MRG
McDOWELL RACKNER GIBSON PC

ALISHA TILL
Direct (503) 290-3628
alisha@mrg-law.com

March 27, 2018

VIA ELECTRONIC AND U.S. MAIL

Attention: Filing Center
Public Utility Commission of Oregon
P.O. Box 1088
Salem, Oregon 97308-1088

Re: Docket UG 344: NW Natural's Supplemental Direct Testimony and Exhibit of Randolph S. Friedman

Attention Filing Center:

Attached for filing in the above-referenced docket is an electronic copy of NW Natural's Supplemental Direct Testimony and Exhibit of Randolph S. Friedman (NW Natural/1300-1301). Confidential copies of the exhibit will be sent to the Filing Center and parties who have signed the Protective Order (Order No. 18-002).

Please contact this office with any questions.

Sincerely,

Alisha Till

Alisha Till
Legal Assistant

Enclosures

BEFORE THE

PUBLIC UTILITY COMMISSION OF OREGON

UG 344

NW Natural

Supplemental Direct Testimony of Randolph S. Friedman

ISS/ OPTIMIZATION
EXHIBIT 1300

March 2018

EXHIBIT 1300 – SUPPLEMENTAL DIRECT TESTIMONY

ISS/ OPTIMIZATION

Table of Contents

Rates & Regulatory Affairs
NW NATURAL
220 N.W. Second Avenue
Portland, Oregon 97209-3991
1-503-226-4211

I. INTRODUCTION AND SUMMARY

Q. Please state your name and position with Northwest Natural Gas Company (NW Natural or the Company).

A. My name is Randolph S. (Randy) Friedman. I am Senior Director, Gas Supply for NW Natural.

Q. Please summarize your educational background and business experience.

A. I joined NW Natural in March 1989 as Gas Contracts Administrator. In September 1992 I was promoted to the position of Manager, Gas Acquisition and Pipeline Relations. Effective June 1994, I became the Manager of Gas Supply. My title was changed to Director, Gas Supply, in 2005, and to my present title in 2015. Prior to joining NW Natural, I was employed for seven years at Southern California Edison Company, where my duties included load and fuel price forecasting, generation and transmission project evaluation, and natural gas procurement. I hold a Bachelor of Science degree in Mechanical and Nuclear Engineering from the University of California, Berkeley. I also hold a Master of Science degree in Management from Purdue University.

Q. What is the purpose of your testimony?

A. The purposes of my testimony are to:

(1) Provide the Public Utility Commission of Oregon (Commission) with a summary of the Company's Mist Storage Services (Storage Services) and resource optimization activities (Optimization Activities), as well as the history of its current revenue sharing arrangements approved by the Commission under NW Natural's Schedules 185 and 186;

Rates & Regulatory Affairs
NW NATURAL
220 N.W. Second Avenue
Portland, Oregon 97209-3991
1-503-226-4211

(2) Describe Order No. 15-066, in which the Commission directed the parties to secure an independent evaluation and cost allocation study of the Storage Services and Optimization Activities to aid in its review of the revenue sharing arrangements, and the subsequent study performed by the Liberty Consulting Group (Liberty), which culminated in the Final Report issued on November 27, 2017 (Liberty Report or Report);

(3) Summarize the key findings and recommendations of the Liberty Report; and

(4) Explain why the Commission should maintain the existing revenue sharing arrangements for Storage Services and Optimization Activities.

Q. Please summarize your testimony.

A. NW Natural first became involved in the activities conducted under Schedules 185 and 186 as a means to expand and optimize utility resources beyond what would otherwise occur in the normal course of business. The Company invested shareholder dollars to expand the then-existing Mist storage capacity, as a means of creating value for its investors while at the same time benefiting utility customers through sharing and the ability to recall pre-built capacity on an as-needed basis and at depreciated cost. The Company next developed its optimization activities—through contracting with third-party wholesale traders—in order to create further value from resources in its gas supply portfolio.

The sharing arrangements for the revenues flowing from NW Natural's Storage Services and Optimization Activities were agreed to by Staff and the Company as fairly

Rates & Regulatory Affairs
NW NATURAL
220 N.W. Second Avenue
Portland, Oregon 97209-3991
1-503-226-4211

compensating NW Natural's shareholders and customers for their respective contributions. In particular, the sharing for NW Natural's Mist Storage Services—which is set at 20% customers/80% Company—is intended to recognize the fact that the incremental investment to provide these services was provided by shareholders, while providing customers with benefits to reflect the shared use of certain rate-based investments. The sharing for the Optimization Activities—which is set at 67% customers/33% Company on resources in customer rates and 20% customers/80% Company on resources not in customer rates—is intended to compensate the Company for the increased complexity, level of effort, and risks these more speculative activities impose on shareholders, while at the same time recognizing the fact that most of the resources relied upon are paid for in customer rates.

Customers have benefitted significantly from NW Natural's Storage Services and Optimization Activities. First, since 2000, customers have received a total of $133.5 million in credits under Schedules 185 and 186. In addition, customers have received a substantial benefit provided by the ability to recall portions of the expanded Mist Storage in increments as needed, and at a depreciated book cost. ***And importantly, customers have received all of these benefits with no additional cost and a reduction in risk***.

In NW Natural's 2011 general rate case, Docket No. UG 221, and again in Docket No. UM 1654, some parties argued that the sharing percentages adopted by the Commission for Storage Services and Optimization Activities should be revisited. In UM 1654, after a full contested case with two separate hearings, the Commission determined that it required additional information upon which it might base its decision.

Rates & Regulatory Affairs
NW NATURAL
220 N.W. Second Avenue
Portland, Oregon 97209-3991
1-503-226-4211

The Commission issued Order No. 15-066, directing the parties to hire a third-party to perform an independent study and cost-allocation evaluation, to aid a decision as to the appropriate revenue sharing percentages. That exercise has now been completed, with the Report issued by Liberty on November 27, 2017. That Report, which is attached as Confidential NWN/1301, concludes that the sharing percentages for Storage Services are supportable, but that the Company's percentage of revenues attributable to Optimization Activities might be appropriately decreased.

While the Company agrees with the Report's conclusion that the sharing percentages for Storage Services should remain the same, NW Natural respectfully disagrees that the Company's percentage of Optimization Activities revenues should be decreased. As described herein, NW Natural believes that the current sharing arrangements appropriately reward and incent the Company to expend considerable effort and resources to maximize the revenues from Optimization Activities, which primarily benefit the Company's customers. Customers have benefitted, and, at the same time, the sharing of revenues has provided the Company with sufficient incentive to take on the complexity and risks associated with this discretionary activity. For these reasons, the Company requests that the Commission make no changes to the existing sharing percentages under Schedules 185 and 186.

II. HISTORY OF NW NATURAL'S MIST STORAGE AND RESOURCE OPTIMIZATION ACTIVITIES

Rates & Regulatory Affairs
NW NATURAL
220 N.W. Second Avenue
Portland, Oregon 97209-3991
1-503-226-4211

Q. Please explain the circumstances under which the Company first became engaged in the Storage Services and Optimization Activities that are the subject of Schedules 185 and 186.

A. As historical context, I first would like to note that the Mist Storage facility (Mist or Mist Storage) was originally developed from within the utility and was initially fully dedicated to serving core utility customers (our utility customers who purchase firm service). Mist Storage utilizes depleted gas reservoirs located near Mist, Oregon. The original utility storage and related pipeline development went into service in 1989. The Company completed subsequent Mist expansions for utility customers in 1991, 1997, and 1999. All of these expansions were for the sole purpose of serving core customers, and accordingly, the capital costs of these pre-2000 expansions were included in utility rate base.

In the late 1990s, the Company began to perceive that there was a potential business opportunity to develop additional Mist Storage for the purpose of serving the broader Pacific Northwest regional market. We talked with prospective regional wholesale customers as well as companies in the storage business in other parts of North America. This early exploration supported our view that a need existed in the market, which the Company could compete to serve on a non-utility basis.

In considering how to proceed, the Company identified two fundamentally different options. It could either (1) develop an entirely new set of storage facilities outside of the utility through a subsidiary under full Federal Energy Regulatory Commission (FERC) jurisdiction; or (2) develop incremental capacity from within the

Rates & Regulatory Affairs
NW NATURAL
220 N.W. Second Avenue
Portland, Oregon 97209-3991
1-503-226-4211

utility, with FERC review limited to the interstate storage services being provided. After discussions with Commission Staff, the Company decided to pursue the second course of action. By taking the incremental investment approach, NW Natural was able to leverage sunk costs and avoid construction of unnecessarily duplicative facilities. The Company's view was that the potential new non-utility revenues not only could be used to cover its incremental investment and operating costs, but also could be partially shared with core utility customers to help offset some of the sunk costs already embedded in their rates. Moreover, core utility customers would benefit from the Company's early development of additional Mist Storage capacity by having the ability to recall the storage capacity in the future at a depreciated cost when it is needed to serve them, without development risk, and without the risk of recalling more resources than actually needed (forecast risk).

To realize this plan, the Company first reached agreement with Commission Staff and other parties on how the new non-utility margin revenues would be shared with core utility customers. It then sought and was granted regulatory authority in 2001 from FERC under 18 C.F.R. § 284.224 to utilize new, non-rate-base assets to provide storage services in interstate commerce (also referred to as "interstate storage service"). With these regulatory approvals in place, the Company then invested shareholder dollars to add storage capacity at Mist in 2001, with subsequent shareholder investments for additional expansions in 2004, 2005, and 2007. To date, these non-rate-base investments have totaled over $65 million (original investments before depreciation and

Rates & Regulatory Affairs
NW NATURAL
220 N.W. Second Avenue
Portland, Oregon 97209-3991
1-503-226-4211

any recall by the utility).[1] More recently, Rate Schedule 80 was approved by the Commission to provide Mist Storage Services to customers that desire to receive such service wholly within the state of Oregon (also referred to as "intrastate storage service").

Q. How did the Company become involved in Optimization Activities?

From discussions with other companies already in the storage business, the Company learned that "optimization" was important to the storage business activity in order to maximize storage value. Thus, in order to take full advantage of its existing and planned investments, the Company decided to optimize its storage capacity through wholesale trading.[2] In the early years, these Optimization Activities included the sale and trading of excess gas, existing Mist Storage, and excess capacity on upstream pipeline contracts on the Northwest Pipeline (NWP) and other upstream pipeline systems. Later, as opportunities arose, we added new wholesale trading activities such as the exchange of gas commodity contract purchases at different trading locations ("portfolio" optimization), the use of off-system underground storage contracts at Jackson Prairie and in Alberta, and the extraction of natural gas liquids.

Q. Did the Company have the in-house expertise necessary to successfully undertake these Optimization Activities?

[1] To date seven reservoirs have been developed for storage use with total working gas of 16 billion cubic feet (Bcf), of which only 11 Bcf needs to be reserved for core utility requirements.

[2] At this point in time, the Company established a separate business segment for SEC reporting to conduct the Storage Services and Optimization Activities—in recognition of the fact that they are different in nature from the typical activities undertaken by the utility.

Rates & Regulatory Affairs
NW NATURAL
220 N.W. Second Avenue
Portland, Oregon 97209-3991
1-503-226-4211

A. No, we did not. As a Local Distribution Company (LDC), our focus and expertise were and still are dedicated to acquiring gas and meeting the more direct needs of our customers. While these typical gas utility activities require significant knowledge and skill, they are qualitatively different from the much more complicated and speculative Optimization Activities. For this reason, the Company decided to contract with a third-party wholesale natural gas trading company to partner with on these new Optimization Activities. The specific third-party entity used by the Company has changed over the years but has been Tenaska Marketing Ventures (TMV) since 2005.[3] The Company has found it important to work with a national marketing/trading company because they have the capability and expertise required to maximize the value of these Optimization Activities, as well as the regulatory understanding to avoid potential pitfalls. However, it is important to note that, prior to making resources available to the third-party, the Company first optimizes what it can by itself and passes any savings to customers through the normal Purchased Gas Adjustment (PGA) sharing mechanism.

