transmission capacity for the purposes of design day portfolio planning. Most of the capacity under the 100,000 dekatherm Transco Potomac Extension contract, for example, is dedicated to delivery of Saltville and Pine Needle peaking supply, and therefore only a small amount is reflected as Transco firm transmission in the Portfolio Plan.⁶⁵ Information on WGL's current firm pipeline service agreements, including whether the associated capacity is reflected in the 2017-2021 Portfolio Plan, is summarized on the following table.⁶⁶

⁶³ Supplemental response to Data Request #62.

⁶⁴ Responses to Data Request #5 and Data Request #23. The purpose of the requirements study is to determine the appropriate level of no-notice service to maximize system flexibility and minimize balancing costs.

⁶⁵ Interview #16.

⁶⁶ Responses to Data Request #62 and Data Request #64. The Columbia Hardy storage transportation contract figure is the amount received at Lost River off the Hardy pipeline.

WGL Current Firm Pipeline Service Agreements

Pipeline	Contract Number	Type	Daily Demand (Dth)	Expiration	Portfolio Plan
Columbia Gulf	79356	Firm Transportation	70,314	03/2018	N
Columbia Gulf	79356	Firm Transportation	70,314	03/2020	N
Columbia Gulf	79356	Firm Transportation	70,316	03/2022	N
Columbia	4484	Firm Transportation	69,451	03/2018	Y
Columbia	4484	Firm Transportation	69,451	03/2020	Y
Columbia	4484	Firm Transportation	69,451	03/2024	Y
Columbia	4484	Firm Transportation	9,453	03/2022	Y
Columbia	77323	Firm Transportation	30,395	10/2023	Y
Columbia	100681	Storage to Gate (Hardy)	80,166	03/2023	N
Columbia	100303 *	Storage to Gate	99,162	03/2018	N
Columbia	100303 *	Storage to Gate	125,637	03/2020	N
Columbia	100303 *	Storage to Gate	99,162	03/2023	N
Columbia	100303 *	Storage to Gate	99,162	03/2024	N
Columbia	6800 *	Storage to Gate	50,000	03/2024	N
Columbia	7599 *	Storage to Gate	60,000	03/2024	N
Transco	1006508	Firm Transportation	2,425	04/2022	Y
Transco	1002275	Firm Transportation	1,811	04/2022	Y
Transco	1010433	Firm Transportation	6,469	04/2022	Y
Transco	1012254	Firm Transportation	61,583	04/2022	Y
Transco Potomac Exp	9061029	Firm Transportation	100,000	10/2027	10,223 only
Transco (Backhaul)	9104800	Firm Transportation	25,000	10/2020	Y
Transco (Leidy SE)	9178818	Firm Transportation	165,000	12/2030	Y
Dominion	100005	Firm Transportation	60,224	03/2024	Y
Dominion	200386	Firm Transportation	25,000	10/2026	Y
Dominion	700041	Storage to Gate	46,776	03/2024	N
Dominion	100112	Storage to Gate	40,000	03/2026	N
Dominion Cove Point	FTS2001	Peaking to Gate	50,000	04/2025	N
Dominion Cove Point	FTS3001	Peaking to Gate	50,000	08/2018	N
DCP West to East	n/a	Firm Transportation	350,000	04/2025	N
E. Tennessee-Patriot	n/a	Firm Transportation	80,000	03/2027	N

* Daily demand shown is October through March; daily demand for April through September is lower.

All of WGL's transportation contracts with Columbia and Columbia Gulf are right-of-first-refusal agreements. Contracts on Dominion and Dominion Cove Point are all year-to-year agreements; contracts on Transco are a mix of both types. Columbia Gulf contracts can be used to deliver gas from the Gulf to Leach, Kentucky, which is the receipt point on the Columbia pipeline. The East Tennessee Patriot pipeline agreement provides upstream transportation to move Saltville storage gas to the Transco pipeline. The Dominion Cove Point West to East

• • ————— • •

agreement gives WGL the flexibility to move gas that was delivered via Dominion, Columbia, or Transco to the southern part of the WGL system depending on operational or weather factors, or to send gas to Cove Point for liquefaction.⁶⁷ A table summarizing minimum payments to each pipeline supplier for fiscal year 2017 under existing agreements is contained in Appendix A.

WGL's on-system peaking facilities at Ravensworth and Rockville and its contracts for off-system peaking resource each provide supply ranging from a few days to nearly two weeks. WGL generally issues RFPs for one-year seasonal off-system peaking contracts in August so that the final selections can be reflected in the Portfolio Plan. Additional information about these resources, including capacity and scheduled expiration dates, is summarized in Appendix A.

Given the large disparity between WGL's two million dekatherm design day requirement and its average daily sendout—approximately 700,000 dekatherms in winter and 200,000 dekatherms in summer—making use of seasonal options would be particularly advantageous.⁶⁸ Approximately 350,000 dekatherms of WGL's peaking capacity, or 18 percent of its total portfolio, comes from contracts for seasonal short-term supply. In addition, WGL's contracted firm transportation capacity decreases by approximately 250,000 dekatherms for the months of April through September.

The Energy Acquisition group also manages six interruptible pipeline service agreements not related to the design day portfolio; these contracts are summarized on the following table.⁶⁹

Interruptible Pipeline Service Agreements

Pipeline	Contract Number	Daily Demand (Dth)	Expiration
Columbia Gulf	37702	355,000	n/a
Columbia Gulf	39085	355,000	n/a
Columbia	37636	60,000	3/2024
Columbia	37636	350,000	n/a
Transco	9002834	30,000	n/a
Transco	9002853	465,000	n/a
Dominion	E00520	60,000	n/a

During the audit, Silverpoint reviewed WGL's pipeline and storage contracts as well as the confirmation agreements associated with its seasonal peaking arrangements.⁷⁰ We found the contract binders to be complete, and contract details were consistent with information provided in response to other team requests. The Washington Gas Capacity Contract Approvals procedure

⁶⁷ Interview #16.

⁶⁸ Response to Data Request #6. Silverpoint found no publicly available data on average daily sendout for other utilities in the region.

⁶⁹ Response to Data Request #62.

⁷⁰ Interview #10.

describes the purpose of capacity contracts and lists the required signatures, by position title, for utility and asset optimization contracts.⁷¹ Contract binders typically included the approval sheet with signatures of relevant management personnel consistent with the WGL approval procedure.

C. Capacity Resource Planning During the Audit Period

Silverpoint examined WGL's capacity resource portfolio planning strategy and its decision making process, focusing in particular on its analysis of open season opportunities and changes to its portfolio during the audit period. WGL's forecasted design day requirement grew by seven percent over the last five years. The table below summarizes the initial year design day requirement in each of the last five Portfolio Plans, and shows the capacity that WGL had in place to meet that requirement.⁷²

Forecasted Design Day Requirements (Dth)

Portfolio Plan	First Year Design Day Requirement	Minimum Reserve of 5%	Total Requirement	Capacity Available
2013-2017	1,855,000	92,750	1,947,750	1,951,189
2014-2018	1,880,000	94,000	1,974,000	1,992,200
2015-2019	1,938,000	97,521	2,047,933	2,059,235
2016-2020	1,961,000	98,050	2,059,050	2,079,235
2017-2021	1,986,000	99,300	2,085,300	2,102,935

WGL maintains a minimum reserve margin of five percent above its forecasted design day requirement.⁷³ This reserve margin provides for any number of contingencies, such as worse than design day weather conditions, disruptions in gas supply regions, and failures of equipment in either the distribution system or interstate pipelines. It also allows for uncertainties such as delivery shortfalls by CSPs or failure by customers to comply with interruption orders. While there is no standard industry reserve margin, five percent is within the range used by other utilities in the region.

As part of its current year planning process, WGL compares how well its capacity portfolio fits to winter seasonal firm demand under each of three winter weather scenarios—normal, most severe, and least severe.⁷⁴ During the audit period, the Energy Acquisition group utilized year-to-year off-system peaking contracts to help satisfy any capacity shortfalls in meeting design day requirements.

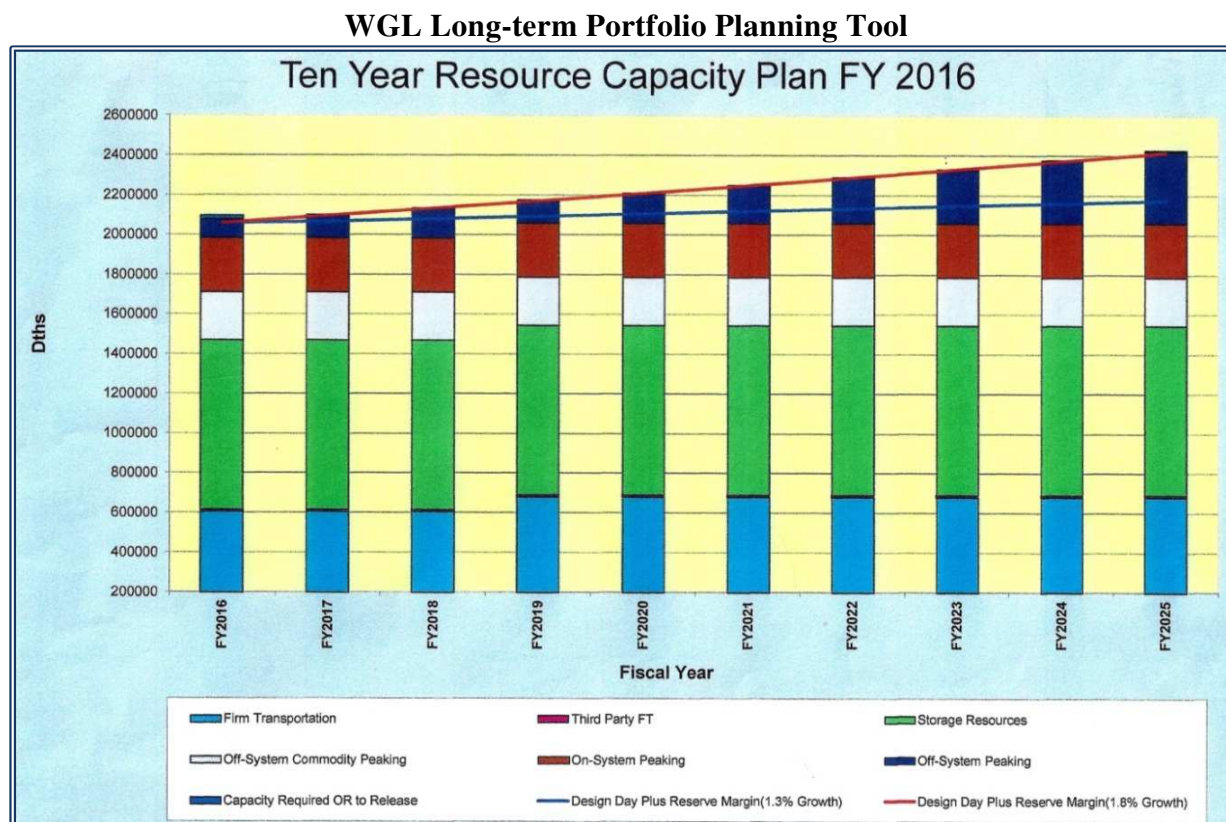
⁷¹ Response to Data Request #78.

⁷² Responses to Data Request #5 and Data Request #36.

⁷³ The reserve margin requirement was imposed by the Maryland Commission.

⁷⁴ Winter season forecasts are derived from the five-year annual sendout forecast by month discussed in Chapter III. WGL plots load duration curves against resources of firm transportation, storage, and peaking capacity. This load duration curve analysis is discussed in the Portfolio Plan each year and is not repeated here.

While the near-term objective of portfolio planning is to remedy shortfalls in current year design day requirements, the primary focus should be on developing a coherent strategy for meeting those requirements over a longer time horizon. New capacity resource additions are inherently “lumpy,” and there is an inherent time lag in many capacity decisions.⁷⁵ Storage system expansion projects that typically take three to five years to complete, for example, may in some cases take even longer.⁷⁶ To aid longer-term planning, the Energy Acquisition group prepares a ten year resource analysis comparing capacity that will be available each year to expected demand based on recent forecasting efforts. An example of this analysis for fiscal year 2016 appears below.⁷⁷



A capacity resource portfolio should be designed to reflect the physical realities of gas pipelines and the utility’s distribution system. Gate station capacity and pressure limits and other operating requirements have to be taken into account to design a portfolio that is feasible from an operational perspective. Energy Acquisition personnel interact extensively with WGL’s System Planning group in that regard.⁷⁸ The System Planning group assesses the existing portfolio to

⁷⁵ WGL’s asset optimization program is particularly helpful in monetizing the value of any unused portion of new capacity additions.

⁷⁶ Interview #5. The additional storage on the Dominion pipeline that WGL committed to in 2007, for example, did not actually become available until 2014.

⁷⁷ Interview #4 and response to Data Request #29.

⁷⁸ Both groups report to the Vice President of Gas Supply & Engineering.

identify potential operational issues using its distribution system model, and shares information about planned system improvements that can be factored into future capacity requirements. Discussions between the two groups are particularly important for identifying and evaluating options to meet demand day requirements later in the ten year planning horizon, since the solution may require a combination of system investments (*e.g.*, a new gate station) in addition to new portfolio options.