III. DETAIL REGARDING MIST STORAGE SERVICES

Q. Please describe the nature of the Company's Mist Storage Services.

A. Rate Schedule 185 relates to Mist Storage Services that the Company provides to interstate and intrastate markets at negotiated market prices, subject to a FERC-mandated maximum rate cap.

[3] In 2008, FERC issued Order 712 to provide clarity around the optimization of interstate pipeline capacity, and to match the FERC nomenclature our optimization agreement with TMV is now known as an Asset Management Agreement (AMA).

Rates & Regulatory Affairs
NW NATURAL
220 N.W. Second Avenue
Portland, Oregon 97209-3991
1-503-226-4211

Q. Please describe the Company's interstate Storage Service.

A. NW Natural's interstate Storage Service includes the injection, withdrawal, and underground storage of customer-owned gas at Mist, as well as the transportation of customer-owned gas to and from Mist Storage using NW Natural's high-pressure pipeline system. Customer-owned gas is delivered to a point at which NW Natural is directly interconnected to an upstream interstate pipeline and then injected into Mist Storage. At present, NW Natural is connected to two interstate pipelines—NWP and the small Kelso Beaver Pipeline (KBP). There are two points of connection in use for interstate storage service—the NWP gate station at Molalla and the NWP gate station at Deer Island. Those points also serve as delivery points when an interstate customer wishes to withdraw its gas from storage. Once customer-owned gas is withdrawn from storage and delivered to the NWP system, the interstate customer is responsible for the movement of the gas.

Interstate Storage Services are subject to a general tariff and an operating statement filed with and approved by FERC, with updated filings made on a periodic basis. The operating provisions generally follow the same gas day, scheduling cycles, and other parameters that mesh with the operations of the upstream interstate pipeline system.

The marketing of interstate Storage Services was handled initially within NW Natural as a non-utility business activity but was transferred to NW Natural Gas Storage LLC when that affiliate was created in 2009 in conjunction with the Company's development of a separate gas storage facility in California (Gill Ranch). With

Rates & Regulatory Affairs
NW NATURAL
220 N.W. Second Avenue
Portland, Oregon 97209-3991
1-503-226-4211

personnel shifts over the years, the marketing function is once again being handled within NW Natural. Rates and contract volumes for interstate Storage Services are negotiated for contracts of varying durations.

Q. What services are included in the intrastate Storage Service?

A. Intrastate Storage Service, which is provided under the Company's Oregon Tariff, Rate Schedule 80, is similar in all respects to interstate Storage Service except for one distinction: The withdrawn gas does not move on the NWP system, but instead stays within NW Natural's Oregon service territory. The gas withdrawn from Mist Storage is subsequently moved to industrial customer location(s) in accordance with the tariffed Oregon Rate Schedule under which the customer receives transportation service on the Company's distribution system. In essence, the withdrawn gas moves to the Molalla or Deer Island gate station but is not scheduled as a delivery to NWP, hence the customer avoids incurring the additional transportation charges that NWP would assess if the gas withdrawn from storage were actually scheduled onto the NWP system. From Molalla or Deer Island, the gas looks like any other delivery of customer-owned gas onto NW Natural's system. For this reason, the scope of Rate Schedule 80 is limited to large, non-residential customers who are physically able to access gas that is received into NW Natural's system at either the Molalla or Deer Island gate stations. Rate Schedule 80 is a small component of the Company's Storage Service revenues.

Q. You have mentioned that one of the benefits of the Mist expansion is the ability to recall capacity for core utility customer use when needed. Can you explain how such recall works?

Rates & Regulatory Affairs
NW NATURAL
220 N.W. Second Avenue
Portland, Oregon 97209-3991
1-503-226-4211

A. Yes. One of our goals in expanding storage at Mist was to provide our core sales service customers with the ability to incrementally add storage capacity only when needed, and in the amounts needed, through capacity recall. To allow for such economic recall, we have negotiated interstate and intrastate storage contracts for terms of varying durations. The Company's Integrated Resource Plan (IRP) analysis considers these contract expiration dates as the Company determines whether more Mist capacity should be recalled to meet growing core sales service customer requirements. Expiring capacity that is not recalled can then be re-contracted. Almost all Mist Storage Service agreements are contracted on a firm basis because firm contracts yield the highest value, but interruptible contract variations are possible and do occur.

Q. Are recall decisions reversible or dependent on the market value of Storage Services?

A. No. Once the capacity is recalled to serve core sales service customers, current regulatory treatment does not allow for a subsequent reversal that would return such capacity for contracting through Storage Services. Hence, recall decisions are evaluated every year, approval is required by a team of Company executives, and the recall quantities are made in the smallest possible increments needed to satisfy core customer load projections for the subsequent planning year as determined through the IRP analysis.[4] Making these decisions one year in advance of need allows time for the effective remarketing of any expiring Storage Services contracts whose capacity is not needed for recall.

[4] Recall decisions are rounded to the closest 5,000 Dth/day for administrative convenience.

Rates & Regulatory Affairs
NW NATURAL
220 N.W. Second Avenue
Portland, Oregon 97209-3991
1-503-226-4211

Q. How much of the expanded Mist capacity has been recalled for core utility customers to date?

A. From 2004 through 2018, the Company has recalled storage capacity on six separate occasions, in amounts totaling 95,000 Dth/day of peak day deliverability. The portion of Mist now reserved for core customers totals 305,000 Dth/day out of the current total Mist peak day deliverability of 520,000 Dth/day.[5]

Q. What level of involvement does the utility in general, and the Gas Supply department in particular, provide for the interstate and intrastate Storage Services?

A. In the field, the utility personnel who run the utility storage operations at Mist provide the same support for non-utility Storage Services; for example, 24-hour-a-day, seven-day-a-week monitoring of system status, operation of compressors, wellheads and related equipment, maintenance activities, call-ins after hours and on weekends/holidays in the event of outages or other problems, and so forth.

In the office, the main role of utility personnel is for the daily (including after-hours, weekends, and holidays) scheduling of gas to meet the needs of Storage Service customers, which is done in coordination with the utility's usage of Mist gas supplies. The incremental cost associated with work performed by utility personnel for Mist Storage Services is allocated to the Gas Storage business segment.

[5] Mist total deliverability is designed at 515 million cubic feet per day, which is converted to Dth based on the heat content of the gas. This heat content traditionally was approximately 1010 Btu/cf at Mist, resulting in the 520,000 Dth/day cited here. Recently, however, heat content has increased on the NWP system and currently exceeds 1040 Btu/cf at Mist, resulting in a higher figure of at least 536,000 Dth/day. However, the current higher heat content is regarded as a short-term market condition that will revert to historical levels over the next few years.

Rates & Regulatory Affairs
NW NATURAL
220 N.W. Second Avenue
Portland, Oregon 97209-3991
1-503-226-4211

IV. DETAIL ON OPTIMIZATION ACTIVITIES

Q. Please describe in more detail the Company's Optimization Activities.

A. Optimization Activities fall into five general categories: (1) Mist Storage Optimization; (2) Liquids Extraction; (3) Commodity Contract (Portfolio) Optimization; (4) Pipeline Capacity Optimization; and (5) Off-System Storage Optimization. All Optimization Activities seek to create additional value for customers and shareholders by engaging in more speculative transactions for the resources that are not being fully utilized by sales service customers.

Q. You previously explained that the Company has engaged a third-party to provide optimization services through an Asset Management Agreement (AMA). Can you describe how NW Natural works with the third-party to perform the Optimization Activities?

A. The Gas Supply department is responsible for negotiating the terms of the AMA arrangement and developing strategies with our optimization partner to maximize value while maintaining reliability standards for core utility and Storage Service customers. At least one individual in Gas Supply is involved virtually every day in consultations with our optimization partner (TMV) to review current positions, assess available resources, and determine new opportunities for optimization. Higher values, though, generally are obtained through strategies that can take many months to unfold, heightening the need for a close working relationship with our optimization partner so that we can adapt as needed to changing market conditions and customer requirements. Examples of such strategies and transactions are described in my testimony below.

Rates & Regulatory Affairs
NW NATURAL
220 N.W. Second Avenue
Portland, Oregon 97209-3991
1-503-226-4211

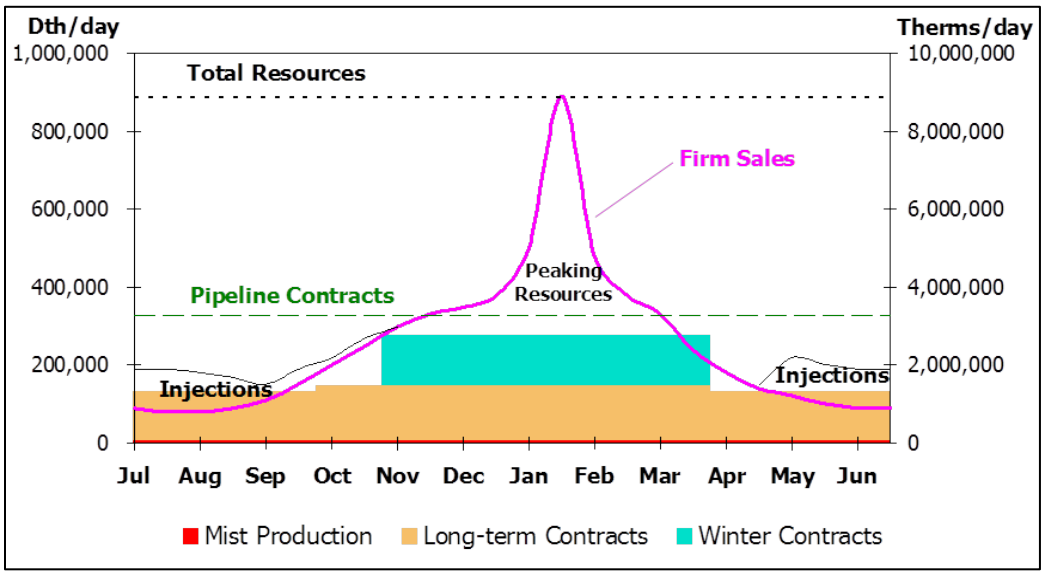
The largest involvement outside the Gas Supply department comes from the Legal and Mid Office (financial risk management) groups, because they analyze each type of optimization transaction for regulatory compliance and financial impact. With their approval, individual transactions then can be pursued by the Front Office, i.e., certain authorized individuals within the Gas Supply department.

The costs of this utility involvement are not borne by customers, but instead are allocated to the separate, non-utility Gas Storage business segment in which the costs and revenues of Storage Services and Optimization Activities are recorded.