Until recently, WGL's capacity portfolio strategy was to maintain a balanced portfolio that was roughly one-third firm transmission, one-third storage, and one-third peaking. On a per unit basis, storage is a more expensive than firm transportation to meet design day requirements. However, while firm pipeline transmission is less costly on a per unit basis, WGL must pay the demand charges all year, despite only a small portion of the capacity being needed to meet gas customers' requirements during periods of low demand.⁷⁹ In response to the growth in system demand, coupled with the shortage of available firm transmission options, WGL revised its strategy—it now plans to use storage to meet 50 percent of peak day demand.

To that end, WGL added over 125,000 dekatherms of new firm storage capacity during the audit period. The Dominion Alleghany project, which WGL committed to in 2007, had an in-service date of April 2014 for purposes of injections of gas into storage; by November 2014, the storage and transportation were fully in service. In 2013, Columbia offered a ten year contract for 26,473 dekatherms per day of storage capacity. WGL opted to acquire the capacity, as it aligned well with operational needs and the gas could be delivered to multiple city gates on the western side of the system.⁸⁰

WGL also added 190,000 dekatherms per day of firm transportation capability. Two new contracts—165,000 dekatherms per day on Transco Leidy Southeast and 25,000 dekatherms per day on Transco Backhaul—allow the Company to expand its gas supply to the Marcellus shale region. The Transco Backhaul contract was added in 2013, based on an earlier commitment. The Transco Leidy Southeast capacity addition in 2015 evolved over the 2012-13 period. Capacity under existing Transco East Leidy and MarketLink contracts, totaling 75,000 dekatherms, is no longer treated as “firm” during periods of high demand. WGL decided to replace this capacity with 135,000 dekatherms of Transco Leidy Southeast capacity that it subsequently increased by 30,000 dekatherms to 165,000; the last increment of capacity was paired with a long-term gas supply contract to replace a higher priced contract that was expiring.⁸¹

All of these additions came about as a result of pipeline open season offerings. The Energy Acquisition group analyzes each pipeline open season opportunity to determine whether WGL's participation in the project is required to meet increasing firm demand, or if it offers a reliable lower-cost alternative to an existing transmission or storage contract nearing its expiration. The

⁷⁹ Interview #8.

⁸⁰ Interview #8 and responses to Data Request #34 and Data Request #39.

⁸¹ WGL retained the MarketLink and East Leidy contracts, which were moved to its asset optimization program; these contracts are slated to be transferred to WGL Midstream. The net increase in firm transportation capacity is therefore 115,000 dekatherms.

group assesses whether a given project has the ability to deliver firm gas to WGL from a reliable, liquid market, and if it is compatible with existing contracts and load profiles. In many instances, the Energy Acquisition group did not bid on open season capacity because gas could not be delivered to WGL's city gates without having to acquire additional capacity, which in many cases was not available.

The following table summarizes the new capacity resource opportunities that the Company examined during the audit period, and indicates whether WGL did or did not bid on the each opportunity.⁸²

New Capacity Resource Opportunities and Open Season Projects			
<i>2013-2017 Portfolio Plan</i>			
UGI Market Area Storage	N	NiSource East Side Expansion Project	N
Spectra Energy Capacity Expansion	N	LNG Storage Capacity Proposal	N
Transco Atlantic Access Capacity Expansion	N	Commonwealth Pipeline Project	N
Jefferson Island Storage & Hub Storage Proposal	N	Transco Leidy Southeast Project	Y
National Fuel Pipeline Capacity Expansion	N	Columbia Gas Transmission	N
<i>2014-2018 Portfolio Plan</i>			
Dominion Transmission Firm Storage Capacity	N	Columbia FSS/SST Storage Proposal	Y
Jefferson Island Storage & Hub Storage Proposal	N	Transco Leidy Southeast Project	Y
<i>2015-2019 Portfolio Plan</i>			
UGI Storage Company Storage Capacity Project	N	Spectra Energy Capacity Expansion	N
CenterPoint Energy Expansion Capacity Project	N	UGI Energy Services Proposal	N
WB Xpress-Columbia Gas Transmission Project	Y		
<i>2016-2020 Portfolio Plan</i>			
Dominion Cove Point	N	Transco VA Southside Expansion	N
Clearfield Project	N	Transco Open Capacity	N
MARC 1 Expansion	N		
<i>2017-2021 Portfolio Plan</i>			
Chestnut Ridge Storage	N	ET Express Project – Spectra Energy	N
Virginia Power Capacity Release via Dominion	N	Transco Open Capacity	N

In addition to the four new transportation and storage options discussed above, WGL contracted for WB Xpress capacity on Columbia that will facilitate transportation along the pipeline's westbound line.

During the audit, Silverpoint requested copies of memos, presentations, financial analyses, or reports utilized by management during its review of capacity options, but WGL provided no such written documentation beyond what is already discussed in the Portfolio Plans. The Energy

⁸² Responses to Data Request #5, Data Request #36, and Data Request #38. These projects are described in more detail in the Portfolio Plans.

Acquisition group does consider a combination of factors when determining the best mix of resources based on costs, operations, growth, and reliability for the system as a whole. We do know that the group routinely analyzes the total cost associated with holding its capacity resource contracts on an annual basis, which is essential when negotiating new agreements.⁸³ The Energy Acquisition group's review process includes the following:⁸⁴

- Resource planning and assessment – matching current resources to the load curve, and determining the appropriate mix of firm transmission, storage, and peaking assets
- Analysis of resource options – monitoring market events during the year to identify timing and availability of alternatives, and evaluating the relative costs of options
- Inter-departmental collaboration – working with the System Planning and Engineering groups regarding peak hour and deliverability requirements and infrastructure needs, and with marketing/business planning personnel regarding projected load growth
- Industry dynamics and gas pricing – monitoring changes to market mechanics and natural gas pricing; assessing must-take versus swing supply options
- Regulatory issues – incorporating policy implications such as Customer Choice.

The Energy Acquisition group has noted that it had no other new projects serving the WGL city gates to benchmark new open season opportunities against at the time of their evaluation.⁸⁵

WGL has no formal policies or procedures that address capacity-related analysis and decision-making. There is little information available about the norms at other regional utilities, although many routinely file long-range supply plans that describe, at least in general terms, their capacity portfolio planning objectives. Massachusetts utilities, for example, typically refer in their filings to meeting design day requirements in the most reliable and least cost manner possible.⁸⁶ Since their regulators have a statutory mandate to ensure energy supply for the commonwealth “at the lowest possible cost,” this language is not surprising.⁸⁷ Piedmont Natural Gas in North Carolina, on the other hand, weighs five “best cost” factors—price, security, deliverability, flexibility, and supplier relations—in assessing portfolio options.⁸⁸

All utilities agree on the need for balance. Ultimately, a utility must provide delivered gas at a reasonable price, which sometimes requires tradeoffs between balancing the portfolio of capacity resources and the portfolio of gas supply. At WGL, for example, the Columbia pipeline provides

⁸³ The capacity cost ranking analysis is described in the 2017-2021 Portfolio Plan, provided in response to Data Request #5.

⁸⁴ Response to Data Request #37.

⁸⁵ Response to Data Request #98.

⁸⁶ See for example “NSTAR Gas Company d/b/a Eversource Energy Forecast and Supply Plan 2015/2016–2019/2020,” dated March 25, 2016, and “Long-Range Resource and Requirements Plan of Boston Gas Company and Colonial Gas Company each d/b/a/ National Grid for the forecast period 2016/17 to 2020/21,” dated November 1, 2016.

⁸⁷ See Massachusetts G.L. c. 164 § 69I.

⁸⁸ Testimony on behalf of Piedmont Gas in the Annual Review of Gas Costs Pursuant to G.S. 62-133.4(c) and Commission Rule R1-17(k)(6), Docket No. G-9, Sub 690, dated August 1, 2016.

WGL with the most geographical and hourly flow delivery flexibility; Dominion, on the other hand, is the least flexible.⁸⁹ Gas suppliers served by Dominion, however, often offer WGL the lowest cost available gas. Evaluating capacity portfolio options involves weighting factors such as price, diversity of supply, and flexibility, and in the end balancing these factors requires a good deal of judgment. In that context, good utility practice in portfolio planning means keeping informed about the natural gas industry, following supply and demand developments, monitoring gas prices on a real-time basis, staying in contact with existing and potential suppliers, and monitoring important proceedings involving pipeline transporters. During the audit, the Silverpoint team found WGL personnel to be very knowledgeable and actively engaged in tracking the continuously evolving natural gas market.

While there is no industry standard for capacity resource planning, many utilities use the SENDOUT® optimization model as a “what if” planning tool for testing the operational and economic consequences of a variety of supply alternatives. Utilities also use the model to identify the need for and type of additional resources for design day conditions. SENDOUT® uses linear programming to calculate the least cost dispatch of a utility’s existing capacity resources needed to meet demand and reliability requirements. The model automatically takes into accounting physical limitations and contract constraints that are reflected in thousands of relationships and variables, and performs tens of thousands of iterations until it reaches a least cost solution.

The Company did use SENDOUT® in the past, but found that the model, as it was applied to WGL’s service territory, was biased toward inefficiently draining lower-cost storage too early in the heating season.⁹⁰ WGL’s forecasting consultant, Energytools, developed its own model, Resource Optimizing Gas Model (ROGM), which it uses to generate total gas and capacity cost estimates for WGL’s Gas Acquisition Model Estimating System (GAMES) report, part of the Gas Procurement Report filed with the Commission.⁹¹ ROGM is structured in much the same fashion as SENDOUT®, and is designed to optimize the use of WGL’s resources for a five year period by minimizing the total cost of supply, by month, for a particular demand profile. ROGM solves for least cost supply subject to constraints defined in database tables that capture detailed information about the distribution system (*e.g.*, demand points), as well as information on pipelines and storage assets (*e.g.*, monthly demand costs, and minimum and maximum daily demand, injection, and withholding rates). ROGM includes constraints designed to keep storage levels within certain limits set by WGL in advance, a feature that WGL found lacking in SENDOUT® in the past.⁹²

Under its existing contract with WGL, Energytools will run other versions of ROGM on an ad hoc basis as requested. The Energy Acquisition group does not use ROGM for evaluating short-

⁸⁹ Response to Data Request #5.

⁹⁰ Interview #8.

⁹¹ Interview #4 and response to Data Request #70. The Company and Energytools ran the two models in tandem for a few years before relying exclusively on ROGM.

⁹² Interview #14. At Silverpoint’s request, Energytools provided an overview of ROGM and shared sample output reports.

term capacity resource options or for any short-term capacity planning activities.⁹³ Silverpoint also saw no evidence that the Energy Acquisition group used ROGM during the audit period to evaluate its longer-term capacity decisions.

D. Future Planning Considerations

WGL expects that design day resource requirements will continue to grow roughly one percent per year, given the current level of residential and commercial real estate development in its service territory. Like many utilities in the region, WGL's options for new capacity are rather limited.⁹⁴ In order to obtain incremental firm transmission or storage capacity, WGL will have to continue to participate in open season offerings by pipeline service providers while monitoring the market for any turn back of pipeline capacity contracts or pipeline capacity releases. Newly constructed pipeline options are, however, considerably more costly than existing firm transmission. The Company's most current projection of future design day requirements are summarized in the table below.⁹⁵

2017-2021 Portfolio Plan Design Day Forecast

Heating Season	Total System Demand (Dth)	Absolute Growth
2016-17	1,986,000	25,000
2017-18	2,002,000	16,000
2018-19	2,019,000	17,000
2019-20	2,036,000	17,000
2020-21	2,054,000	18,000

WGL has no plans at this time to add firm transportation capacity in order to access new gas supply basins. Similarly, it has no plans to reconfigure existing firm transmission commitments as part of a longer-term strategy.⁹⁶ In the near-term, the Energy Acquisition group will continue to utilize year-to-year off-system peaking contracts to satisfy capacity shortfalls while examining other more permanent options, a strategy reflected in the ten-year portfolio planning tool shown earlier in this chapter.

Beyond growing demand, WGL's capacity resource planning will be influenced by another important consideration—the need for significant system expansion to maintain system integrity.⁹⁷ To more fully understand this issue, Silverpoint met with WGL's System Planning

⁹³ Interview #14 and Interview #15.

⁹⁴ Interview #5. Additional information on this topic is included in Appendix A.

⁹⁵ Response to Data Request #5.

⁹⁶ Interview #8.