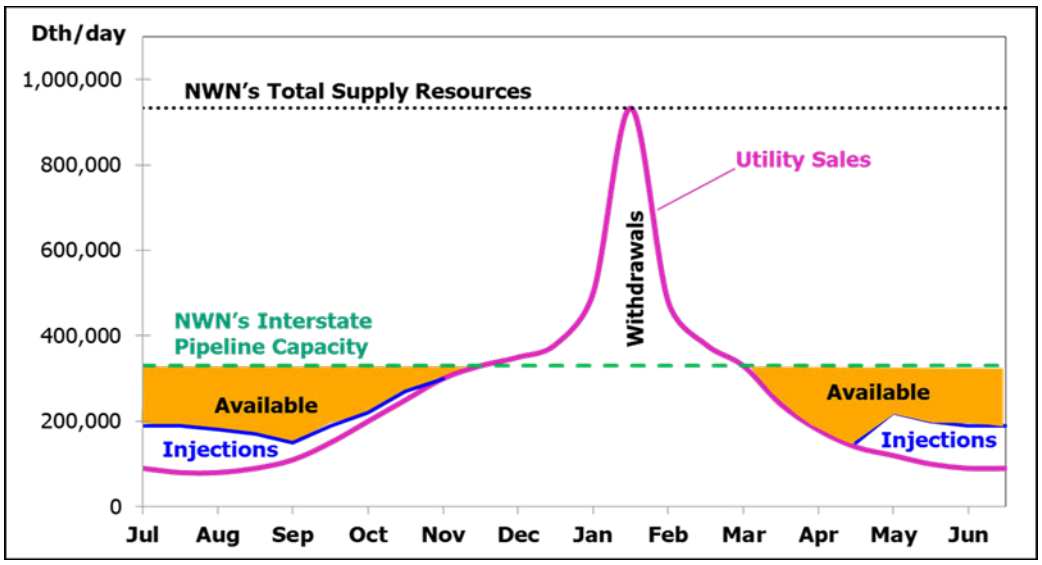
Q. Why does the Company have gas resources that are not fully utilized by core customers at all times?

A. As an LDC, NW Natural is obligated to ensure reliable service to its firm sales service customers under all foreseeable weather conditions—including peak cold weather conditions. As modeled in the IRP, the Company plans its resource portfolio around "design" weather conditions. Design weather includes criteria for temperatures over the entire heating season and, perhaps most importantly, the peak cold day. The resulting load pattern is highly seasonal as shown below.

Rates & Regulatory Affairs
NW NATURAL
220 N.W. Second Avenue
Portland, Oregon 97209-3991
1-503-226-4211



The Company uses the IRP process to assemble the most cost-effective gas resource portfolio to serve this pattern of customer load requirements. A combination of pipeline and peaking (primarily storage) resources is the most efficient mix. However, pipelines by their nature are in place every day whether used or not, and so are available for optimization as shown below.



Rates & Regulatory Affairs
NW NATURAL
220 N.W. Second Avenue
Portland, Oregon 97209-3991
1-503-226-4211

In addition, the projected load requirements are themselves based on an extreme cold weather design, meaning that they are not expected to occur in an average year. This difference between design and average year weather conditions creates the potential for under-utilized resources, making more resources available for potential optimization, particularly with storage resources as discussed below.

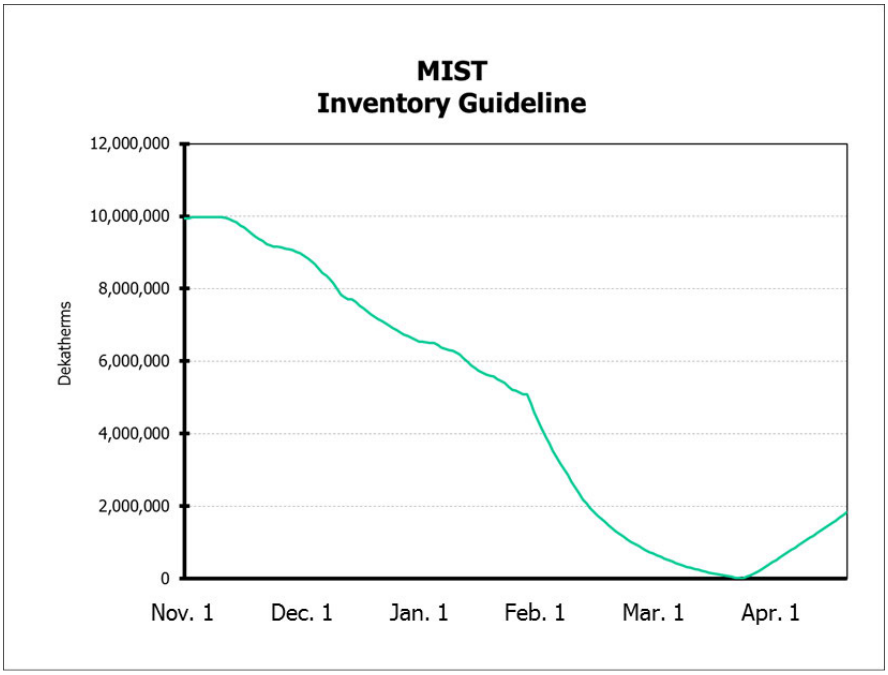
Q. Please describe Mist Storage Optimization.

A. All Mist Storage capacity is reserved either for core firm sales service or interstate/intrastate Storage Service customers (the service described above). However, when Mist is not fully utilized by either or both of these groups, the Company has the opportunity to generate additional revenues through optimization. This optimization opportunity is primarily a function of gas injection or withdrawal rates, which in turn have some relationship to the total amount of working gas in Mist Storage on any given day. Injection and withdrawal rates are inversely correlated, i.e., the more gas that is being injected for customers, the more optimization capability exists to do withdrawals, and vice versa.

As previously mentioned, NW Natural's IRP analysis is based on "design" weather conditions. Because cold weather can and has occurred late in the heating season, the Company's analysis (using the SENDOUT® model as described in the IRP process) indicates that maximum deliverability should be maintained into early February. But, because most winters are not extremely cold, this practice typically results in inventory not being fully withdrawn from Mist. One output from the SENDOUT® analysis is a guideline for how to dispatch (or hold back on dispatching) gas out of each storage

Rates & Regulatory Affairs
NW NATURAL
220 N.W. Second Avenue
Portland, Oregon 97209-3991
1-503-226-4211

resource in order to maintain reliable service. An example of such a guideline is shown in the table below.



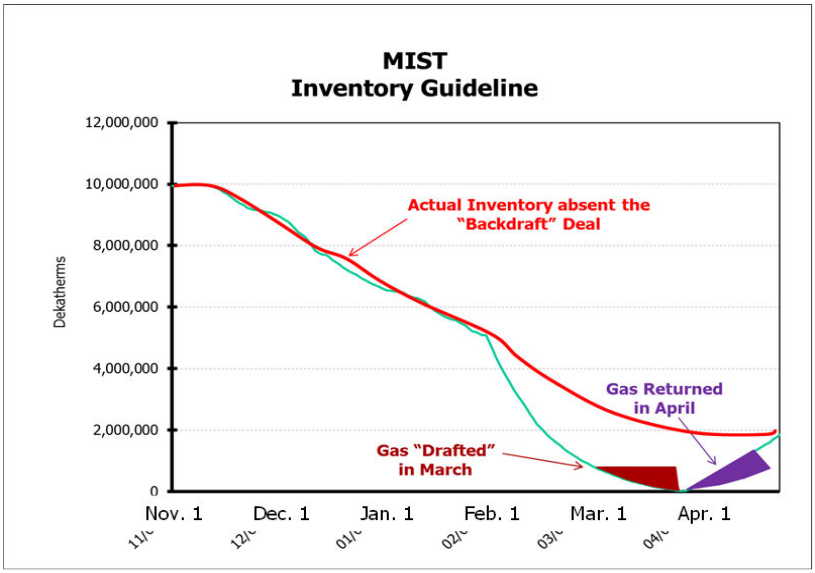
From the chart above, note that storage inventory needs to be maintained at a fairly high level into early February, but then can drop quickly once the design peak day condition has passed. By mid-February most of the winter has passed, so it is not unusual to have significant quantities of gas left in storage in a normal winter weather season.

The gas still in inventory after the cold weather has passed represents an opportunity to serve additional load, but usually that load is not to be found on the utility system. Looking for transactional opportunities outside the utility system entails additional risks, as described below, and requires a larger trading "footprint" than NW Natural has in place for meeting base utility service, but these opportunities are well-

Rates & Regulatory Affairs
NW NATURAL
220 N.W. Second Avenue
Portland, Oregon 97209-3991
1-503-226-4211

suited to a company whose strength is based on wholesale natural gas trading capabilities.

An example of a wholesale transaction is the "backdraft" arrangement pictured below. The green line again represents the Company's guideline for inventory levels at Mist in order to ensure reliable service to its utility customers.



The "backdraft" in this picture is the act of withdrawing gas ("drafting") for use by an off-system market after the February peak condition has passed and while gas prices are still relatively high. The gas is returned back to the Company at a later time, and potentially at a different location, when prices are lower and there is more flexibility on the upstream pipeline system. From a utility customer perspective, nothing has changed because the gas is returned to inventory at the same price that it left. However, the sale of the gas (in March in this example) and its purchase at a lower price (in April in this

Rates & Regulatory Affairs
NW NATURAL
220 N.W. Second Avenue
Portland, Oregon 97209-3991
1-503-226-4211

example) generates revenue that would not otherwise have been obtained from this asset.

This simple example is potentially just a sliver of the entire storage optimization transaction. The price spreads between months are not static but widen and narrow on a day-by-day, minute-by-minute basis. By anticipating these movements, i.e., speculating, our optimization partner can use these same volumes in multiple transactions. That is, when the spreads between months are relatively wide, the optimizer sells the spread. When the spreads narrow, the position is closed out and some level of profits are realized. When the spreads again widen, the position is sold again and the process repeats. If the spreads never narrow but instead stay the same or continue to widen, the optimizer simply waits for the physical settlement of the transaction and is not caught "short" because the physical volumes exist at Mist to backstop the trade.

These activities reflect the fact that the price of natural gas is constantly moving up or down over time and at each location where gas is traded. Of course, the ability to take advantage of these price movements requires sophisticated trading systems and a large trading staff to analyze and act quickly when transactional opportunities arise. NW Natural does not employ such systems or staff in serving its utility customer needs, and as such cannot engage in this kind of speculative activity on its own.

Q. Please describe liquids extractions.

A. Natural gas liquids (NGLs or liquids) refer to certain heavier hydrocarbons like ethane, propane, and butane that are associated with methane production—methane being the

Rates & Regulatory Affairs
NW NATURAL
220 N.W. Second Avenue
Portland, Oregon 97209-3991
1-503-226-4211

primary component of natural gas. Liquids typically have a market value somewhere between that of methane and oil. The market value can make the extraction of the liquids from methane profitable, depending on the spread between methane and NGL prices, the relative proportion of the different NGLs in the gas stream, and the cost-effectiveness and efficiency of the extraction facilities.

In British Columbia and the U.S. Rockies, the extraction of liquids occurs in the production areas, before the gas stream reaches the typical natural gas trading hubs. In Alberta, however, the industry was built such that the extraction process usually occurs in two stages: a preliminary ("shallow cut") in the production areas and then a more extensive ("deeper cut") at facilities located closer to the provincial borders, which is where there are additional markets to absorb the NGLs.

Q. How does NW Natural participate in liquids extraction?

A. The Company purchases gas out of Alberta, where a significant amount of extraction activities take place outside the production fields and after NW Natural has taken possession of the gas. For this reason, NW Natural is in a position to participate in liquids extraction by employing a processing company to perform the extraction on the Company's behalf.

Q. What special skills or knowledge are required for this activity?

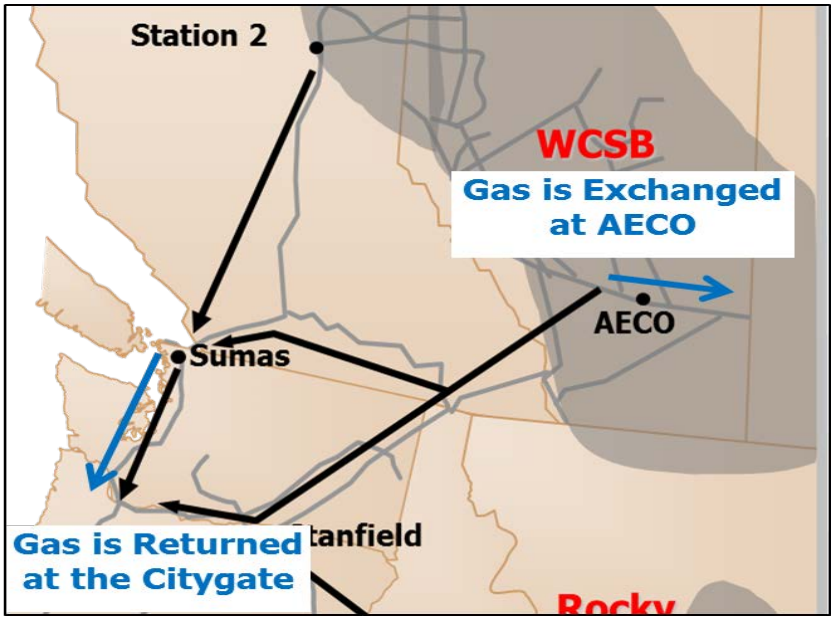
A. To take advantage of the economics of liquids extraction requires expertise in different fuels and different markets than would be typical for a gas LDC. For example, it requires knowledge of and negotiations with the owners of the various NGL extraction plants. It requires a trading footprint that extends east of Alberta and south to the mid-Continent

Rates & Regulatory Affairs
NW NATURAL
220 N.W. Second Avenue
Portland, Oregon 97209-3991
1-503-226-4211

markets—not just the Pacific Northwest. These activities require knowledge and expertise that go beyond the capabilities needed to provide LDC services that are present within the Company.

Q. Please describe Portfolio Optimization.

A. Portfolio Optimization can also be thought of as price arbitrage between trading points, but by directly utilizing LDC gas supply contracts rather than storage capabilities. These exchanges are made during periods when the Company's upstream pipeline capacity and gas commodity contracts open up opportunities for gas movements in new directions. As with the other trading activities previously mentioned, this requires a large and nimble trading staff with systems to track and act quickly on such opportunities. An illustration of this type of transaction is shown below.



The graphic above also illustrates another point, namely, that optimization transactions can involve multiple activities. In this example, gas that is purchased by

Rates & Regulatory Affairs
NW NATURAL
220 N.W. Second Avenue
Portland, Oregon 97209-3991
1-503-226-4211

NW Natural in Alberta is immediately exchanged with the optimization partner, who moves the gas to eastern markets and replaces the volumes with gas purchased in British Columbia. That in and of itself may generate revenues, but even if there is no profit in that exchange, the transaction has provided volumes that can be transported to the Alberta border from which the liquids can be extracted. So even if the exchange transaction has a negative value, the net result when combined with the liquids extraction should be positive if the optimization partner has managed all the risks of these deals, including counterparty risks such as finding creditworthy purchasers for the now-dry gas at the Alberta border.

Q. Please describe Pipeline Capacity Optimization.

A. As previously mentioned, using a third-party trading partner that can aggregate requirements over a much larger market area and potentially combine the pipeline capacity with some of the other activities mentioned above yields a better result than the LDC could achieve on its own. Pipeline capacity on its own, however, represents a fairly small opportunity for optimization.

Q. Please describe Off-System Storage Optimization.

A. This refers to the price arbitrage opportunities discussed above for Mist Storage but applied to Jackson Prairie and any other storage contracts held by the Company. Current examples include two 3-year contracts held with storage providers in Alberta.

Q. What level of involvement does the utility in general, and the Gas Supply department in particular, provide for Optimization Activities?

Rates & Regulatory Affairs
NW NATURAL
220 N.W. Second Avenue
Portland, Oregon 97209-3991
1-503-226-4211

A. Besides accounting services, the Gas Supply department is involved virtually every day in consultations with our optimization partner to review current positions, assess available resources, and determine new opportunities for optimization. The cost of this utility involvement is billed to the Gas Storage business segment.

Q. In UM 1654 the Citizens' Utility Board (CUB) argued that the Company's efforts to work with its asset manager to maximize revenues from Optimization Activities were typical among LDCs and that there was no evidence that the Company went "above and beyond" the average effort. Do you agree?

A. No, I do not. NW Natural believes that the structure of its AMA with its current asset manager provides incentives for NW Natural to work proactively with the asset manager to maximize revenues—in an arrangement not available to all LDCs that have AMAs. NW Natural continues to believe that NW Natural works harder with its asset manager to achieve superior results for our customers and shareholders than do other LDCs with AMAs.

V. The Development of the Current Sharing Arrangements

Q. How did the Commission determine the current allocation of profits from the Storage Services and Optimization Activities?

A. NW Natural met with Staff and the customer groups and presented several alternative sharing arrangements. After discussion, the parties agreed to the sharing allocations reflected in Schedules 185 and 186, and upon Staff's recommendation, they were approved by the Commission.

Rates & Regulatory Affairs
NW NATURAL
220 N.W. Second Avenue
Portland, Oregon 97209-3991
1-503-226-4211

Q. Please describe Schedules 185.

A. Schedule 185 is titled "Special Annual Interstate and Intrastate Storage and Transportation Credit," and applies to the Company's firm sales service customers whose rates include costs related to the Mist Storage facility. Under Schedule 185, customers receive a credit for the Oregon share of net margins received by the Company for (a) interstate storage and related transportation services provided under FERC jurisdiction; (b) intrastate storage activities and related transportation services under Rate Schedule 80; and (c) optimization of total Mist Storage capacity (core and non-utility allocated in accordance with the schedule).

Q. How are these revenues allocated under Schedule 185?

A. Schedule 185 provides that NW Natural will share with eligible customers the net margin received from non-utility interstate and intrastate storage services on a 20/80 basis, with 20 percent to be credited to customers and 80 percent to be retained by NW Natural. In addition, Schedule 185 provides that NW Natural will also share with eligible customers the net margin that is attributable to optimization of Mist Storage capacity (i.e., deliverability). Net margins from Mist Storage optimization are shared: (a) 20/80 for the proportion of non-utility Mist capacity not included in the rates, and (b) 67/33 for the proportion of core Mist capacity that is included in the rates, with 67 percent being credited to customers and 33 percent being retained by NW Natural.

Q. How did the Company and the parties develop the sharing under Schedule 185?

The parties agreed that the 20/80 sharing allocation was reasonable to compensate customers for the use of certain assets that were in rate base in order to accomplish

Rates & Regulatory Affairs
NW NATURAL
220 N.W. Second Avenue
Portland, Oregon 97209-3991
1-503-226-4211

what was otherwise an entirely shareholder-funded endeavor. The Company was pleased with the opportunity to expand its non-utility business, and Staff and stakeholders were pleased with an arrangement that allowed customers to benefit without incurring cost or risk.

Q. Please describe Schedule 186.

A. Schedule 186, which is titled "Special Annual Core Pipeline Capacity Optimization Credit," applies to firm and interruptible sales service customers whose rates include costs related to upstream pipeline capacity. The purpose of Schedule 186 is to credit eligible customers with the Oregon share of net margins received by NW Natural for the optimization of core customer pipeline capacity, which includes all off-system pipeline capacity, commodity, liquids extraction, and storage capacity. Schedule 186 does not apply to optimization of those portions of Mist Storage that are included in customer rates.

Q. How are revenues allocated under Schedule 186?

A. Schedule 186 provides that NW Natural will share with eligible customers the net margin attributable to third-party optimization for the entire portfolio of upstream capacity contracts. Specifically, under Schedule 186, the Company will share net revenues with its firm and interruptible sales customers on a 67/33 basis, with 67 percent to be credited to customers, and 33 percent to be retained by NW Natural.

Q. Can you describe how the revenue sharing percentages for Schedule 186 were developed?

Rates & Regulatory Affairs
NW NATURAL
220 N.W. Second Avenue
Portland, Oregon 97209-3991
1-503-226-4211

A. Initially, the parties agreed to the same 20/80 sharing percentages for Optimization Activities as those applicable to Storage Services. This was because when the Company first began this activity in 2000, it expected any margin from its Optimization Activities to be small and to come primarily from Mist Storage. However, after the first year of experience, the Company discovered that the opportunity for optimization of other resources was greater than expected. This fact highlighted an important issue for the Company: unlike the interstate and intrastate Mist Storage Services, which are funded with shareholder dollars, the majority of the Company's Optimization Activities leverage resources that are included in customer rates. In light of this fact, the Company proposed to increase customers' share for optimization of resources in customer rates from 20 percent (20/80) to 67 percent (67/33). This adjustment was intended to significantly increase the benefits to customers while maintaining an appropriate and necessary incentive for NW Natural to continue these optimization activities and seek new opportunities, and thus ensure that the "win/win" sharing arrangement remained fair and durable over time.

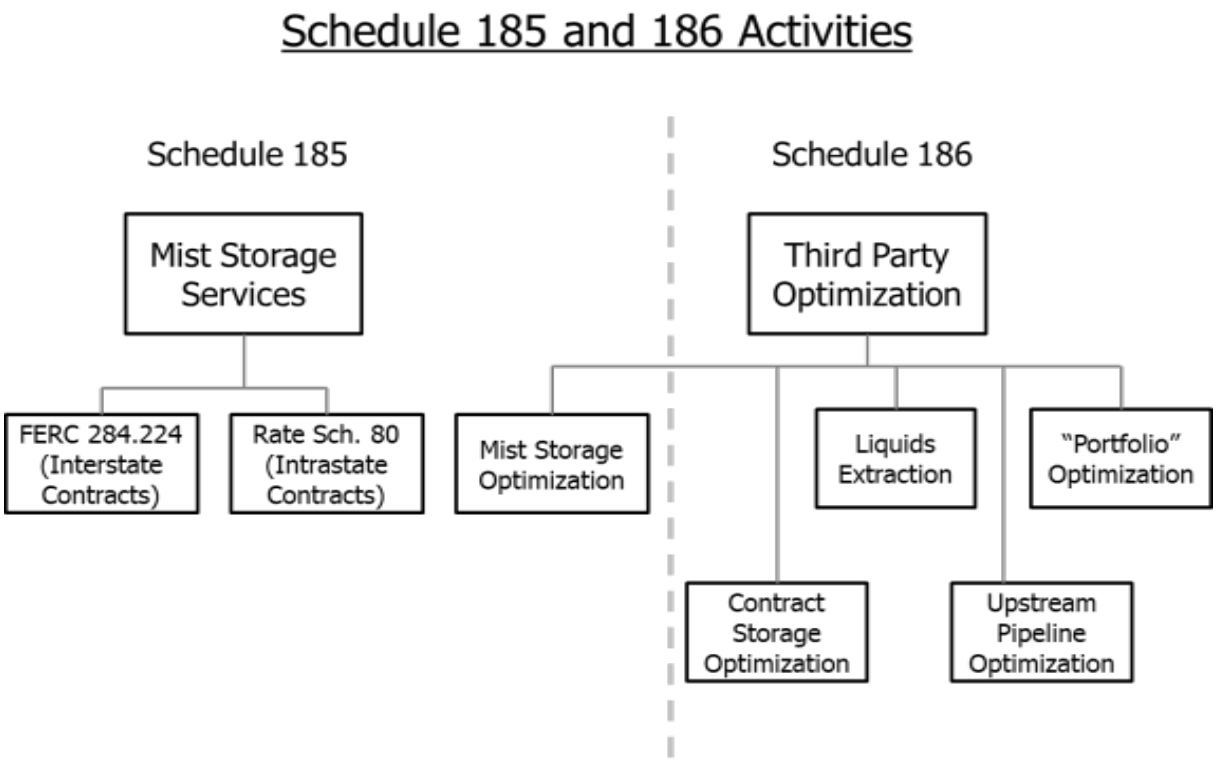
In addressing the increase, the Company specifically requested that customers receive 67 percent because, at that time, that allocation matched the weighted average cost of gas (WACOG) sharing percentage adopted for the PGA for its internal normal utility optimization of gas supply resources. Matching the 67 percent WACOG sharing was important because the Optimization Activities were in their infancy, and the Company felt that, by using the PGA sharing percentage, it could eliminate any concerns of potential gamesmanship regarding classification of activities as Optimization Activities

Rates & Regulatory Affairs
NW NATURAL
220 N.W. Second Avenue
Portland, Oregon 97209-3991
1-503-226-4211

versus normal utility gas supply WACOG savings. The Company also felt that the 33 percent retention by shareholders still provided a sufficient incentive. Today, it is well established which activities fall within each category (Optimization Activities vs. normal WACOG savings), primarily because the Optimization Activities are conducted under the AMA; nevertheless, the increase of the customer sharing up to 67 percent has remained in place as a significant customer benefit.