⁹⁷ Future planning considerations involve more than just capacity, and can include gate station upgrades, main reinforcements, new regulators, and remote controlled valves. The System Planning group's ten-year plan is an important tool to identify critical areas in WGL's transmission system that need significant system improvements as a result of system load increases from the addition of new customers.

group to review the Company's distribution system modeling and analysis efforts. During the interview, engineering personnel shared sample model output reports and explained analysis that compared available capacity at each gate station to expected future flow and pressure requirements.⁹⁸

WGL's service territory covers approximately 26,000 square miles and ranges north to the Frederick, Maryland area, south to the Woodbridge, Virginia area, west to Loudoun County, Virginia, and east to Prince George's County, Maryland. The gas distribution model represents the entire utility system, including approximately 13,000 miles of distribution mains, 600 miles of high pressure transmission mains, and a total of 41 major and minor city gates.⁹⁹ The model provides a bottoms-up estimate of how much gas would be required to meet peak hour demand conditions, and predicts operating pressures that would occur throughout the system. The System Planning group revises this model every year to account for pipelines and customer loads that were added since the last update. To verify the model, engineers compare actual system data from the coldest day of the year to the model's predicted flows and pressures for those conditions, and results are typically within five to seven percent of actual conditions.¹⁰⁰

For long-term planning purposes, the System Planning group models the effect on the system of expected peak hour demand over the next ten years. The model is updated for each year to reflect expected new customers and locations of demand growth so that WGL can identify likely future system reinforcement requirements.¹⁰¹ The model output shows which gate stations will experience increased demand and where gas will come from to serve each area; it will also show when and where any low pressure issues on the system will arise.

The lowest pressure portion of the WGL system is in the eastern part of Maryland. WGL's operational standards are to maintain a minimum operating pressure of 100 pounds per square inch gauge (psig) on high pressure mains during the system peak on design day. Under those standards, WGL has determined that, beginning in the 2020-21 heating season, it will not be able to maintain required pressures in this area on design day with its current system configuration and city gates.

The Company first identified this issue in 2004, when WGL was expecting a high level of growth that ultimately failed to materialize due to a considerable slowdown in the building market. At that time, the Company's first choice for addressing the problem was a peaking plant

⁹⁸ Interview #12.

⁹⁹ WGL refers to high pressure mains as its transmission system, although they are not transmission as defined by the Pipeline and Hazardous Materials Safety Administration. Major city gates have a capacity of more than 2,500 dekatherms per hour; only one WGL city gate is served by more than one pipeline. A list of major city gates is contained in Appendix A.

¹⁰⁰ Interview #12. Peak hour demand is derived by dividing design day total demand by 20, a common rule of thumb; peak hour conditions typically occurs around 8 or 9 a.m. As discussed in Chapter III, the System Planning group uses its model to verify the reasonableness of the Energy Acquisition group's design day estimate.

¹⁰¹ The System Planning group updates the marketing forecast to add new business loads of which it is aware.

in eastern Maryland. There was, however, considerable local opposition to siting a new LNG peaking plant.¹⁰² WGL subsequently abandoned this plan and focused on its other alternative—adding takeaway capacity at a new gate station located next to an existing one. The project would involve adding twenty-seven miles of pipeline to WGL’s transmission system to move gas into the area. Additional information about this project, including location and estimated total cost, along with a more detailed system map, are provided in Appendix A. WGL will not proceed with the system expansion project until a feasible supply option, either firm transportation or storage, is in place. The Energy Acquisition group continues to evaluate options, and has secured a portion of the requirement by committing to firm transportation on the new WB Xpress project on the Columbia pipeline.¹⁰³ The Company reportedly performed an economic analysis of alternatives in 2004, but this assessment was not updated.¹⁰⁴

Planning efforts by the System Planning and Energy Acquisition groups are being influenced by another significant issue—a potentially large spike in design day resource capacity requirements. During the polar vortex in 2014, WGL experienced problems with some interruptible customers refusing to comply with Company-required interruption requests during periods of high demand. Some of these customers no longer meet the requirements for interruptible service set forth in WGL’s tariff (*e.g.*, a back-up boiler with an alternate fuel source). In the future, these customers will face steep fines for failure to comply with requests to use alternative fuel during interruptions. Many of these customers are now seeking to convert to firm service, which presents a large operational challenge. The impact on the WGL system if all interruptible customers became firm would be substantial.¹⁰⁵

E. Conclusions

1. WGL has a sound overall strategy for its capacity resource portfolio.

To ensure its ability to reliably serve existing and future customer requirements, the Company maintains a diverse mix of contracts for long-haul pipeline capacity, storage, and peaking services. WGL’s portfolio meets balance, flexibility, and cost minimization objectives, as the resources can be used in different combinations to meet specific requirements, whether for design day conditions or for day-to-day operational needs. The Company also takes advantage of seasonal portfolio options that help reduce excess capacity during non-winter months.

WGL’s current strategy to utilize storage to meet 50 percent of peak day demand is appropriate, given the shortage of available firm transmission options and expected continued growth in

¹⁰² For example, WGL’s PGC proceeding in Maryland in Case 9509(c) was quite controversial until the issue of the peaking plant was dropped from the case.

¹⁰³ According to the Columbia Pipeline Group website, the WB Xpress project will significantly improve service and flexibility of natural gas delivery in Virginia and West Virginia. It involves construction of 2.9 miles of new pipeline, two compressor stations, and the replacement of 26 miles of existing pipeline to increase capacity.

¹⁰⁴ Interview #12.

¹⁰⁵ Interview #12. Additional information on this topic is included in Appendix A.

customer demand. The Energy Acquisition group assesses all open season offerings and acts on those that will enable the Company to meet future firm demand. To that end, WGL added 125,000 dekatherms of new storage and 115,000 dekatherms of new transportation capability during the audit period. The new transportation contracts enable WGL to take advantage of changing gas markets by expanding its gas supply to the Marcellus shale region.

2. While WGL has effective capacity portfolio planning practices, it maintains insufficient supporting documentation about its analysis and decision-making.

The Energy Acquisition group effectively collaborates with other WGL departments to analyze the feasibility of available capacity portfolio alternatives. The System Planning organization maintains a detailed and reliable gas distribution model that facilitates capacity portfolio planning and decision-making. Consistent with good utility practice, Energy Acquisition personnel are well-informed about industry supply and demand developments, and are proficient in balancing factors such as price, security, and flexibility when assessing available capacity options.

Silverpoint did not identify instances in which we believe that the Company made incorrect capacity portfolio planning decisions. However, in the absence of written analysis or similar documentation, we could not verify that decisions made were the best available at the time. We acknowledge that the Company often has only one option to evaluate at a time, so comparative economic analysis is not always feasible. In our view, the Energy Acquisition group relies too heavily on institutional memory. We were concerned by the lack of rudimentary documentation such as file memos or meeting notes, and it was unclear when and how senior management reviewed and approved key decisions. In a similar vein, WGL has no formal written guidelines, procedures, or policies that would provide a useful context for assessing management decisions or judging the thoroughness of its analysis.

3. Continued growth in firm customer demand will necessitate significant capital expenditures for system enhancements within the next few years.

The WGL distribution system will require a significant capital expansion project in the near future to ensure system integrity during design day conditions. Assuming current rates of growth in customer demand, WGL will not be able to maintain adequate operating pressures in the eastern Maryland portion of its distribution system beginning in the 2020-21 winter season. To remedy the condition, the Company will need to invest in miles of new pipeline and a new gate station. Also, in the wake of the polar vortex in 2014, a significant number of interruptible customers are exploring with WGL the possibility of converting to firm delivery service. Available firm capacity opportunities are already limited, and a further increase in firm demand could trigger additional system enhancements.

F. Recommendations

IV-1 Improve documentation of portfolio planning analysis and decision-making.

WGL should develop and implement guidelines for the maintenance of supporting capacity resource planning documentation. At a minimum, the Energy Acquisition group should maintain files with analysis and information such as copies of spreadsheets, contemporaneous pricing and market data, notes from meetings with pipelines or other suppliers, and similar documents that could inform other parties about the basis for decisions about, for example, open season projects and contract renewals. The ROGM optimization model should be used whenever practical to analyze alternatives and the output retained for future reference. Short memos written to either planning files or to senior management could be used to summarize options considered and any analysis that supports recommended actions.

IV-2 Update the no-notice requirements study and reassess the level of no-notice storage service.

No-notice type service is typically more expensive than regular firm storage paired with transportation. Storage owners define what services they choose to offer, and WGL does not always have the option to contract for storage without the no-notice service premium. WGL currently has under contract considerably more no-notice storage service than the minimum that is needed to serve its firm customers, based on the Company's last requirements study from 2012. Given its continuing demand growth, WGL should update the requirements study to determine what level of no-notice storage service is appropriate. Although near-term opportunities for savings are unlikely, the Company should continue to monitor the storage market for possible alternatives in the future.¹⁰⁶

¹⁰⁶ WGL cannot drop the no-notice component of a current storage contract, and would have to replace the capacity with a new contract. A storage owner cannot amend an existing contract to remove the no-notice component; if WGL no longer wanted this service the owner would have to offer the no-notice capacity to other market participants before it could offer WGL the capacity without no-notice service.

V. Natural Gas Planning and Procurement

A. Introduction

Approximately sixteen percent of the Company's 1.1 million customers purchase gas from third party suppliers under the Customer Choice program. As provider of last resort, WGL has the obligation to purchase gas for default service customers who do not participate in the program. In terms of volume, approximately 60 percent of the Company's total annual system sendout, summarized in the following table, is for default gas service.¹⁰⁷

WGL Annual System Sendout

Fiscal Year	System Sendout (Dths)
2012	149,464,000
2013	174,433,000
2014	185,019,000
2015	174,753,000
2016	169,861,000

Each year during the audit period, the Energy Acquisition group planned for and purchased 90 to 110 million dekatherms of default gas supply at a cost of \$300 to \$500 million per year.¹⁰⁸

In this audit, Silverpoint reviewed WGL's process for procuring default gas supply to determine if it is sufficient to ensure optimal prices that are just and reasonable. The team examined the Company's methods for planning to meet these gas requirements throughout the year. As part of that review, we spent a full day with the Energy Acquisition team in order to observe the daily planning process, including weather and sendout forecasting, and selection of the daily supply portfolio. The team observed WGL employees purchase daily swing gas, schedule gas with the pipelines, and nominate storage gas, and we surveyed back office functions such as balancing and month-end settlement. Silverpoint also examined the Company's risk management function as it pertains to gas procurement, including credit and market risk policies and hedging practices.

B. Gas Planning

In the industry, the largest volume of natural gas trading occurs during the last week of every month, or bid week, when utilities seek to secure core requirements for the upcoming month. Most utilities base their monthly purchases on normal weather forecasts, but may also consider less severe and more severe weather in order to provide insights about possible swings in volume. Net monthly gas requirements will depend on supply already secured under existing seasonal contracts and expected storage withdrawals. At WGL, the first step in bid week planning is to analyze sendout levels from the past three years to determine the lowest possible

¹⁰⁷ Response to Data Request #112.

¹⁰⁸ 2016 Gas Procurement Report provided in response to Data Request #27.

sendout that the utility could experience in the upcoming month, given expected weather. The Energy Acquisition group uses this level as the basis for setting amounts to be procured through monthly base load contracts (or in the first month of seasonal contracts), taking into account planned storage withdrawals and existing firm supply commitments.¹⁰⁹ It is important that the Company not over-contract for base load gas because it may not have anywhere to put excess supply depending on its ability to inject into, or reduce withdrawals from, storage.¹¹⁰ The pattern of storage injection and withdrawal availability is driven by requirements set forth in contracts with individual storage facility owners. Every storage facility has defining physical characteristics that determine safe limits for operating pressures, total storage quantities, and the amount that can be injected and withdrawn each day. Understanding and managing the complexities of gas storage is therefore a critical aspect of the Energy Acquisition group's gas planning function.

As part of its monthly planning process, the Energy Acquisition group meets with system planning, engineering, business development, gas control, and customer service personnel to discuss issues of a tactical nature that may impact its gas supply decisions. For example, there may be upcoming maintenance scheduled at a specific city gate that would require a temporary modification to gas procurement plans to accommodate different flows.¹¹¹ If there are specific operational issues that require changes, the System Planning group can run its distribution system model to determine what adjustments can be made in gas supply to meet required pressures.¹¹²

The purpose of daily gas planning is to develop a reliable forecast for projected day-ahead sendout, and then to develop a supply plan for meeting that demand on the system.¹¹³ The Energy Acquisition group's daily planning activities begin with an analysis of future weather. WGL utilizes a spreadsheet model that consolidates information drawn from fourteen different weather forecasts. The model derives average and median values of expected temperature and wind speed which are then used to calculate forecasted heating degree days.¹¹⁴ Next, WGL utilizes a curve-fitting software program to generate a wide variety of regression lines (*e.g.*, exponential fit, quadratic fit) around historical temperature and firm sendout data from the last several years.¹¹⁵ The Energy Acquisition group ultimately selects four of these regression models based on which have provided the best fit in recent days. The Company will adjust models as warranted to recognize discernible customer patterns or to more heavily reflect recent trends. These regressions generate four firm sendout estimates for forecasted heating degree days, which WGL uses to derive averages and standard deviations. Although the Company's focus is the next

¹⁰⁹ Gas that will be provided by CSPs must also be taken into account.

¹¹⁰ Interview #4 and Interview #15.

¹¹¹ Interview #8 and Interview #12.

¹¹² Interview #7.

¹¹³ Daily gas planning on Friday is to meet customer demand for the weekend and following Monday.

¹¹⁴ Interview #5 and Interview #7. Generally, only wind speeds above nine miles per hour affect the forecast.

¹¹⁵ WGL uses CurveExpert, a curve-fitting and data analysis software, in which data can be modelled using a toolbox of over 90 linear and nonlinear regressions models, smoothing methods, or various types of splines.

gas day, the models calculate preliminary forecasts for up to two weeks in the future, which provides additional perspective for supply planning purposes.¹¹⁶ The Energy Acquisition group develops a separate forecast for interruptible load, which includes both its own customers as well as those of third party suppliers.¹¹⁷

After arriving at a projected day-ahead sendout level, the Energy Acquisition group develops a gas supply plan to satisfy demand unmet by existing monthly and seasonal commitments. To derive the most cost effective mix of resources for the day, WGL utilizes a spreadsheet model that evaluates the relative cost of all available supply options. The spreadsheet shows the volumes of gas that are required at different points on the distribution system, and available swing capacity remaining under existing firm transportation contracts. Information about the cost of supply at various receipt points (*e.g.*, Dominion North Point, Transco Station 65), including variable pipeline costs and gas market prices, are automatically uploaded into the spreadsheet, which then calculates the delivered gas price to gates via the four pipelines serving the system. The spreadsheet also shows the cost of the next gas storage layer that would be drawn from at each facility, which is priced on a first-in-first-out basis. Storage gas data such as current inventory levels, operational ratchet requirements, and embedded gas cost are maintained by Gas Accounting group personnel and loaded manually into the spreadsheet each day.¹¹⁸

Based on the relative cost of supply options, the spreadsheet model calculates a recommended mix of swing gas, withdrawals of storage gas, and injections into storage, taking into account information such as ratchet rates. Energy Acquisition personnel use the model for guidance and as a what-if analytical tool, but ultimately rely on their judgment to determine how much day-ahead delivered gas to purchase and how much storage gas to withdraw on any given day, designed to minimize the amount of intra-day gas purchases, if any. The Energy Acquisition group does not strictly apply a least cost supply solution for each day, but rather utilizes lower cost storage gas to keep gas costs relatively stable over the course of the month. As a result, the use of lower cost storage gas is spread more evenly throughout the month.¹¹⁹ The Energy Acquisition group collaborates with gas control personnel during the daily planning process to ensure that all operational requirements are met by the mix of daily supply. A morning set-up report summarizes the mix of supply sources, and is updated by the group throughout the day as needed; an example of this set-up sheet is included in Appendix A.

Gas planning is a dynamic process. A utility must remain flexible in order to react to evolving conditions, whether in the market, in the weather, or on its own distribution system. The use of storage gas is a particularly important aspect of supply planning, allowing a utility to tailor its strategy to current or seasonal market conditions. Gas planning is more art than science, and it is

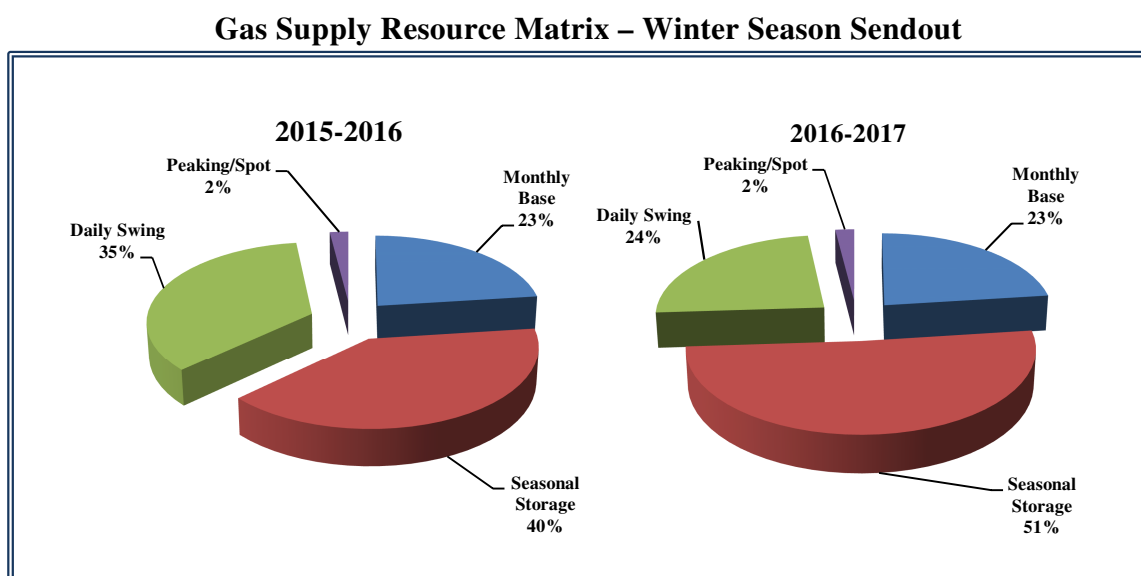
¹¹⁶ The Gas Control Weather & Sendout Forecast provided in response to Data Request #68, for example, covers fifteen days.

¹¹⁷ Interview #7.

¹¹⁸ Interview #7 and Interview #15. Spreadsheet information is also routinely shared with gas control personnel. The Storage Injections/Withdrawals report provided in response to Data Request #66, for example, provides a snapshot of what amounts the Gas Control group can utilize for the day under no-notice service.

¹¹⁹ Interview #7.

impossible to ascertain after the fact whether a given supply portfolio was indeed optimal. An example of the Company's supply strategy during the two most recent winter seasons is illustrated in the charts below.¹²⁰



Each winter heating season was different in terms of the factors that drive the gas supply resource mix—pipeline and storage constraints, weather, commodity pricing, and system maintenance. The 2015-16 winter season was considerably warmer than the most recent one, and was actually the second warmest in WGL history. In 2016, Columbia waived its seasonal storage contract quantity ratchets, allowing more gas to remain in storage at the end of the 2015-16 winter season. WGL therefore had the option to purchase discounted daily swing gas during the 2015-16 heating season instead of utilizing storage gas. During the recent 2016-17 winter season, WGL could withdraw more storage gas, which at that time was relatively cheaper than higher priced daily swing gas.¹²¹

Given the relative importance of storage gas, and its share of the total cost of customer gas supply, utilities typically develop some type of procurement plan for the summer injection season. Some utilities merely use monthly contracts at indexed prices to purchase gas in excess of their sendout requirements for injection purposes. At others, storage injection is part of an incentive program in which the utility tries to achieve lower prices through active trading of futures contracts. Other utilities use asset management agreements, where transportation capacity that would otherwise be used to fill storage goes to a marketer who also has an agreement to supply the aggregate quantity required in storage. At WGL, purchasing gas for the summer injection season is generally managed by WGL's agent Vega as part of the asset optimization program. In today's liquid and transparent gas markets, pricing signals are much more subtle;

¹²⁰ Responses to Data Request #6 and Data Request #102. Monthly base consists of long- and short-term contracts.

¹²¹ Response to Data Request #108.

identifying meaningful price advantages over index-based prices typically requires the kind of diligent monitoring and analysis that full-time traders like Vega can perform.

For the most part, all utilities pursue an optimal or least cost gas purchasing strategy. Piedmont Gas in North Carolina, for example, has a “best cost” gas purchasing policy based on the same five factors it uses to assess capacity portfolio options—price, security, flexibility, deliverability, and supplier relations.¹²² In Pennsylvania, Columbia Gas has a purchasing strategy to “maintain reliable service while remaining as flexible as possible consistent with changing market conditions.”¹²³ Regardless of how they describe it to their regulators, all utilities have the same objective—to deliver competitively priced, reliable supply—which depends not only on successful gas commodity procurement but also on the capacity resource portfolio already in place. How each utility achieves its optimal supply mix is unique to that company, and depends on its location, access to pipelines, storage, and gas supply basins, and in some cases, regulatory guidelines or mandates.

WGL has no formal written policies or procedures that address short-term gas supply planning analysis and decision-making or the daily set-up process.¹²⁴ Publicly available information about seasonal, monthly, and daily planning practices at other regional utilities is thin; the topic is, however, sometimes discussed briefly in management audit reports. Anecdotally, we know that utilities such as National Fuels and New Jersey Natural Gas utilize more sophisticated models such as Nostradamus, a neural network short-term demand and price forecasting system, in their planning efforts.¹²⁵ The model utilizes advanced programming and mathematical techniques to represent the characteristics of the given utility system, and typically uses two to three years of actual daily demand and weather data to provide daily morning load forecasts. The system is self-diagnosing, and reportedly improves forecasting accuracy over time. At the other extreme, utilities such as Central Hudson Gas & Electric and Iberdrola reportedly use basic spreadsheet models that auditors have criticized for their lack of sophistication or inconsistent results.¹²⁶

Regardless of the analytical methods or tools that a utility uses, the result of its planning efforts should be forecasts that are reliable and reasonably accurate. There are, however, no industry

¹²² Testimony on behalf of Piedmont Gas in the Annual Review of Gas Costs Pursuant to G.S. 62-133.4(c) and Commission Rule R1-17(k)(6), Docket No. G-9, Sub 690, dated August 1, 2016.

¹²³ Columbia Gas of Pennsylvania Purchased Gas Cost Proceeding, Docket R-2016-2531807, Exhibit No. 5.

¹²⁴ Interview #15.

¹²⁵ “Audit of Affiliated Transactions between New Jersey Natural Gas Company and New Jersey Resources and Affiliates and a Comprehensive Management Audit of New Jersey Natural Gas Company,” dated June 24, 2014, and “National Fuel Gas Distribution Corporation Final Report,” performed on behalf of the New York State Department of Public Service, dated July 2013. Nostradamus is a product of ABB, Inc., which also owns SENDOUT®.

¹²⁶ “Comprehensive Management Audit of Central Hudson Gas & Electric Corporation,” dated February 2011 and “Management Audit of Iberdrola S.A., Iberdrola USA New York State Electric and Gas, and Rochester Gas and Electric,” dated June 2014, both performed on behalf of the New York State Department of Public Service.

standards for daily forecast accuracy.¹²⁷ For most utilities, inaccuracy of day-to-day forecasts has no immediately obvious quantifiable negative effect on the cost of gas or on system reliability. There is considerable flexibility in storage contracts, as well as the opportunity to update gas supply nominations throughout the day to support intra-day purchases. Penalties from pipelines or suppliers for balancing charges would be one measure of the inherent cost of inaccurate forecasting, but these are less likely due to the availability of no-notice service. The primary purpose of no-notice service is to ensure delivery of the difference between daily nominations and actual requirements on the day. Under no-notice storage service, the holder is not required to submit a nomination for injection or withdrawal; such service does, however, command a price premium.

Reliable forecasts are nonetheless very important, since a one degree deviation in temperature during the winter can change WGL's daily sendout by 30,000 dekatherms.¹²⁸ As feedback to the daily demand forecasting process, on most days the Energy Acquisition investigates differences between forecasted levels and actual sendout levels to account for differences (*e.g.*, interruptible customers coming off line).¹²⁹ The Company neither performs any formal analysis to compare day-ahead forecasts to actual sendout over a period of months or years, nor does it maintain the data to do so. WGL believes that its forecasting is adequate because it has not experienced a gas day in which the variance between forecast and actual sendout exceeded its no-notice storage rights.¹³⁰

C. Gas Purchasing

Once a utility's gas procurement strategy is in place, the actual mechanics of buying gas are relatively straightforward. As a result of deregulation, the natural gas market today is transparent and relatively efficient. Most utility gas supply agreements are either seasonal or monthly base load contracts, primarily entered into during bid week. The rest of a utility's requirements are generally met with swing or spot purchases, which are often as short as one day. Contract pricing can be fixed or indexed to the market, and spot or daily swing gas is purchased at either a published index price or at a negotiated rate.

Consistent with current industry practice, WGL satisfies its default gas supply requirements using winter season contracts, storage withdrawals, monthly contracts, and daily gas purchases, and maintains a diverse portfolio of contracts and suppliers.¹³¹ In advance of the winter season, the Energy Acquisition group issues RFPs to potential suppliers seeking offers to provide gas during the November through March period. Using these offers the group can then execute

¹²⁷ A recent management audit report of Iberdrola in New York cites a two percent band of accuracy for daily forecasting as an 'industry standard,' although we have found no basis for that conclusion.

¹²⁸ Response to Data Request #113.

¹²⁹ Interview #15.

¹³⁰ Response to Data Request #113.

¹³¹ Interview #4. As required, the Company also purchases from minority- and women-owned gas suppliers consistent with the Memoranda of Understanding in place in both Maryland and the District of Columbia.

seasonal contracts with suppliers on an as-needed basis. These contracts can cover the entire season or a subset of months (*e.g.*, December and January only). While these base load contracts are usually fixed price, the Company has used contracts with collars or other hedging instruments built into them.