Q. Can you summarize the activities that are governed by Schedules 185 and 186?

A. Yes. The following figure depicts how the various activities relate to Schedule 185 and Schedule 186:



Rates & Regulatory Affairs
NW NATURAL
220 N.W. Second Avenue
Portland, Oregon 97209-3991
1-503-226-4211

The above figure shows that Mist Storage is the source for all of the Schedule 185 credits while the other gas resources in the Company's portfolio (supply, pipeline and storage contracts) are the source for the Schedule 186 credits.

VI. BENEFITS TO CUSTOMERS AND SHAREHOLDERS UNDER CURRENT SHARING ARRANGEMENTS

Q. What have been the results for shareholders and customers under the Schedule 185 and Schedule 186 sharing arrangements?

A. In NW Natural's view, the sharing arrangements have worked well and as intended. For Storage Services covered by Schedule 185, the sharing arrangement was intended to provide a sufficient profit opportunity to justify the Company's at-risk, discretionary investment of over $65 million to expand the Mist facilities. While returns have varied from year-to-year depending on market conditions, so far it has been a good investment for shareholders. In addition, customers have received 20 percent of the net pre-tax income from investments and activities funded exclusively by shareholders and customers have been able to recall this pre-built Mist capacity when needed at a depreciated value, sized in the amounts needed, and without any of the risks typically associated with storage development.

For Optimization Activities under Schedule 185 and Schedule 186, the sharing arrangement was intended to provide a sufficient profit opportunity to justify the Company taking on the more speculative Optimization Activities and their associated incremental costs and risks. The majority of margin is derived from optimizing resource

Rates & Regulatory Affairs
NW NATURAL
220 N.W. Second Avenue
Portland, Oregon 97209-3991
1-503-226-4211

contracts, which are not included in rate base. Because the costs of these contracts are passed through to customers and do not earn a return, sharing is necessary to incent shareholders to take on the added risks associated with the discretionary Optimization Activities. Under the existing sharing arrangement, customers receive the majority of the optimization margin without any exposure to additional risk or incremental costs, and the Company is incented to continue these activities.

Q. Specifically, how have customers benefitted?

A. Customers have received a cumulative $133.5 million in credits since 2000.

For Mist Storage Services, there is an additional and significant customer benefit because the Company has been and will continue to be able to recall Mist Storage to meet customers' actual demand need in smaller capacity increments as the need arises. By recalling smaller portions of storage that the Company has pre-built, the Company helps customers avoid paying for excess capacity that is not needed, both because recalls are not "lumpy additions" and because the customers' need for new capacity is itself subject to demand growth forecasting risks. In addition, because the expanded storage has already been constructed, customers are not exposed to the permitting and development costs and risks. And once the storage resource is recalled for customer use, the resource goes into rates at depreciated book cost, not the actual costs to construct.

VII. COMMISSION ORDER NO. 15-066

Rates & Regulatory Affairs
NW NATURAL
220 N.W. Second Avenue
Portland, Oregon 97209-3991
1-503-226-4211

Q. Please describe the Commission proceedings that led to the Commission's directive in Order No. 15-066 that an independent study of Storage Services and Optimization Activities be performed.

A. In NW Natural's 2011 General Rate Case, Commission Staff and CUB argued that the revenue sharing arrangements for Storage Services and Optimization Activities should be revisited. Specifically, Staff and CUB argued that the amount of revenues earned by the Company for those activities was unwarranted and should be reduced. The Company disagreed, arguing that the sharing framework should be retained. The parties ultimately settled this issue by agreeing that the current sharing percentages should remain in place until the Commission considered the issue in a new docket opened specifically for that purpose.[6] To implement this agreement, the Commission opened Docket No. UM 1654.

Q. Please summarize the proceedings held in UM 1654.

A. UM 1654 was a fully litigated contested case docket, which included two separate hearings and four rounds of testimony. Despite the amount of evidence presented, the Commission ultimately determined that it required additional information to decide the issues. Specifically, to assist it in determining the correct treatment of these revenues, the Commission ordered that a third party should conduct an evaluation and cost study of NW Natural's Storage Service and Optimization Activities. The Commission described the study it desired as follows:

[6] *In the Matter of Northwest Natural Gas Co. Application for a General Rate Revision*, Docket No. UG 221, Order No. 12-408 at 10 (Oct. 26, 2012).

Rates & Regulatory Affairs
NW NATURAL
220 N.W. Second Avenue
Portland, Oregon 97209-3991
1-503-226-4211

> *The study will more robustly examine the risks, costs, and benefits of NW Natural's optimization activities, the assets being utilized for those activities, the allocation between regulated and unregulated services, and the various components of NW Natural's system that drive the costs and revenues associated with interstate storage services.*[7]

To implement this mandate, the Commission ordered the parties to form a steering committee to hire a third-party to conduct the study, and further stated that it would retain the Company's current sharing percentages while the study was conducted and reviewed.

VIII. LIBERTY'S CONCLUSIONS AND RECOMMENDATIONS

Q. Did the parties retain a third-party to conduct a study consistent with the Commission's order?

A. Yes. Consistent with the Commission's order, the parties formed a steering committee and worked together to hire an independent consultant to review NW Natural's Storage Services and Optimization Activities, and to make recommendations about appropriate approaches to revenue sharing for each. Specifically, after investigating potential experts, the steering committee solicited proposals from three consultants, and, after a full review, engaged Liberty.

Q. Please describe Liberty's study approach.

A. To initiate the study process, the steering committee members developed a chronology of events in the development and use of Mist Storage and provided it to Liberty, and NW Natural also provided detailed financial information. Liberty gathered additional

[7] *In the Matter of Northwest Natural Gas Company, Investigation of Interstate Storage and Optimization Sharing*, Docket No. UM 1654, Order No. 15-066 at 5 (Mar. 5, 2015).

Rates & Regulatory Affairs
NW NATURAL
220 N.W. Second Avenue
Portland, Oregon 97209-3991
1-503-226-4211

information through data requests, interviews, and meetings. Liberty then analyzed the information to evaluate costs and allocation, as described in the Liberty Report.

Q. Please summarize Liberty's conclusions.

A. Liberty came to two primary conclusions. ***First***, Liberty determined that there is significant support for continuing the current sharing arrangements for the Company's Storage Services. ***Second,*** Liberty found that there is room to reduce NW Natural's share of optimization margins, to bring the Company closer in line with sharing established in other jurisdictions.

Q. What was the basis of Liberty's conclusions?

A. Regarding the Storage Services revenues, Liberty determined that the current sharing arrangements are consistent with industry standards and are balanced and appropriate. Moreover, Liberty finds that continuing sharing percentages at the status quo will maintain benefits for customers and shareholders at approximately past and current levels, and that no change is warranted.

Regarding the sharing for Optimization Activities, Liberty expressed its belief that the sharing percentages for these activities should be altered. Liberty's conclusion regarding these sharing arrangements appears to be based on two primary findings. First, Liberty finds that, while NW Natural has worked diligently with its asset managers to promote the robust optimization of its portfolio assets and has produced substantial value for its customers through these efforts, NW Natural's efforts are not beyond those generally seen in the industry. Second, Liberty presents the results of its survey of the sharing arrangements for optimization activities generally found in the industry, which

Rates & Regulatory Affairs
NW NATURAL
220 N.W. Second Avenue
Portland, Oregon 97209-3991
1-503-226-4211

found that the percentage made available to NW Natural's customers falls at the low end of the observed range for jurisdictions that provide for sharing. Given these findings, Liberty concludes that the Company's sharing percentage could be reduced.

Q. Do you agree with Liberty's conclusions?

A. In part. NW Natural agrees that the current sharing percentages for Storage Services should be maintained. However, the Company disagrees that NW Natural's percentage of revenues from Optimization Activities should be decreased.

Q. Why do you disagree with Liberty's conclusions about the revenue sharing percentages for Optimization Activities?

A. NW Natural believes that the range of sharing arrangements reviewed in Liberty's survey are not specific to the more sophisticated Optimization Activities conducted by NW Natural through its AMA. Many of the LDCs surveyed by Liberty do not employ an asset manager, and it appears that the optimization activities referenced are equivalent to those NW Natural carries out itself, which benefit customers through the PGA. Moreover, NW Natural believes that even those LDCs that have engaged a third-party asset manager may not have an arrangement that encourages or allows the type of sophisticated transactions engaged in by NW Natural's asset manager on the Company's behalf. NW Natural believes that if Liberty had focused its review on optimization programs similar to that included in Schedules 185 and 186, NW Natural's share, while still at the high end of the range, would not appear to be an outlier.

Moreover, NW Natural's customers have benefitted greatly under the current sharing arrangements, while at the same time the Company has enjoyed consistent

Rates & Regulatory Affairs
NW NATURAL
220 N.W. Second Avenue
Portland, Oregon 97209-3991
1-503-226-4211

rewards for its efforts on customers' behalf. NW Natural believes that the regulatory certainty of a consistent sharing framework has been an important factor in the success of both its Optimization and Storage Services Activities, and the Company believes that these arrangements should be maintained.

Q. Does this conclude your testimony?

A. Yes.

Rates & Regulatory Affairs
NW NATURAL
220 N.W. Second Avenue
Portland, Oregon 97209-3991
1-503-226-4211

BEFORE THE

PUBLIC UTILITY COMMISSION OF OREGON

UG 344

NW Natural

Exhibit of Randolph S. Friedman

ISS/ OPTIMIZATION

EXHIBIT 1301

Final Report on
The Liberty Consulting Group's Evaluation of
NW Natural's Optimization Activities

Public Version
Confidential Material Redacted

1451 Quentin Rd Suite 400
#343
Lebanon, PA 17042

admin@libertyconsultinggroup.com

717-270-4500

November 21, 2017

Table of Contents

I. Introduction

A. Background

This study addresses forward-looking alternative methods and shares for apportioning NW Natural margins (net revenues) produced by offering contract gas storage services into interstate and intrastate markets and by optimizing the use of the assets employed to provide service to customers for utility sales service ("core utility customers"). These optimization activities include the capture of opportunities presented by the Mist underground storage facility. They also include very substantial opportunities inhering in the capacity provided by other utility assets. Mist may generate the greatest visibility on optimization, but the economic benefits produced by these other assets have proven far greater.

NW Natural Gas Company ("NW Natural") serves more than 700,000 customers in Oregon and Southwest Washington. NW Natural owns and operates the Mist underground gas storage facility, which:

- Supports deliverability to core customers at times of peak demand
- Enables withdrawal of lower-priced seasonal purchases stored when prices are high
- Provides capability to offer interstate and intrastate storage services
- Provides capability to support a variety of other transactions whose positive margins enhance the facility's economic value.

Mist storage employs depleted gas reservoirs located near Mist, Oregon. NW Natural faced significant forecasted expansion in demands for utility service in the late 1990s. Original storage and related pipeline development at Mist entered utility service in 1989, with subsequent expansions adding to capability in 1991, 1997, and 1999. Company management undertook development and expansions through this time to serve core customers, leading to the inclusion of their capital costs in utility rate base. Thus, expected increases in core-customer needs provided the driver for capacity expansion. Throughout this report, references to "management," absent explanation generally refer to the leadership and management of NW Natural.