WGL uses monthly contracts at index prices to secure base load supplies for non-winter months.¹³² When considering options for its monthly purchases, the Energy Acquisition group utilizes its spreadsheet model, discussed earlier in connection with daily planning, to compare delivered cost options across the various pipelines. The Company purchases daily and monthly gas on the Intercontinental Exchange (ICE). ICE is an open, internet-based platform for energy commodity trading that provides exchange trading and clearing services for natural gas, including futures and options. Monthly and daily transactional prices are based on New York Mercantile Exchange (NYMEX) indexes.¹³³

WGL uses *GasPro*, a commercial software product, to capture its gas procurement transactional data. *GasPro* is a fully integrated system for trading, balancing, scheduling, tracking, and accounting for all of the Company's physical and financial transactions. WGL's gas trading area is located within the same floor space as the rest of the Energy Acquisition organization, including Gas Accounting, which facilitates frequent communications throughout the day. Buyers are assigned to purchase swing gas for the day on one or more specific pipelines. During our on-site visit, the Silverpoint team observed WGL's buyers as they monitored gas purchase opportunities on ICE. During our review, Energy Acquisition group personnel posted offers, sent instant messages back and forth with prospective suppliers, and committed to purchases.¹³⁴ WGL does not exclusively transact on ICE for swing gas purchases, it also executes gas transactions by instant messaging, email, and phone. Much of purchasing is initiated through personal relationships developed over time in the industry. Silverpoint observed an Energy Acquisition buyer purchase gas on ICE as well as through an offer initiated by a seller via instant message.¹³⁵ During our session, we found there was careful monitoring of price movement on the different pipelines, and frequent communication among buyers and other members of the Energy Acquisition group.

After a WGL buyer finalizes a purchase, ICE exports the transactional data directly into *GasPro*. The buyer must review and confirm each transaction in *GasPro*. Once confirmed, the buyer nominates, or schedules, the transportation path of the gas purchased on an interstate pipeline's website. WGL is responsible for tracking down any interstate pipeline imbalances for either WGL's gas or that of a third party supplier.¹³⁶ WGL also provides its daily and monthly transaction pricing information to Platts, which publishes an index for each of the roughly one hundred market trading hubs in North America (typically the volume-weighted average of all

¹³² Interview #2.

¹³³ Interview #15 and response to Data Request #100.

¹³⁴ Offers posted on ICE are anonymous until the party chooses to disclose its identity.

¹³⁵ Interview #7.

¹³⁶ Interview #7. Often, pipeline imbalances are the result of an error in data input.

trades reported for each hub). Trades that would be considered outliers to an index's common trading range are scrutinized by Platts' staff.¹³⁷

The Gas Accounting group administers back office functions associated with WGL gas purchasing, transportation, and storage activities as well as physical asset optimization transactions. The group is responsible for balancing and settlement of all transactions entered into the *GasPro* system, as well as transportation and storage injections and withdrawals under multiple contracts.¹³⁸ Transactions are recorded on the pipeline owners' website applications as well as in *GasPro*, and the goal of the balancing is to ensure that both systems are reconciled; the Gas Accounting group is responsible for researching and resolving any discrepancies.¹³⁹

D. Risk Management and Hedging

Credit and Market Risk Management

The purpose of the corporate risk management function is to identify, quantify, manage, and mitigate the risks faced by a parent company and its subsidiaries. In the case of WGL, this includes managing the credit and market risk associated with its capacity portfolio contracts, commodity purchases, and asset optimization activities. WGL Holdings has a risk management organization and committee structure comparable to those at other utilities. Its governing Board-level policy document is the WGL Holdings, Inc. Risk Management Policy, which describes principles applicable to standard business transactions.¹⁴⁰ The document describes the responsibility of the Risk Management Committee (RMC), composed of senior vice presidents and above, that oversees all WGL entities to ensure implementation of the policy.¹⁴¹ Each business unit has its own risk operating group. The WGL Risk Operating Group addresses issues related to the gas portfolio and asset optimization; standard topics at the group's monthly meetings include credit exceptions and violations,¹⁴² market risk, liquidity updates, and new transactions.¹⁴²

As expected, the Company has formal, comprehensive policies in place regarding credit and market risk. The WGL Holdings, Inc. Counterparty Credit Risk Management Policy defines roles, responsibilities, and the process for setting counterparty credit limits. It describes specific guidelines such as credit worthiness criteria and methods for risk measurement, and defines risk limits for parties based on financial ratings.¹⁴³ The Washington Gas Commodity Market Risk Management Policy applies to all physical commodity transactions, whether by the Energy Acquisition group or by third party agents like Vega, and to financial transactions. It defines

¹³⁷ Response to Data Request #100.

¹³⁸ Interview #7. The group also balances and settles purchases and sales by Vega on WGL's behalf.

¹³⁹ Interview #7. During our session, Silverpoint observed accounting personnel performing these functions as well as working on the monthly closing process.

¹⁴⁰ Response to Data Request #84.

¹⁴¹ Interview #6. Silverpoint reviewed examples of RMC and WGL Risk Operating Group meeting agendas and standard reports during the audit.

¹⁴² Response to Data Request #75.

¹⁴³ Response to Data Request #73.

approved physical and financial transaction types, and establishes daily allowable transaction limits by position title. The Manager of the Energy Acquisition group, for example, is authorized to purchase up to 50,000 dekatherms per day of seasonal base load gas.¹⁴⁴

The Director of Risk Analysis & Mitigation oversees the credit and market risk functions and reports directly to the CFO. Her organization provides support for all regulated and non-regulated affiliates.¹⁴⁵ The Market Risk group is responsible for assessing the exposure of the WGL and WGL Midstream asset optimization portfolio. It also monitors all Energy Acquisition group transactions for reasonableness to make sure they are within the range of market prices.¹⁴⁶ The Credit Risk group is responsible for assessing and monitoring the financial stability and credit risk of existing and prospective counterparties. Functions of the group include communicating with gas traders, both within the Energy Acquisition group and at Vega, approving counterparties, calculating daily credit exposure, monitoring transaction exposure against defined limits, and facilitating negotiation of contract terms.

The Credit Risk group prepares a daily report for WGL that summarizes the current credit and liquidity position of each of its counterparties. The group also prepares a weekly counterparty report that details the type and term of transactions open to each counterparty, as well as current credit limits. These reports are referenced by the Energy Acquisition group during its gas procurement activities. WGL currently has well over one hundred counterparties, including pipeline and storage companies and gas suppliers.¹⁴⁷

Risk Management Hedging

Hedging is an integral part of any commodity market, including natural gas, as a means toward establishing price stability. Standard utility practices such as the use of storage gas, purchasing from a diverse set of suppliers and supply basins, and maintaining contracts of varying duration and expiration dates are all forms of hedging, but the main objective of these activities is typically to ensure a secure, reliable, and adequate natural gas supply. The primary purpose of risk management hedging, on the other hand, is to mitigate variability and volatility in price. WGL's risk management programs encompass three categories of hedging:

- Winter physical hedging of gas that is performed by the Energy Acquisition group
- Financial hedging in connection with summer gas storage injection that is governed by the Treasury organization and executed by the Corporate Asset Optimization group
- Risk mitigation hedges that are performed by the Corporate Asset Optimization group in connection with the WGL asset optimization program.

¹⁴⁴ Response to Data Request #74.

¹⁴⁵ Response to Data Request #71 and Interview #6. Risk management objectives do not differ between regulated and non-regulated businesses.

¹⁴⁶ Interview #6.

¹⁴⁷ Interview #6 and response to Data Request #51. Silverpoint reviewed examples of these reports during the audit.

The Washington Gas Natural Gas Hedging Policy governs both physical hedging associated with winter flowing gas as well as financial transactions to hedge the cost of gas for storage injection.¹⁴⁸ The policy affirms WGL's commitment to stabilizing the cost of natural gas for its firm sales service customers by reducing the exposure to price spikes and mitigating price volatility. It requires that all hedging transactions be backed by physical requirements—speculative transactions are explicitly prohibited.¹⁴⁹ All transactions must conform to existing counterparty credit risk and commodity market risk policies that permit a variety of hedging instruments, including the following:

- Futures contract – an agreement to purchase or sell gas for delivery in the future at a price determined at the beginning of the contract; the contract obligates each party to fulfill the contract at the specified price
- Swap – a contract where parties exchange payments based on changes in the price of gas or a market index while fixing the effective price they pay for the physical commodity
- Cap – a contract where the buyer is assured of not paying above a certain maximum price
- Collar – a contract whereby the buyer is assured of not paying more than some maximum price, and the seller is assured of receiving some minimum price
- Call option – an agreement where the buyer has the right but not the obligation to purchase a futures contract for a specific period at a predetermined strike price
- Put option – an agreement where the seller has the right but not the obligation to sell at a future date at a fixed price.

The Energy Acquisition group is responsible for executing physical commodity hedging transactions, and for developing and recommending a hedging plan for review and approval. The Corporate Asset Optimization group is responsible for executing financial hedges, although the policy does not explicitly assign responsibility for developing the summer hedging plan. All hedging program plans must be approved by the Vice President of Regulatory Affairs & Energy Acquisition (the position title has changed since the policy was put in place).¹⁵⁰

WGL's physical hedging program was approved by the Commission in 2010, authorizing the Company to make physical hedging transactions up to three years in advance of the period of time in which those transactions would take place.¹⁵¹ WGL did not execute long-term physical purchases under this program during the audit period. The decision not to hedge through long-term purchases is supported by the Company's formulaic objective to not physically hedge more than 50 percent of its winter firm sales load. As WGL currently maintains existing storage at approximately 53 percent of its winter sendout levels, it would be able to manage short periods of price volatility using its storage volumes and base gas purchases.¹⁵²

¹⁴⁸ The Washington Gas Asset Optimization Program Policy governs risk mitigation hedging associated with the WGL asset optimization program, and is discussed in Chapter VI.

¹⁴⁹ Response to Data Request #82.

¹⁵⁰ Response to Data Request #82.

¹⁵¹ Order No. 16042, dated November 4, 2010.

¹⁵² Interview #2 and response to Data Request #3.

The Commission approved WGL's financial hedging program in 2013, authorizing the Company to recover the cost of certain financial products to hedge summer storage gas injections.¹⁵³ WGL did not perform any financial hedging under this program during the audit period. Market dynamics, most notably the discovery of Marcellus shale gas in the Northeast, have significantly reduced market price volatility. WGL has not used financial hedging since 2011, on the theory that the inherent supply dynamics eliminate the need to incur added costs to execute financial hedges in today's low volatility environment. The Company expects stable prices during the summer injection season to continue and believes there is a low probability for sustained price spikes; it does, however, monitor the market for circumstances such as storms that might lead to short-term price spikes during the June to September period.¹⁵⁴ The recommendation on whether or not to engage in financial hedging is currently made by the Vice President and Treasurer in consultation with the Energy Acquisition group. The recommendation is then approved by the CFO and the Vice President, Gas Supply & Engineering.¹⁵⁵

None of the jurisdictions in which WGL operates has explicitly defined what it considers to be an acceptable level of gas price volatility, nor has it established criteria that dictate when hedging should be applied. WGL has the discretion to hedge or not based on its own judgment, which is the norm among utilities in the region. WGL's programs are considerably less structured than those of utilities like National Grid that have in place well-defined financial hedging protocols and structured decision rules that indicate when, how much, how far forward in time, and with what instrument to hedge.¹⁵⁶ In reality, hedging programs at most utilities are generally aimed more at risk reduction rather than true risk management. While there is no clear consensus as to the benefit of hedging in today's market, all utilities would agree today's market is considerably less volatile than it was ten years ago. The following graph illustrates the trend in the NYMEX end-of-day settlement price since 1991.¹⁵⁷

¹⁵³ Order No. 17130, dated May 10, 2013. Financial hedging was a pilot program before this time.

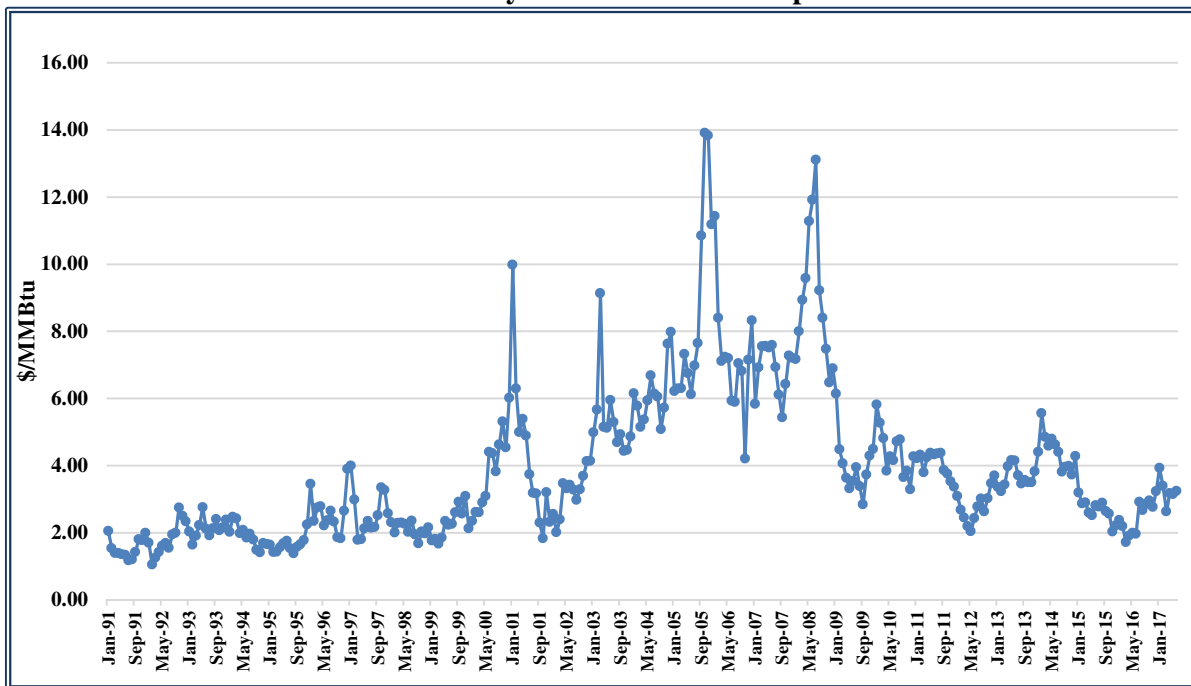
¹⁵⁴ Response to Data Request #2.