Expansion since 2000 has continued, but under a change that introduced the concept of utility-service "recall." This transition introduced a novel approach to rate treatment for utility capital assets. Pending recall for serving core customers, expanded capacity has remained outside rate base until recalled. Moreover, recall has occurred in discrete portions of Mist capability, with those amounts established by current needs to support core-utility use. Pending such recall, management has retained the ability to use that capacity to serve the broader Pacific Northwest regional market, for the principal benefit of NW Natural's "ownership" (a term we use in this report to distinguish the general economic interests of shareowners in corporate economic results from the special interests created by margin sharing here). Revenues from these non-core operations relying on unrecalled capacity have had to support investment carrying and operations costs assigned to that capacity. NW Natural's ownership, as opposed to its customers, have thus borne the risks and captured the opportunities associated with unrecalled Mist capacity. Margin sharing with customers has produced a moderate exception to this general assignment of risks and opportunities.

NW Natural began making these subject-to-recall investments to add to Mist capability in 2000, following them with similarly-treated investments for additional expansions in 2001 through 2008. As of year-end 2016, these investments totaled approximately $67 million.

Management also optimizes the value of the non-Mist, utility-owned or contracted supply assets, with the gains produced shared in different proportions (contrasted with Mist sharing) between customers and ownership.

An arrangement approved by the Oregon Public Utility Commission (OPUC, or the Commission) has since 2001 determined the sharing of net revenues between core utility customers and ownership. Services offered to customers outside of Oregon, subject to the jurisdiction of the U. S. Federal Energy Regulatory Commission (FERC) rely in part on assets that meet core-customer needs. The Commission's review of the sharing arrangement in Docket No. UM 1654 produced a directive (Order No. 15-066) to conduct an independent, outside cost allocation study and evaluation.

B. Study Scope

Our work provides an independent evaluation and cost allocation study of optimization activities, addressing:

- The assets being optimized
- The investment and other "contributions" made on behalf of core customers and those made otherwise
- The changes in the capabilities of assets used to optimize
- The sources of their funding
- The marketplace opportunities created by those changes
- The operational and financial risks that those changes and marketplace opportunities created
- Current and historical allocation of costs and benefits between Oregon-jurisdictional and FERC-jurisdictional services
- The benefits (absolute and relative) accruing on the Oregon-jurisdictional and FERC-jurisdictional sides from those allocations
- Comparison of allocations with those in other, similar situations.

The study's scope addresses three sources of shared margins produced by NW Natural management:

- Contract gas storage services for on-system and off-system customers: Intrastate Storage (NW Natural Rate Schedule 80) and Interstate Storage Service (FERC 284.224)
- Mist optimization
- Other asset optimization.

Our scope excluded one other form of sharing - - incentives for securing the natural gas commodity at prices better than targeted levels. The Purchased Gas Adjustment mechanism governs that sharing.

The current sharing arrangements have been vetted with and transparent to the Commission and stakeholders throughout this period. This report seeks to provide a foundation for stakeholder discussion and Commission determination of whether current margin sharing remains optimum looking to the future. We did not consider realigning past sharing percentages or dollar amounts with historic costs and benefits. We did, however, find historical results useful in understanding how stakeholders and ownership "got here," but, in the final analysis, the only questions we addressed concern "where things are going."

C. Study Process

We began by asking the Steering Committee members to work together to produce a chronology of events in the development and use of Mist Storage facilities, in order to develop promptly a reasonably complete picture of the development of the facilities and their use, an understanding of key decisions and events, and to begin the identification of areas where committee members might have differing understandings or perspectives. The cooperative efforts of the members in developing that chronology provided a strong foundation for the fact gathering and analysis we undertook as the study progressed.

Other early study efforts included a request for detailed financial information about the development and operation of the facility, including key components such as Capital Expenditures and Revenue and Expenses for both customer and shareholder assets. Management compiled this information and made it available to Steering Committee members for review for accuracy and completeness.

We undertook an iterative series of information requests and interviews (both in-person and telephonically). Weekly status calls with the Steering Committee kept us and the members updated on project status and progress, and gave an opportunity to discuss issues, observations, key assumptions, data needs, next study steps, and other matters as work progressed. We prepared a number of interim presentations or white papers to help guide progress under mutually-understood concepts and schedules. These status calls helped ensure that all members of the Steering Committee had access to the same information that we received, and that opportunity existed for the expression of the viewpoints of all as work proceeded.

We conducted a multi-day kick-off meeting and interview session at NWN's Portland offices, with each Steering Committee member in attendance. NWN management began the kick-off session with an overview presentation to review key details of Mist development and use, significant investments and development at Mist, and roles and responsibilities associated with Mist Operations and other optimization. Management's third-party asset manager, Tenaska, also attended a portion of this session, sharing the perspective of its personnel on their role in optimization activities and answering questions from the Steering Committee.

We followed these initial sessions with additional data gathering and acquisition through data requests and the conduct of phone interviews. These data gathering steps helped further Liberty's

understanding of key concepts and helped complete our remaining data needs. We conducted a web meeting with the Steering Committee to present a preliminary overview of key analytical assumptions and methods, preliminary findings in various project areas, and key analyses of financial and operational data. The goal of this session was to update all members of the Steering Committee on the key paths to project completion, to confirm consensus on the types of analytical and modeling work that would form the key underpinnings of the final report, and to review data use and potential revisions or modifications to information provided by NWN, or used by Liberty. Each member of the Steering Committee provided oral or written comments in response to this overview presentation, which Liberty considered for the completion of remaining project deliverables. Further data requests and phone interviews followed this process to acquire the final information necessary to complete our analysis.

Liberty and the Steering Committee met again in Portland for a final presentation of preliminary findings and conclusions, with a goal of sharing these key issues with the Steering Committee and obtaining feedback regarding factual accuracy, where and whether additional data or perspectives should be considered, and what additional efforts would be needed to compete the report. Liberty used the feedback from these meetings to aid in the writing of our draft report. This draft was shared with the Steering Committee, whose members had an opportunity to review and provide written and verbal comments and feedback.

D. Sources and Amounts of Sharing

1. Sharing Structure

The first source of sharing is associated with the portion of Mist capability not yet recalled for core-service utility use, and falls under the category of ***Interstate Storage Services (ISS)***. Calculations for determining and sharing ISS margins operate as follows:

- Begin with total ISS revenues
- Deduct costs for O&M (*e.g.*, allocating payroll for the utility employees supporting storage transactions), leases, depreciation, interest, and property taxes
- The result equals "net revenues"
- Apply 20 percent of net revenues to offset costs to core utility customers
- Leave 80 percent of net revenues available to ownership.

The second source of sharing arises from exploiting the ability to optimize Mist capability that frequently proves excess to the needs of core and storage customers. The calculations for determining and sharing margins in this ***Mist Optimization*** category operate as follows:

- Begin with Total Mist Optimization revenues
- Set margin shares according to the apportionment of Mist deliverability (recall of Mist capability produced an allocation of 59 percent to core utility service for 2016)
- Apply 67 percent of the 59 percent of deliverability allocated to core-utility service to offset costs to core utility customers
- Leave 33 percent of the 59 percent of deliverability allocated to core-utility service available to ownership

- Apply 20 percent of the remaining 41 percent of deliverability to offset costs to core utility customers
- Leave 80 percent of the remaining 41 percent deliverability allocation available to ownership.

The third source of sharing, ***Other Asset Optimization***, arises from non-Mist opportunities associated with assets such as upstream pipeline use, other storage, portfolio optimization, and the extraction of valuable natural gas liquids remaining in gas sourced from some regions in Canada. The calculations for determining and sharing those margins operate as follows:

- Begin with Other Optimization revenues
- Deduct compensation paid to the third-party asset manager
- The remaining amount equals margins subject to sharing
- Apply 67 percent of margins subject to sharing to offset costs to core utility customers
- Leave 33 percent of margins subject to sharing available to ownership.

2. Historical Margin Amounts

The next chart summarizes the margins produced for sharing since 2000. They have amounted to a very substantial [redacted] over this period.

Sources of Margins (2000-2016)
(in millions) (confidential)

The next chart shows customer shares of those margins, which have amounted to $137 million.

Customer Shares of Margins (2000-2016)
(in millions) (confidential)

E. Our Approach to Cost Analysis

1. The Commission's Order

Oregon Commission Order No 15-066 (Docket No. UM 1654) addressed the question of cost analysis for purposes of our study:

> *We determine that a neutral third party should conduct an evaluation and cost allocation study of NW Natural's optimization activities. The study will more robustly examine the risks, costs, and benefits of NW Natural's optimization activities, the assets being utilized for those activities, the allocation between regulated and unregulated services, and the various components of NW Natural's system that drive the costs and revenues associated with interstate storage services.*

This Commission determination treats cost evaluation and allocation in a holistic fashion (*i.e.*, in the context of the risks and benefits associated with those costs). Examining costs under this broad framework reflects a "marketplace" view, which we consider an integral element of the relationship between NW Natural's customers and Company ownership as it involves optimization. That view accommodates the reality that has existed since optimization began - - transactions take place, not in a regulated utility market, but in competitive ones.

2. A Useful Context for Examining Optimization Costs

Customers and ownership have had a symbiotic relationship under optimization. The term "dynamic" gives more precision than "relationship" to the circumstances created by splitting costs, benefits, risks, and ultimately the margins such factors have combined to produce. "Relationship" implies multiple parties; here NW Natural acts as a single entity for purposes of asset ownership and providing for the transactions with third parties on which optimization

depends. The dynamic created by sharing, however, gives NW Natural two identities in a practical sense - - one seeking to optimize costs for core utility customers and one seeking to recover investment and operating costs through uncertain market revenues.

This dynamic supports an approach that conceptually views these two identities as "transacting parties." This "transaction" perspective reflects that customer and ownership interests have distinct characteristics. Certainly, the sharing arrangement has the essential characteristics of a bargain, which aligns costs, risks and opportunities with benefits. Equally certainly, the interests of the two, while reconcilable, are not identical when it comes to sharing the optimization *risks, costs, and benefits* that frame the issues relevant here. For example, a gain in one party's percentage share comes from the share of the other. For another example, risk tolerances when customers take them are different from those that ownership is likely to be willing to take for its own account when operating in competitive markets.

Addressing the issues that surround optimization margin-sharing requires resolution of significant baseline questions that this report examines:

- What revenues and ***costs*** require allocation?
- By what methods should revenue and ***cost allocation*** occur?
- By what methods should ***asset cost allocation*** occur?

Applying a "cost" perspective traditionally used in the regulated-utility regulatory construct ultimately does not inform meaningful answers to the overarching questions about optimization margin-sharing. Optimization must employ prices competitive with those of market choices available to customers who have alternatives (often robust) to those that NW Natural can offer. With respect to assets not yet included in utility rate base (or, at NW Natural ownership's risk, as this report explains), no backstop has existed for the return of and on investment where market prices prove insufficiently compensatory. No regulatory method has existed to cover the costs of any inefficient portion or stranded costs of such investments.

Separating Mist versus Non-Mist optimization activities highlights key differences among the three sharing mechanisms we examined. All have similarity in that each must operate under the risks and opportunities (and resulting benefits) resulting from the market pricing. However, responsibility for the costs of the asset portions enabling optimization can vary significantly between the two. For the revenues produced for Interstate Storage, for example, customers gain benefit without the inclusion of any investment costs in their rates for utility service. Ownership, by contrast, bears risks of recovering substantial carrying costs for investments. The same is true for optimization revenues from the unrecalled portion of Mist.

For non-Mist optimization, and for the portion of Mist optimization relying on rate-based costs, ownership gains benefit for no investment costs for which they have responsibility, while customer rates include substantial investment costs. An attempt to sort through these divisions in a logical manner would prove complex, even should one find a traditional utility regulatory construct appealing, despite what we view as the overriding need to consider the market in which optimization occurs. There is one notable exception, which has informative value in two respects

- - one quantitative and one illustrative of the effective customer/ownership business relationship created by the dynamic existing here.

The first source of illumination results from examining value gained or foregone in deciding not to place the entirety of Mist investment in rate base at the outset. This alternative would have left to customers all the risks and opportunities of optimizing the substantial capacity in excess of core customer requirements. Management and stakeholders both expected that excess to remain in existence for a fairly short time. As compared with a potential long-term investment for shareowners, these expectations moderated both shareowner opportunities and the risks as envisioned by management at the time. However, as we explain in this report, that excess has lasted at least a decade longer than originally forecasted some 16 years ago. This hypothetical alternative (which assumes without asserting that such risk would have been considered tolerable for a regulated utility at that time) provides one benchmark for looking at how risks and benefits have sorted themselves out over time.

The second, conceptual source of illumination provided by this hypothetical alternative comes from the clarity that the customer/ownership dynamic brings to a useful notion. When it comes to sharing use of assets planned for utility use, one should expect an internal sorting of *risks, costs, and benefits* to reflect reasonable consistency with what one might expect of a relationship hammered out between a utility and a third-party. In other words, if one can objectively determine that the sorting of *risks, costs, and benefits* existing here would be reasonable if agreed to with a third party, then that determination provides a substantial indicator of the reasonableness of a similar sorting between customers and ownership.

3. How We Analyzed Costs

Thus, we believe that the Order calls for an evaluation and study broader than that encompassed by a traditional revenue-requirements or cost-of-service analysis for utility investments. The Commission's addition of risks, benefits, and utilization of assets to "costs" reflects how the relationship here differs from the situation typical in examining long-lived utility assets solely dedicated to utility use with an assured opportunity to earn (not a guarantee of) a regulated return:

- The relationship here did not involve a certain-to-be-long opportunity for returns, because of the ability of a high-growth utility operation to recall capacity at depreciated cost and at times of its choosing.
- There was no assured opportunity to earn any, let alone a pre-identified, return on the investments remaining outside rate base (*i.e.*, not yet recalled by utility operations).
- Given the lack of a regulatory ratemaking construct to provide utility-typical assurances of return on a long-term investment, it would not have been realistic to secure a non-utility party with whom to engage in a manner that would have provided the timing and cost benefits produced by the power to recall possessed by utility operations.

More than 15 years have passed since the initiation of Mist expansion activities designed to meet utility requirements, while providing to investors market opportunities to compensate them for investment amounts not yet recalled for inclusion in utility rate base. We do consider it pertinent

to examine Mist expansion beginning around 2000 for shedding light on "how we got here," but our purpose for doing so involves forward-looking alternative sharing mechanisms.

There is one partial exception to this limitation, which corresponds to a possible alternative approach, recognized by management when planning Mist expansion. That approach consisted of building capabilities out fully at customer expense, providing customers with the opportunity to benefit from revenues gained from market opportunities.

Our evaluation compared actual results with historical expectations. We did not do so to re-evaluate what we believe to have been transparent and accepted sharing methods. Rather, we sought to provide a basis for determining to what degree realistic expectations for customers and ownership have been met across the period from 2000 to 2016. That balance or imbalance may exist, considering just two examples:

- Provide some support for an alternative that would continue current sharing arrangements for some period to permit better alignment between of expectations and actualities
- Suggest alternatives for change, should the numbers show that a rough balance has not existed, or that Mist has changed operating characteristics or operates in a different market environment.

A central aspect that our analysis considered recognizes that, in and around 2000, an opportunity available to a non-utility partner (ownership or third party) existed to:

- Invest in storage assets above current utility needs in return for securing net storage revenue after a 20-percent sharing of that revenue with customers
- Bear the risks of storage markets and pricing, and construction
- Remain subject to recall by the utility as and when determined by the utility, causing a transfer of the recalled capacity's depreciated investment, and loss of the associated storage market revenue.

To summarize, we examined and evaluated what we observed as the key aspects of the Mist storage business. That analysis includes costs, risks, benefits, and asset contributions. Those aspects comprise:

- The apportionment of storage assets, capabilities and operations
- Allocations of capital and operating costs
- Storage opportunities, risks, and revenues
- Margin-sharing arrangements and their impact on shareholders and customers
- Cash flows to shareholders from the storage assets
- Actual shareholder rates of return and returns on investment
- The degree to which customers and ownership have obtained the "benefit of their bargain" through 2016
- Forward-looking changes in margin-sharing arrangements and their likely impacts.

F. Overall Summary

We have examined sharing arrangements, their foundations, their history, expectations under them, and alternative structures that may make sense to apply in the future. Our discussions with Steering Committee members produced several elements of the framework under which we structured our work:

- The production of a range of alternatives, rather than a single Liberty view
- The ability to gauge results under those alternatives on a forward-looking, not retrospective, basis.

We considered a period of five years to be appropriate for "look-aheads" in what have been very dynamic markets in the industry. This report provides a range of alternate approaches in the two main categories of sharing within our scope - - Mist and asset optimization. For each of those alternatives, we have also provided variations. We calculated expected ownership and customer results for each variation. We did so using a simplified model that permits calculations of expected results for the variations we have presented.

As our description of the variations we tested demonstrates, one can postulate a very large number of permutations and combinations for each variable. We did not calculate results for each, but the availability of our model and its ease of use permit each Steering Committee member to do so for any variation or combination of variations of interest. Some overlap exists between the Mist and the Non-Mist results we have modeled. Small timing variances also exist between these two types of expected results modeled. Management's methods of accounting for the two forms led us to calculate expected Mist optimization results on a calendar-year basis, and to calculate other optimization using the "contract" years that management uses for other optimization results. One can rationalize the small overlap and timing differences, but it makes sense to perform that rationalization only for a final, select set (as opposed to all) of variations.

Our overall views, expressed here not to imply criticism of other solutions, take two principal forms:

- The original design, the historical results, the expected results, the continuation of similar risks and opportunities, and the comparatively smaller dollar amounts at stake provide significant support for continuing the current sharing arrangements for interstate and intrastate Mist storage.
- Substantial room exists to reduce ownership's share of optimization margins to bring them closer into line with those established in other jurisdictions, while still leaving management with a sufficiently strong incentive to perform optimization in complex and dynamic markets.

II. Mist Margin Sharing

A. Background

1. The Inception of Mist Interstate, "At-Risk" Storage

Following FERC authorization, NW Natural began in 2001 to offer storage services into the interstate market. This offering relied on expanded Mist capacity not yet required to meet the needs of its on-system customers. Management developed the service following analysis of markets in the Pacific Northwest and regular interaction with other storage operators. NW Natural made a September 1999 presentation to the Oregon Commission Staff, proposing that shareholders: (a) make what we have termed "At Risk" investments needed for the interstate storage markets, and (b) provide "pre-built capacity," including reservoirs and station compression, for eventual use by the utility system. The proposal would identify the net costs of interstate storage as the: (a) "incremental investment-related costs" (depreciation, interest, property taxes), and (b) "incremental O&M and administrative costs" for Mist storage expansions required to garner revenue from interstate storage services and facility optimization activities.[i]

Significant discussions of the proposal preceded a Staff analysis and recommendation memo dated April 18, 2000. The memo noted:

> "… *NW Natural discussed its desire to begin offering storage services into the interstate market using storage capacity that is temporarily excess to the Company's core customer needs. ... the Company's proposal to provide such service would involve the expansion of storage reservoir capacity at Mist at shareholder expense and in advance of its core customer's needs. However, because some use of existing utility facilities (such as the North Coast Feeder and Miller Station) would be required, NW Natural has proposed a sharing mechanism to compensate the core customers before such use. Any incremental expansion costs associated with this service would be borne by the company's shareholders and such costs would not be included in utility rates until such time as the capacity is recalled for the core's use, and rate making treatment is approved by the Commission."*

Staff recommended that the Commission approve a mechanism (incorporated into Rate Schedule 185) for sharing net revenues between the company and its core customers on a 20 percent customer, 80 percent ownership basis.[ii]

Management has conducted Interstate Storage Service (ISS) business pursuant to rules promulgated by the Federal Energy Regulatory Commission (FERC). Those rules prescribe a cost-allocation method that results in maximum permissible rates for services. Management has consistently found these "maximum rates" far in excess of "what the market will bear" in the Pacific Northwest. Discounting the rate to a market level, as allowed by FERC rules, has permitted management to market available capacity to the market with notable success from 2000 to the present, with expectations that the market will continue to find the services attractive.

2. The Basic Mist Bargain between Customers and Ownership

The progression of storage development at Mist centers around storage assets developed and held for future use by the utility. Storage developed at Mist resulted from future core-customer needs identified through an integrated resource planning process that has had broad stakeholder visibility and participation. Even after 2000, the factors driving Mist storage development included core utility needs and that development remained subject to the ability to capture capability as it became needed for utility use. Meeting core utility needs has thus provided "critical mass" and central justification for expanding storage and deliverability. Moreover, utility rate base assets have provided Mist with the "connectivity" needed to inject and withdraw gas in economically useful ways. Utility personnel also provided experience and market intelligence useful in developing and executing plans for the expansion of storage at Mist.

Consequently, three principal factors - - the core needs provided by utility demand, the existence of a transportation and delivery system connecting Mist to markets, and utility knowledge and effort - - have made customer needs and contributions a key element in Mist development.

While development at Mist has anticipated, and sought to accommodate eventual utility use, development has proven to lead growth in utility needs by a large factor. Mist development beginning in 2000 came on the basis of widely shared expectations for a high rate of growth in utility needs as NW Natural made the investments that produced expansion. In retrospect, that growth has proven very much slower than the assumptions driving the pace of investment in Mist expansion. The differential between deliverability increases and utility needs has had a profound effect on the stake that ownership has had and continues to have in Mist. They have financially supported expansion in return for taking the lion's share of the margins that expanded deliverability in storage markets has produced. Ownership's opportunity for uncapped margins came, however, with the risks of producing substantial revenues in dynamic markets and under operating risk. Moreover, the duration of those risks has become long extended, as the pace of utility recall has been very much slower than expected. The extension of risk, however, has also been accompanied by a concomitant extension of opportunities to make economically beneficial use of the portion of Mist capability not yet recalled for core utility use.

Customers have shared on a minority basis in the market opportunities, but their principal benefit has come in ways not available under traditional utility capital expansion approaches:

- No need to pay upon expansion for storage capabilities not immediately needed
- No need to take market risk for recouping the costs of temporarily excess capacity
- No need to carry full installation costs in rates, because recall comes at costs depreciated through the time of each recall of incremental Mist capability.

NW Natural ownership's undertaking of pre-recall market opportunities and risks generated these benefits.

3. A Mutually Failed Expectation - - Not Necessarily "Bad News"

Differences between expectations and realities since the year 2000 have proven substantial. Original expectations called for expanded storage at Mist to become "used and useful" in providing core utility services within a few years. Expected annual utility recalls of 20,000 dekatherms per day (Dth/day) would produce full recall of the capability added through

developments involving the Reichhold field (discussed below) in less than six years. Now more than 15 years down the road, a portion of that capability remains unrecalled. Much slower than expected utility recall has had a significant ameliorating effect on the storage costs include in rates for core utility services. Equally important, it has materially extended the duration of both the opportunities and the risks that ownership expected to be taking at the time of key expansion activities across the period since the year 2000.

Our analysis has focused on addressing sharing mechanisms currently and for the future. The scope of our study did not include a retrospective analysis of the merits of arrangements to date, although, as we will describe, those arrangements have produced significant benefits for both customers and ownership.