¹⁵⁵ Response to Data Request #86.

¹⁵⁶ "Comprehensive Management and Operations Audit of National Grid USA's New York Gas Companies," Case 13-G-0009, dated July 25, 2014. Each year, National Grid prepares a written gas cost volatility reduction plan that summarizes its overall strategy and established guidelines and controls, which is then reviewed and approved by an energy procurement risk management committee.

¹⁵⁷ Source: Indexmundi.com.

Historical Henry Hub Natural Gas Spot Price



The relatively stable natural gas prices of the 1990s were followed by a decade of unrest, with prices that were not only higher but more volatile. The calm period of 1985-2000 likely occurred because of oversupply after deregulation of wellhead gas production. Over the last several years, the industry has returned to another period of relative oversupply and less erratic pricing.

Publicly available information about utility hedging programs is quite limited. Anecdotally, we do know that some utilities have programmatic hedging programs that are executed automatically, regardless of current market volatility. South Jersey Gas, for example, has a non-discretionary hedging program to purchase a portion of its requirements through a series of futures contracts.¹⁵⁸ As of 2014, National Grid in New York was still utilizing financial hedging. There is evidence that some utilities have ceased, or at least significantly cut back, on financial hedging activities. In Pennsylvania, Peoples Gas recently reported that it had ceased financial hedging activity in 2013.¹⁵⁹ A management audit in New York found that National Fuels was using no financial hedging.¹⁶⁰ In North Carolina, Frontier Natural Gas is currently performing no financial hedging, although two other utilities in the state, Public Service Company and Piedmont Natural Gas, continue to do so. This trend is also evident outside the region. Colorado Springs Utilities suspended its financial hedging program in 2012, and late last year, the Florida Commission ordered a moratorium on future financial hedging by the state's gas utilities.

¹⁵⁸ "Audit of the Affiliated Transactions between South Jersey Gas Company and its Affiliates and a Comprehensive Management Audit of South Jersey Gas Company," dated September 2013.

¹⁵⁹ Peoples Natural Gas Company testimony in purchased gas cost proceeding Docket No. R-2016-2528562.

¹⁶⁰ National Fuel Gas Distribution Company Final Report, 2013.

E. Conclusions

1. WGL's gas planning policies and practices are sufficient to ensure reliable default gas supply at a just and reasonable cost.

The Energy Acquisition group utilizes appropriate methods and analytical tools to support its daily and monthly forecasting and supply design activities. Procedures and practices are not formally documented, however, and the effectiveness of WGL's gas planning therefore relies on the collective knowledge and learned experiences of Energy Acquisition personnel. Gas planning is rather tactical and dynamic in nature, and the Company's supply plans are designed to be flexible enough to adapt quickly to changes in the market and in demand. WGL's policy of utilizing storage gas to keep default gas supply cost relatively stable throughout the month is appropriate, and consistent with the Company's overall cost minimization objective.

2. WGL's gas procurement practices are appropriate and consistent with industry norms.

Today's natural gas market is highly price transparent and efficient, and as such the actual mechanics of buying gas are fairly straightforward. Consistent with standard industry practice, WGL provides default gas supply through winter season contracts, monthly base load contracts, daily gas purchases, and storage withdrawals, and most gas is purchased on an open exchange at market index-based prices. During the audit period, WGL procured competitively priced, reliable default gas supply while maintaining a balanced and diverse portfolio of suppliers. The Company also has comprehensive policies and procedures in place to effectively manage the credit and market risk associated with its gas procurement activities.

3. WGL's rationale for suspending its hedging programs during the audit period is reasonable.

Natural gas prices during the audit period have been relatively stable, and WGL's significant storage capacity allows it to mitigate the effects of short-term gas price instability. Given the low volatility in market prices, the Company concluded that hedging offered limited value to customers. Although hedging in today's market would not necessarily be imprudent, WGL has opted to avoid incurring these additional costs.

F. Recommendations

IV-1 Develop written procedures for monthly and daily gas planning activities.

Forecasting and the daily set-up process are somewhat of an art, and rely heavily on the experience on the planners. Without written documentation such as guidelines, instructions, and checklists, it would be very difficult to learn the activities associated with daily and monthly gas planning. The Energy Acquisition group should therefore develop written procedures for training purposes in the event of a loss of a team member due to retirement, transfer, or resignation.

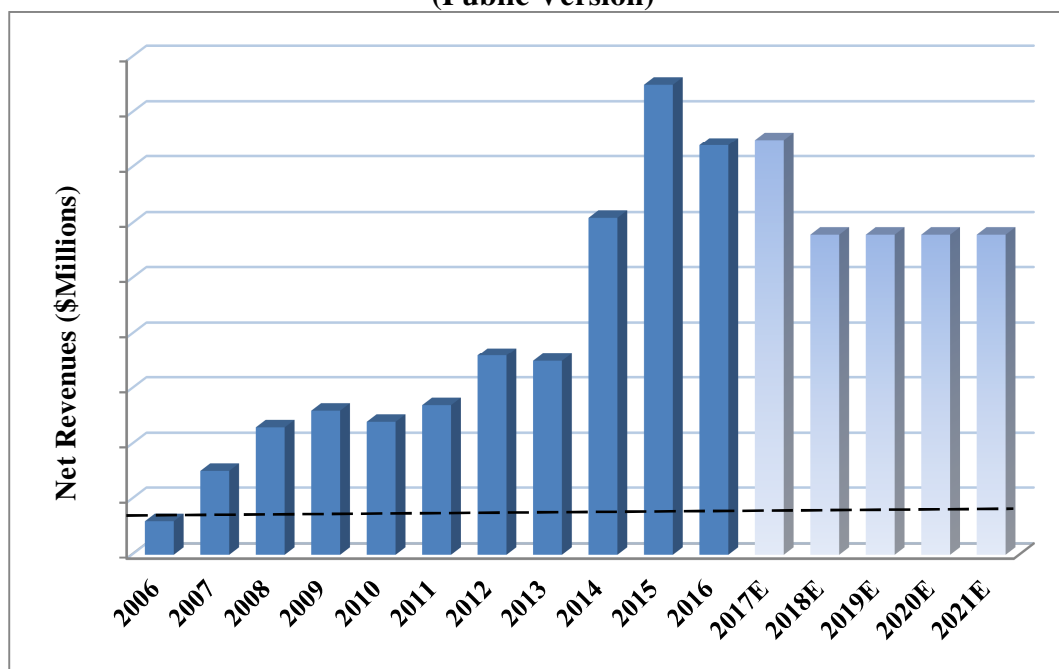
VI. Asset Optimization and Revenue Sharing

A. Introduction

Most gas utilities have programs for capacity release, off-system sales, and/or asset management agreements (AMAs) that serve to monetize temporarily idle transportation and storage assets to the benefit of ratepayers. In the past, WGL had similar programs that made a fixed amount of excess capacity available to third parties like Vega and Entergy-Koch in exchange for flat yearly payments. Under these traditional AMAs, WGL did not know how much profit was actually being earned on its assets. The Company ultimately decided to pursue an alternative type of arrangement that could potentially provide it with much higher returns.

To that end, in 2006, WGL began to allocate a relatively small number of its assets to a corporate asset optimization program. It engaged Vega as an agent to identify opportunities around those assets and to execute physical transactions that would capitalize on those opportunities. Vega was selected as the agent because of its experience in WGL's geographic area and its past experience with the utility's assets. Based on initial success, WGL placed other assets into the program and engaged Vega for those assets as well. By 2008, WGL had placed its remaining transportation and storage assets into the corporate asset optimization program and no longer utilized AMAs.¹⁶¹ The increase in net proceeds since then has been significant, as illustrated in the following graph.¹⁶²

**Actual and Projected Net Asset Optimization Proceeds
(Public Version)**



* The dashed line shows the level of proceeds WGL received under prior traditional programs.

¹⁶¹ Response to Data Request #72.

¹⁶² Response to Data Request #72. A non-redacted version of the graph is included in Appendix A.

In this audit, Silverpoint assessed the overall effectiveness of WGL's asset optimization program. The team examined the assignment of roles and responsibilities between Vega and Company personnel. We evaluated the adequacy of policies, procedures, and practices, and assessed the sufficiency of the Company's oversight and control of the program. The team also examined net proceeds during the five year audit period and compared revenue sharing practices currently in place in each jurisdiction.

During the review, Silverpoint focused in particular on the potential for conflicts of interest. In addition to working on behalf of WGL, Vega also serves as agent for assets owned by the Company's non-regulated affiliate, WGL Midstream. The involvement with WGL Midstream, however, extends beyond asset optimization. During 2014, for example, Vega joined with WGL Midstream and others to invest in a natural gas pipeline development project in Pennsylvania. Silverpoint considered whether there was adequate separation between WGL and WGL Midstream asset optimization activities; we also looked for adequate safeguards to ensure that Vega's transactions were at arm's length and that WGL Midstream assets were not given preferential treatment over those of WGL.

B. Primary Roles and Responsibilities

The WGL asset optimization program differs from a typical asset management structure in that the utility maintains control of all of its assets and does not release them to a third party.¹⁶³ Instead, the Company uses an agent to execute commodity-related physical contracts utilizing its storage and transportation capacity resources when they are not being used to serve its customers. These resources can be recalled from the program at any time, however, if WGL subsequently determines that they are needed to serve firm customers.

Vega is a privately held company located in Houston, Texas. Through its predecessor companies, Vega and its principals have been engaged in the management, optimization, and development of natural gas assets for over 25 years. The current agency agreement between Vega and WGL, dated March 25, 2010, was effective retroactively to the beginning of 2009, and will remain in effect until 2020 unless terminated with 30 days' notice by either party.¹⁶⁴ The contract was amended in October 2012 to reflect the payment terms in place today.¹⁶⁵ Vega currently has five employees dedicated to the WGL account—three traders and schedulers, one head trader, and one back office analytical person.¹⁶⁶

Under the agreement, Vega is responsible for identifying market opportunities and for providing expertise and guidance in developing asset optimization strategies that are then set forth in formal Strategy Approval Forms (SAFs) that describe pre-approved types of transactions. Once

¹⁶³ Assets in the WGL program are managed as a portfolio; there is no distinction by jurisdiction.

¹⁶⁴ Interview #9. Termination payments are set forth in a contract schedule the Company updates on a regulate basis. Standard provisions in the contract cover areas such as warranties, insurance requirements, liability, force majeure, and confidentiality.

¹⁶⁵ These contract terms are discussed in Appendix A.

¹⁶⁶ Interviews #5.

approved by WGL, these SAFs become part of the contract. Vega then executes on these approved strategies to create value for WGL's temporarily dormant pipeline capacity and storage assets. Of the existing SAFs, only five are currently in effect. SAF 08-05 and SAF 08-07, for instance, pertain to approved asset optimization strategies associated with specific transportation assets and storage assets, respectively.¹⁶⁷ Vega is responsible for executing all physical transactions on WGL's behalf, and for recommending financial transactions consistent with approved SAFs. Vega is also responsible for entering its transactions in *GasPro*.¹⁶⁸

The Corporate Asset Optimization organization is responsible for managing and overseeing the WGL asset optimization program, as well as the relationship with Vega. The group executes all financial derivative transactions with guidance from Vega other than those executed by Vega with its prior approval. These financial transactions are risk mitigation hedges generally used for longer-term transactions where the asset optimization program would otherwise be exposed to price risk.

The Energy Acquisition group is responsible for determining which assets should be temporarily allocated to the asset optimization program on an annual, seasonal, monthly, twice daily, and as-needed basis. There is a clear line of demarcation between the asset optimization program and utility gas procurement activities. Vega purchases any gas required for asset optimization transactions. The Energy Acquisition group purchases gas only for its utility customers; it does not execute asset optimization transactions, and no longer engages in any capacity releases and off-system sales.¹⁶⁹ A portion of WGL's summer storage fill program is covered by the Vega agreement. The Energy Acquisition group specifies the volume of gas that must be in storage by the end of the injection season; Vega manages the timing of gas purchases and storage injections in an effort to fill the field at a cost below the published pool price for storage gas on the given pipeline.¹⁷⁰

Energy Acquisition back office accounting personnel are responsible for tracking Vega transactions in *GasPro*, settling physical transactions, and for paying all bills for gas and pipeline charges related to WGL's asset optimization program. When a physical transaction executed by Vega involves the use of WGL's storage gas, the accounting group is responsible for verifying that WGL received the replacement gas.¹⁷¹ The Natural Gas & Derivative Accounting group is responsible for settling all financial transactions.

¹⁶⁷ Interview #9. Detailed information on these strategies is contained in Appendix A.

¹⁶⁸ The Vega contract predates the Company's implementation of the current transaction management system, *GasPro*, in October 2010; the description of the transaction recording process refers to the use of paper deal tickets, and is therefore out of date.

¹⁶⁹ Interview #5. The Capacity Release credits shown in official filings such as the Gas Procurement Report refer to the capacity released to CSPs to serve their customers, and are not from selling excess capacity in the market.

¹⁷⁰ Interview #5. WGL uses the pool price for storage gas for calculating the PGC, and savings realized by Vega become part of asset optimization proceeds.

¹⁷¹ Interview #5.

C. Policies and Procedures

The Washington Gas Asset Optimization Program Policy is the primary governance document for the program, and serves as a reference for the guidelines, key controls, processes, and procedures currently in place to manage program activities.¹⁷² It explicitly states that in cases of competing interests between the asset optimization program and WGL operations, the utility must always prioritize its customers above program needs.¹⁷³ The policy names the Senior Vice President and CFO as the executive responsible for oversight of the program, and describes the roles and responsibilities of functional groups including Corporate Asset Optimization, Energy Acquisition, Risk Analysis & Mitigation, and Accounting.¹⁷⁴ Appendices provide detail on specific aspects of the program, such as:

- Employee transaction limits by corporate position title: financial volumetric limits for basis and commodity swaps (*e.g.*, transaction limit per day, term, and tenor¹⁷⁵)
- Third party agent transaction limits: specific physical volumetric limits for forward/base load and spot transactions (*e.g.*, transaction limit per day, term, and tenor) and specific requirements for written pre-authorization for financial transactions
- Approved program natural gas pipelines
- Authorized program traders and schedulers for physical natural gas and financial contracts, by corporate position title
- Portfolio limits, whereby the program cannot have an open position more than 1 billion cubic feet (BCF) long or short on any given day.¹⁷⁶

The policy describes the entitlement process, whereby capacity resources not needed to deliver gas supply to WGL firm customers are allocated to the asset optimization program. These entitlements are communicated by the Energy Acquisition group to the Corporate Asset Optimization group and third party agent in defined entitlement forums:¹⁷⁷

- Seasonal/biannual meetings for stakeholders to discuss needs for the upcoming season/year, and in some cases to identify assets that will be temporarily idle and therefore available for use by the program during the upcoming season

¹⁷² Response to Data Request #80.

¹⁷³ As discussed during Interview #5, if WGL recalls capacity that Vega already committed to a transaction, Vega must either unwind the transaction or otherwise provide for delivery of the gas that WGL needs. Unwinding a deal is rare, since it would typically be more beneficial to customers for Vega to purchase higher priced replacement gas for a short period rather than unwind an otherwise profitable monthly or seasonal transaction.

¹⁷⁴ Response to Data Request #80. The Corporate Asset Optimization group reports to the Senior Vice President and CFO through the Vice President and Treasurer.

¹⁷⁵ The term tenor refers to the period between now and the end of the term. For example, a financial transaction with a term of two years beginning one year from now would have a tenor of three years.

¹⁷⁶ In certain circumstances, WGL may enter into forward physical transactions that result in an open position, *i.e.*, one in which future gas price risk is not offset by economic hedging products. The policy limits the total volume exposure in open positions to 1 BCF at any given time.

¹⁷⁷ Response to Data Request #80.

- Monthly meetings in which the Energy Acquisition group outlines its capacity plan for the upcoming month and identifies assets that may be temporarily idle or under-utilized and available for use by the program during the upcoming month
- Twice daily conference calls, at 9 a.m. and 3 p.m., in which system needs for the next gas day are discussed, and assets that will be temporarily idle or under-utilized are identified for use by the program for the next day.

The entitlement process also provides for as-needed requests, in which the Corporate Asset Optimization group or third party agent requests additional resources to capitalize on an identified market opportunity. The Energy Acquisition group evaluates the request in the context of current operations, forecasted conditions, and capacity availability, and then either approves or denies it.

Two other corporate policy and control documents provide further structure to the WGL asset optimization program. The Corporate Asset Optimization Commodity Transactions and Deal Entry Procedure document describes the process for recording all commodity transactions entered into by or on behalf of the Corporate Asset Optimization group. It describes the different steps required for executing, recording in the system, and verifying both physical and financial commodity transactions, and identifies the parties responsible for each step.¹⁷⁸ The Asset Optimization Valuation of Commodity Transactions document is a financial reporting internal control narrative that provides an overview of key activities including trade execution, deal confirmation, accounting recordation and reporting, and settlement. Its purpose is to ensure proper accounting treatment, valuation, and financial disclosures for physical and financial derivative transactions. The document also describes the control activities put in place by management, including adequate segregation of duties, system controls and access, timely and accurate transaction processing, proper management reviews, and validation of transactions.¹⁷⁹

The WGL asset optimization program is subject to the Washington Gas Commodity Market Risk Management Policy and the WGL Holdings, Inc. Counterparty Credit Risk Management Policy, both of which previously were discussed in Chapter V. The Vega contract also explicitly requires the company to comply with WGL's risk policies, its vetting of acceptable counterparties, and its credit limits for approved counterparties.¹⁸⁰

Entitlement Procedures

The Silverpoint team reviewed the Company's asset optimization program procedures and practices in more detail, and also observed the daily activities of the Energy Acquisition group, including the 9 a.m. and 3 p.m. entitlement calls with Vega and Corporate Asset Optimization personnel.¹⁸¹ The primary purpose of the 3 p.m. conference call is for the Energy Acquisition group to share its initial estimate of what the next day's entitlements will be. On the 9 a.m. call the next day, the group provides its final determination of what resources will be granted to the program for that particular day. The group generally holds some excess capacity back in case

¹⁷⁸ Response to Data Request #79.

¹⁷⁹ Response to Data Request #81.

¹⁸⁰ Interview #9.

¹⁸¹ Interview #5, Interview #6, and Interview #7.

demand requirements increase, and therefore entitlements to the program are somewhat conservative.¹⁸²

In advance of the daily 9 a.m. call, the Energy Acquisition group prepares a spreadsheet that lists the total daily capacity for each WGL pipeline, storage, and peaking contract; it also identifies the amount WGL expects to utilize to serve customers and the amount remaining, if any, for the asset optimization program for the day-ahead market.¹⁸³ The spreadsheet shows withdrawal and injection capacity for each storage asset, and detailed information for each segment on the pipeline contracts. The group also prepares a separate spreadsheet that shows the same information, but for the day-after-next gas day.

During the 9 a.m. call, the Energy Acquisition group shares its weather and sendout forecasts, and summarizes the amount of resources it expects to use for the next day. Vega personnel typically provide a brief summary of current market conditions and opportunities on which they are working. After the call, WGL sends an email to Vega that summarizes its verbal report and includes the spreadsheets as attachments, and the two parties communicate throughout the day by email as needed. Vega typically updates the spreadsheets showing what it has already utilized for asset optimization transactions and returns them to WGL before the 3 p.m. call.¹⁸⁴

Vega can utilize capacity entitlements for physical transactions without specifically notifying WGL. During the winter, however, Vega must contact WGL if it wants to utilize storage capacity, since the Energy Acquisition group must verify with gas operations that such storage usage will not be problematic. If Vega wants to displace gas that the utility already plans to use, it must also contact the Energy Acquisition group for permission, since transactions of that type must be coordinated with gas control operations in every aspect.¹⁸⁵ In certain circumstances, Vega may identify an opportunity that would require resources that are not part of the daily entitlement. The audit team reviewed sample email exchanges regarding such as-needed requests involving displacements and storage gas.¹⁸⁶ In each case, Vega's email adequately explained the request for additional displacement, storage, and/or transportation resources for a specific day or multi-day scenario; the email response from an Energy Acquisition team member formally granted the request within an hour of receipt.

Beyond the daily calls, Energy Acquisition and Corporate Asset Optimization personnel hold a monthly conference call with Vega during bid week. Personnel from other WGL functional areas participate as required; for example, gas control personnel might attend to discuss expected operational issues. The Energy Acquisition group distributes a spreadsheet that summarizes, for the upcoming month, its current estimate of sendout, expected utilization of individual pipeline assets, and expected storage facility injections and withdrawals that it then reviews on the call.

¹⁸² Interview #7.

¹⁸³ Interview #7 and response to Data Request #48. The Friday call relates to gas for the weekend and Monday. An example of the spreadsheet, provided in response to Data Request #66, is contained in Appendix A.

¹⁸⁴ Interview #7.

¹⁸⁵ Interview #15.

¹⁸⁶ Response to Data Request #47.

Vega provides market updates and discusses any expected variations in its storage plans, and the parties may discuss new or expected strategies.¹⁸⁷ Stakeholders also hold a seasonal meeting twice a year at which the parties discuss assets, upcoming strategies, and any related constraints, such as upcoming maintenance. In some instances, Vega has received approval at these meetings to utilize temporarily idle pipeline transportation capacity for specified summer periods after the Energy Acquisition group has determined it will not be needed to serve firm customers.¹⁸⁸

Risk Management Procedures

The Risk Analysis & Mitigation Market Risk group monitors all WGL asset optimization transactions for reasonableness to make sure they are within market price range. It also confirms the details of any transactions that occur outside of ICE (*e.g.*, by email or phone) by comparing transaction information in *GasPro* to counterparty confirmations. The Market Risk group also is responsible for mark-to-market calculations to value the WGL asset optimization book every day.¹⁸⁹ The Credit Risk group provides daily credit risk reports and updated counterparty reports to the Corporate Asset Optimization group and Vega. Nearly all financial transactions by the Corporate Asset Optimization group or Vega are executed through ICE; these transactions go through a financial clearing house so that WGL is not subject to credit exposure from the counterparty.¹⁹⁰

D. Management Oversight and Controls

Oversight and control of the WGL asset optimization program is monitored by senior financial management. The Corporate Asset Optimization group prepares a five year revenue forecast that reflects its assessment of what future market prices and transaction spreads may be, and how many assets will be available for optimization. The Natural Gas & Derivative Accounting group prepares a quarterly analysis of asset optimization program financial results that includes comparisons to forecast and budget, as well as to prior year results.¹⁹¹ While the programs receive significant senior management attention, asset optimization proceeds are not a separate item on any corporate scorecard or part of any incentive compensation plan that might serve as motivation to increase those proceeds at the expense of WGL regulated activities.¹⁹²

Senior financial management made the initial selection of Vega as agent for the asset management program, and is ostensibly responsible for considering any alternatives. In the early years of the program, the Corporate Asset Optimization group canvassed the market for other companies capable of providing the same services as Vega under the same collaborative operating protocol and compensation structure, but found none. It also developed a request for

¹⁸⁷ Responses to Data Request #49, Data Request #50, and Data Request #72.

¹⁸⁸ Responses to Data Request #54 and Data Request #72.

¹⁸⁹ Interview #6.

¹⁹⁰ Interview #6. In some cases, direct bilateral financial transactions are done directly with the counterparty.

¹⁹¹ Interview #6 and response to Data Request #77. The term budget refers to the estimates that are approved for the following year; forecast refers to the latest update to the original budget figures.

¹⁹² Interview #6.

proposal to gauge interest and pricing for managing the Saltville Storage asset under a more traditional AMA; none of the responses, however, provided a more attractive option for ratepayers than the existing Vega relationship.¹⁹³ WGL also discussed internally the possibility of creating its own trading organization.¹⁹⁴ The Company believes that its alternatives are limited, since few asset management trading companies remain in the business.¹⁹⁵

In 2015, the WGL Holdings Internal Audit group conducted a review of the corporate asset optimization program front office processes. The stated purpose of the audit was to assess business risks and internal controls for key processes, which included the following:

- Completeness and appropriateness of policies and procedures and adequacy of controls
- Adherence to approved deal strategies and authorized limits
- Compliance with commodity market risk and counterparty credit policies
- Accuracy of physical/financial transaction recording, gas scheduling, tracking of volumes and costs, invoicing, and financial settlements
- Appropriateness and accuracy of Vega profit calculations and payments
- Adequacy of security and system protections for access and use of *GasPro* and ICE.

The Internal Audit group determined that controls were adequate to manage significant business risks, and identified a few relatively minor areas for improvement.¹⁹⁶

The Corporate Asset Optimization group manages programs for both WGL and for the non-regulated affiliate WGL Midstream, and its personnel track their time spent for each affiliate.¹⁹⁷ Although the Corporate Asset Optimization group executes financial transactions for both affiliates through ICE, these transactions originate from separate Vega personnel and are captured in separate WGL and WGL Midstream ICE accounts. The Corporate Asset Optimization group has no role in the commercial operations of either affiliate, and there is no apparent incentive for it to favor one affiliate over the other. Vega also acts as agent for both entities. Vega has separate traders and scheduling personnel dedicated to the WGL and WGL Midstream accounts. Once executed in ICE, Vega transactions are final and automatically captured in separate affiliate *GasPro* accounts; as such, there is no ability for Vega to reassign more profitable transactions from one affiliate to the other.¹⁹⁸

Most WGL Midstream assets are in geographic locations different from those of WGL, or have commercial objectives that make them different. The two affiliates do, however, have some similar transportation and storage assets. WGL Holdings management recognized the potential

¹⁹³ Interview #6 and response to Data Request #88.

¹⁹⁴ Response to Data Request #72.

¹⁹⁵ Interview #2. Sequent Energy Management, owned by AGL Resources, is one example.

¹⁹⁶ Response to Data Request #20.

¹⁹⁷ Interview #6. Personnel in other financial groups such as Energy Accounting & Financial Reporting also separately track time spent for affiliates.

¹⁹⁸ Response to Data Request #72.

for conflict of interest, *i.e.*, a pattern of transactions or activities that favored WGL Midstream to the detriment of WGL. To verify no favoring of WGL Midstream occurs, WGL Holdings recently commissioned a focused audit of Vega to examine areas of potential conflict that might arise due to the overlapping assets. The Company selected Dunham Cobb & Associates (Dunham Cobb) to detect any inappropriate pattern of activity and to determine whether satisfactory controls were in place.¹⁹⁹

The Vega audit covered the 2015-16 winter season and was limited to short-term and day-ahead purchases, withdrawals, and injections associated with capacity in place with Vega prior to the 2015-16 season; long-term transactions fell outside the review.²⁰⁰ Dunham Cobb found no evidence that Vega favors WGL Midstream assets at the expense of WGL assets, either in terms of transaction price allocation (*i.e.*, cherry picking prices) or in disproportionate utilization of assets. Utilization does tend to favor WGL Midstream assets, however, because WGL utilizes the most valuable assets for serving customers and much of what is made available for asset optimization are the least useful assets in its portfolio. WGL Midstream, on the other hand, invested in assets that would be most beneficial for earning returns.²⁰¹ Dunham Cobb found that Vega's internal controls were adequate, noting that the firm had demonstrated one of the best "cultures of compliance" that it had ever observed. Additional information on this topic is discussed in Appendix A. WGL Holdings plans to commission similar independent reviews of Vega annually.²⁰²

Vega presumably has non-WGL Holdings accounts, and executes trades for its own book. The Company acknowledges that Vega has had other clients, but none with the same geographic footprint as WGL or with a similar mandate.²⁰³ Any Vega counterparties, including its other clients, would be subject to the Company's risk management and credit policies, which provide some degree of protection against self-dealing. Vega has several policies in place to prevent self-dealing or conflicts of interest, although it has not conducted any third-party audits in this regard.²⁰⁴

E. Asset Optimization Program Results

The margins on individual asset optimization transactions are typically rather modest. Generating significant proceeds from asset optimization programs can sometimes require executing literally thousands of individual physical and financial transactions per year.²⁰⁵ Identifying that many opportunities requires initiative, well-developed industry connections, and an in-depth,

¹⁹⁹ Interview #6.

²⁰⁰ Information about the number of Vega transactions executed in the review period is contained in Appendix A.

²⁰¹ "Review of the Quantitative Results Involving Overlapping AO-MS Assets," dated June 7, 2016," reviewed during Interview #9.

²⁰² Interview #6 and response to Data Request #90.

²⁰³ Interview #6 and response to Data Request #72.

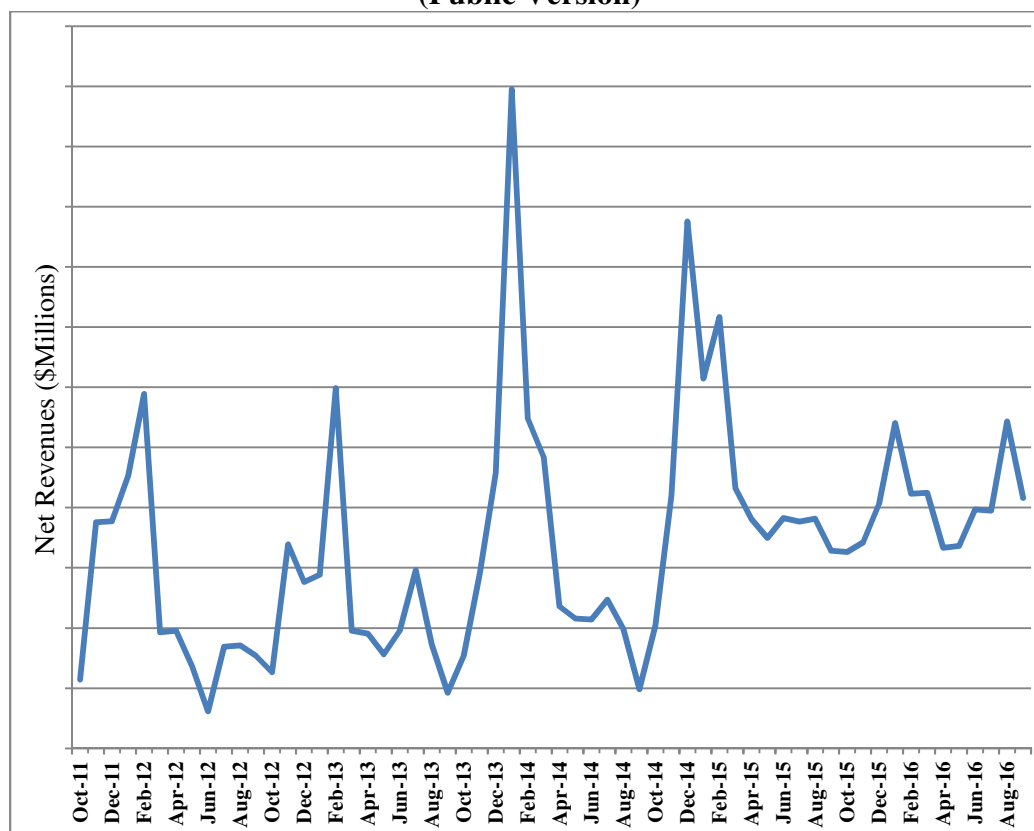
²⁰⁴ Response to Data Request #109.

²⁰⁵ Gross revenues from Vega physical transactions during the audit period are shown in Appendix A.

sophisticated understanding of the marketplace. An agency relationship such as that with Vega allows WGL to take advantage of such expertise to maximize the monetization of its temporarily unused assets, certainly well beyond what WGL believes that it could do alone.

The following graph of monthly net proceeds (*i.e.*, after Vega payments) highlights the cyclical yet unpredictable nature of asset optimization opportunities during the audit period.²⁰⁶

**WGL Asset Optimization Net Proceeds by Month - October 2011 to September 2016
(Public Version)**



Not surprisingly, upward spikes in proceeds occurred in the winter months when gas is in the greatest demand and, therefore, has the highest value. Whenever a company has excess assets during a high value period, we would expect them to generate the most asset optimization proceeds. The spike in January 2014, for example, was driven by increased demand and spreads due to colder than anticipated weather; most of the increased profits came from physical transactions involving WGL's excess transportation assets (e.g., unused pipeline capacity).²⁰⁷ The more tepid winter revenues in the last two years are a reflection of the reduction in market volatility brought about by the development of Marcellus shale. Overall, WGL has been quite

²⁰⁶ Data taken from response to Data Request #89. A non-redacted version of the graph is included in Appendix A.

²⁰⁷ Response to Data Request #103.

successful in capitalizing on its location and portfolio of assets to secure additional savings for customers during the five year audit period.²⁰⁸

The WGL-Vega relationship is an unusual one in the industry. Silverpoint is currently aware of only one other utility, National Grid, which had utilized a similar, although not identical, collaborative relationship to augment its asset optimization for the benefit of customers.²⁰⁹ Not coincidentally, National Grid’s “utility-trader” collaborative relationship was also with Vega.

The WGL asset optimization program is an industry leading practice. We hesitate to label it an industry best practice per se, since the approach may not be implementable or practical elsewhere in many cases. Customer load, asset mix, risk appetite, and access to markets are all important factors. Some utilities, such as those in the Midwest, for example, have relatively limited portfolios or access to markets and therefore fewer opportunities to monetize their excess capacity. By contrast, WGL is particularly well-located with a portfolio of transportation assets that enable it to access several natural gas markets with a diversity of sources, which means more and better opportunities.

F. Revenue Sharing

WGL allocates the net proceeds from its asset optimization program among the three jurisdictions each year based on relative annual firm therm sales through September 30.²¹⁰ Jurisdictional allocation percentages for fiscal years 2012 to 2016 are summarized on the following table.²¹¹ Missing dollar figures are shown in the confidential version of the table in Appendix A.

**Asset Optimization Revenue Sharing
(Public Version)**

PGC/ ACA Fiscal Year	Total Asset Optimization Proceeds (\$000)	Less: Vega Payment (\$000)	Proceeds Available for Sharing (\$000)	% of Proceeds Available for Sharing			Customer Share of Proceeds (\$000)		
				DC	MD	VA	DC	MD	VA
2012	\$	\$	\$	15.24	43.56	41.20	\$	\$	\$
2013	\$	\$	\$	15.14	44.21	40.64	\$	\$	\$
2014	\$	\$	\$	15.18	39.26	45.56	\$	\$	\$
2015	\$	\$	\$	14.89	38.69	46.42	\$	\$	\$
2016	\$	\$	\$	15.03	38.32	46.65	\$	\$	\$
Total	\$	\$	\$				\$	\$	\$

²⁰⁸ Dollar figures can be seen in the Asset Optimization Revenue Sharing table in Appendix A.

²⁰⁹ One of Silverpoint’s team members was responsible for establishing this program at National Grid.

²¹⁰ FC 1129, Purchased Gas Cost Agreed Upon Procedures, February 3, 2017.

²¹¹ Response to Data Request #42.

In the District of Columbia, WGL shares 50% of net asset optimization proceeds with ratepayers. In Maryland, ratepayers receive 100% of the first \$2.6 million in proceeds, 75% of the next \$3.3 million, and 50% of amounts over \$5.9 million.²¹² In Virginia, ratepayers receive 100% of the first \$3.2 million in proceeds, 75% of the next \$3.3 million, and 50% of amounts over \$6.5 million.²¹³ A table that details the District of Columbia portion of asset optimization proceeds over the five year audit period is included in Appendix A.

G. Conclusions

1. The WGL asset optimization program has been very effective in generating significant benefits for ratepayers.

Net proceeds under the WGL asset optimization program have increased roughly tenfold within the last decade, and provide a significant offset to the cost that customers pay for default gas supply. The program allows WGL to take full advantage of Vega's expertise with natural gas markets to monetize its temporarily idle capacity resources. The current Vega compensation structure provides sufficient incentive for that firm to seek to maximize the value of WGL assets and thus both parties share the same overall objectives.

2. The WGL asset optimization program is well designed and well managed.

Under its asset optimization program, WGL retains daily control of its assets and has a more active role in managing outcomes. The defined roles and responsibilities of corporate personnel and Vega ensure adequate segregation of duties. Sound, comprehensive policies, procedures, and controls are in place. The program is audited on a routine basis and receives sufficient oversight from management. Protocols for communicating program entitlements are appropriate and enable Vega to be more proactive in identifying potential market opportunities.

During its audit, Silverpoint noted some minor housekeeping issues. Since position titles in the Energy Acquisition group have recently been changed, references to positions in written documentation should be updated. Also, Vega contract language refers to paper deal tickets, rather than *GasPro*, for recording transactions, and should be amended.

3. The Company has taken proactive measures to ensure adequate separation between WGL and WGL Midstream asset optimization programs.

The Corporate Asset Optimization group manages both programs, but there is no inherent incentive for that group, or senior management, to favor one at the expense of the other. Physical transactions are executed by Vega with separate trading and account personnel for each account,

²¹² Interview #4. This change in Maryland's revenue sharing mechanism was approved in an August 2012 order (Maryland PSC Order No. 85859, August 16, 2012) and went into effect in October 2012.

²¹³ Interview #4. This change in Virginia's revenue sharing mechanism was approved in July 2012 (Order dated July 2, 2012 in Case No. PUE-2010-00139) and went into effect in September 2012.

and each affiliate's transactions take place in separate ICE accounts and are recorded in separate *GasPro* accounts. WGL Holdings has also implemented a yearly audit of Vega to monitor the adequacy of controls and the potential for preferential treatment of WGL Midstream assets over those of WGL.

H. Recommendations

VI-1 WGL should continue to monitor the industry for alternatives to the Vega relationship.

The current contract with Vega will expire in 2020. Although the Vega relationship has been a successful one for WGL customers, the Corporate Asset Optimization group should periodically investigate what other asset managers are participating in the market and explore whether they would have an interest in operating in a collaborative relationship. Only then could WGL assess and conclude that continuing the Vega relationship remained in the best interest of customers. If Vega were replaced, however, WGL would most certainly experience a reduction in net proceeds from the asset optimization program for some time.

Appendix A
Confidential Material
[Redacted]