Nevertheless, as we explain further below, certain aspects of the historical structure and results do have some bearing on the breadth of the perspective appropriate to the circumstances. For example, the historical record makes clear that no permanent division of assets on either an ownership or operating basis was contemplated as part of the Mist operating and sharing structure created and sustained for the past decade and a half. The approach and the mechanisms adopted anticipated a short-term arrangement, following which Mist capability added after 2000 would be owned and operated like that existing in 2000. Specifically, it would be operating as part of utility rate base at depreciated cost to serve core utility needs.

Had utility growth accorded with earlier expectations, the question of sharing the benefits of Mist storage capability added at Reichhold would now be moot for a decade. The high growth rates at the start of this century gave particular significance to the Mist expansion incentives of the sharing arrangements put in place at that time. The low growth now expected over the coming years minimizes the short- and intermediate-term importance of that incentive. Factors like these raise several questions that could have relevance in looking at the continuing merits of current sharing arrangements:

- Has the failed expectation about the fast pace of recall left either customers or ownership substantially disadvantaged?
- If so, does that disadvantage argue for future arrangements that will give the disadvantaged "side" an opportunity for redress?
- Does the lack of a need for an expansion incentive suggest reapportionment of margins?

We examined historical results for two reasons:

- To provide a basis for assessing the first two of the three questions posed above
- To assess how likely continuing the current arrangements into the future may prove in generating benefit levels absolutely and proportionately in line with past results.

B. Summary of Key Conclusions

1. *Resource planning to meet core-customer needs has driven development of storage and delivery capability at Mist.*
2. *All Mist capability developed before 2000 underwent traditional rate base inclusion, with costs entering rate base as development occurred.*

3. *Significant expansions have ensued since (after 2000), with Integrated Resource Planning for core-customer needs still identifying large demand and usage growth in the early years.*
4. *Core customers and the facilities whose costs those customers have borne have played a necessary and central role in Mist development; they have provided:*
   a) ***Critical Mass*** *- - levels of demand and usage needed to justify initial and continuing development of Mist*
   b) ***Connectivity*** *- - pipeline and other facilities necessary to connect Mist with markets*
   c) ***Personnel*** *- - to provide planning, development, and market experience.*
5. *The support that core customers have provided for Mist operations in competitive markets has been substantial, and compensation for that support has taken forms best measured by the opportunities that support has helped to create - - not by allocating the costs of the rate-based facilities involved in traditional utility rate-making.*
6. *There has never been, nor was there planned a permanent division of formal or equitable "ownership" of Mist assets or capabilities*
7. *Mist expansion after 2000 introduced the concept of "recall," under which portions of Mist capacity would become assignable to core-customer use, in amounts determined pursuant to regular Integrated Resource Plan examinations by the Oregon Public Utility Commission.*
8. *Margin sharing has provided customers with direct benefits from storage of about $54 million from 2000-2016.*
9. *Recall has also provided core customers with additional and unusual economic benefits, when compared with traditional utility regulatory means for introducing the costs of "lumpy" capital investments.*
10. *In particular, those additional economic benefits (valued at an additional $54 million for customers) provided core customers with:*
    a) ***Just-in-Time Delivery –*** *Keeping the costs of storage capacity out of rate base until needed by the utility.*
    b) ***Favorable Unit Prices - -*** *The general "first-in-first out" approach to recall (first recalling the oldest producers of unrecalled capacity) and the use of depreciated original cost for recalled capacity.*
11. *Pending recall, NW Natural ownership has remained responsible for the carrying costs of as-yet unrecalled capacity, and has taken the market risks of finding market sources of revenue sufficient to recover those costs.*
12. *Therefore, ownership also made valuable contributions to Mist development:*
    a) ***Mist Development Efficiency - -*** *Optimizing sizing and timing of development*
    b) ***Absorbing Carrying Costs - -*** *Pending recall for core utility use*
    c) ***Warehousing Capacity - -*** *Taking risks of recovering carrying costs pending recall.*
13. *In return, ownership took, subject to sharing, opportunities for returns potentially beyond its costs.*

14. *Ownership expected (but was not guaranteed) a short duration of exposure to risks and opportunities, with Integrated Resource Plan estimates indicating a period of less than six years for exhaustion of the development at Reichhold, the first reservoir developed in 2000/2001.*
15. *Ownership thus focused not on hurdle rates expected by storage market developers, but on incremental earnings per share generated.*
16. *Revenues associated with the portion of Mist not yet recalled have supported ownership's economic expectations, but fell below what one would expect a storage market developer to realize.*
17. *Ownership's period of risk and opportunity has extended to the present, some 16 years after recall-based expansions began.*
18. *Over that period, ownership returns measured against the portion of Mist assigned to unrecalled capacity have lately come into line with storage developer expectations.*
19. *Over that period, the timing, sizing, and pricing of recall provisions have produced sizeable economic benefits for core customers.*
20. *Both customers and ownership have been well served by the recall arrangement, with the unexpectedly long period for recall to exhaust Mist capability proving positive economically for both.*
21. *With unrecalled capacity expected to remain through the next five years at least, core customers will continue to derive substantial benefits from the timing, sizing, and pricing of recall.*
22. *Over that period, market risk will remain for ownership, along with opportunity.*
23. *We view five years as appropriate for a "look ahead" into natural gas markets for sharing purposes, given the volatility of the industry historically.*
24. *The balance of risk and opportunity in fundamentally changed gas markets supports NW Natural management's belief that storage pricing will drop from historical levels - - reducing margins from those produced in recent years.*
25. *On the whole, therefore, it is reasonable to expect that continuation of the current sharing mechanism will provide customers with substantial benefits, without generating for ownership overly "rich" returns from the storage markets in which Mist will continue to operate.*
26. *Moreover, the revenues produced from storage market operations at Mist do not (and cannot reasonably be forecasted to) amount to enough to make any but the largest adjustments to sharing economically meaningful.*

C. Useful Take-Aways from Historical Sharing Structure and Results

As we will show through following discussions of the analyses we have performed, the failure of the recall duration expectation has substantially benefitted both customers and NW Natural ownership. Certainly, shareowners benefit from successful utility operations as well. The benefits we intend when referring to them here, however, refer to those specifically associated with interests in Mist. Customers have benefitted through significant reductions in rate base that

have resulted from later recall and lower depreciated investment costs at times of recall. Ownership has benefitted significantly as well.

We examined ownership results from a traditional investment recovery perspective, as we show below. Our analysis made clear that financial results proved weak in early years, but rebounded in the years that came after the period during which ownership expected to have a continuing stake in Mist capacity. Only in the past year have results from this perspective have come into line with realistic expectations about investments in competitive energy markets. It took those results much longer to come into line with representative hurdle rates, measured by how investors typically assess such investments. Market risk, while it did not prove debilitating in hindsight, did in fact continue to exist through the past decade and a half. While that risk remained material, it is also notable that management did mitigate much of it by lining up reasonably firm "opportunities" contemporaneously with expansion activities. One should not overestimate the degree of risk undertaken, just as one should not discount it.

On the whole, as the discussions of the following analyses show, customers can be said to have done somewhat better to date than ownership relative to expectations, but neither has been shortchanged from an economic perspective. Accordingly, the lack of any "permanent" operational or ownership arrangement allows for consideration of a broad array of future alternatives. In other words, no past disproportion argues for any "catch-up" period to bring customer and ownership interests into an equitable balance.

Present conditions and those anticipated for the next five years or more do not call for a mechanism to incent further At Risk investment, because: (a) there is no identified need in at least the intermediate future for further storage expansion, and (b) maintaining current delivery should require only modest sustaining capital according to management forecasts. Current projections of market revenues continue at a level that will support ownership recovery of remaining investment in unrecalled capacity. Nevertheless, risks continue to apply in the securing of those revenues, particularly because of persistent low gas prices that have transformed the storage market

D. At-Risk Investments in Mist Storage

1. Base, Pre-2000 Core-Utility Investments

Prior to 2000, NW Natural made capital investments at Mist to provide storage capability for core utility operations. The original Mist utility storage and related pipeline development went into service in 1989, with subsequent expansions for utility customers in 1991, 1997 and 1999. Management intended these early expansions to serve core customers, and their capital costs became part of the NW Natural utility rate base.

2. Post-2000 Mist Investments Anticipating Core-Utility Needs

In 2000 and 2001, NW Natural expanded storage capabilities at Mist through the development of the Reichhold reservoir, with a planned deliverability of 110,000 Dth/day. Reichhold differed from its Mist reservoir predecessors in first establishing market use of capacity for direct ownership (as we use the term in this report) benefit. As evidenced by integrated resource plans, the period of market use in that form was expected to be short in duration, as expected use for

core-customers would consume the capability component dedicated to market opportunities. Management marketed the capabilities it had available to potential interstate customers, pending utility recalls of those capabilities. We have termed the investments that produced these market opportunities "At-Risk" investments.

The following illustration shows the original Mist reservoirs of Flora, Bruer and Al's Pool, each developed for NW Natural core customers prior to 2000. The illustration also shows the Reichhold, Busch, Schlicker, and Meyer reservoirs, developed sequentially from 2000 through 2008 and available to the interstate storage markets, subject to recall to serve core utility customers. The graphic also shows the Adams reservoir (currently being developed for Portland General Electric in accordance with a special tariff) and other potential storage reservoirs at Mist.[iii]

Mist Reservoirs

(confidential)

Management made Reichhold reservoir capital expenditures in 2000 and 2001, followed in 2001 and 2002 with the "317 Project." This second post-2000 project expanded Miller Station capability by adding a second compressor (7,500 BHP), increasing compression deliverability by 180,000 Dth/day.

The investments in Reichhold and the 317 Project totaled about $17 million dollars in 2000 through 2002. They represented the first set of At-Risk investments pending recall for core utility use. Management made additional major investments in the interstate storage business in 2004.

The "Sapphire Project" developed two new storage reservoirs - - Busch and Schlicker. Subsequently, the Pearl Phase 1 project in 2005 added two additional injection/withdrawal wells at the Bruer Pool, increasing its deliverability. Pearl Phase 2 (2007) included development of the Meyer Pool and the drilling of two additional injection/withdrawal wells into the Flora Pool. The Molalla Gate Station project, installed in 2007/2008, involved the installation of two compressors permitting physical re-delivery of gas into the interstate pipeline system.[iv]

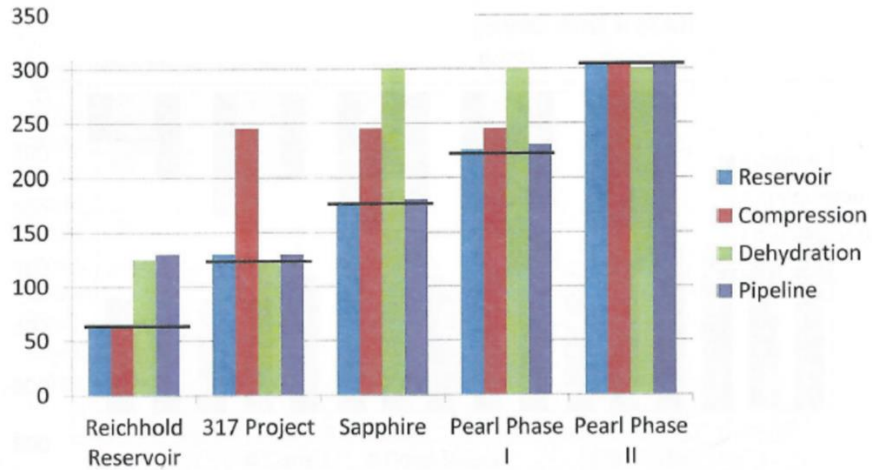
3. Sources and Costs of Mist At-Risk Expansions

The next table and chart show the increases in Mist storage capabilities and the dollars spent on five At-Risk Mist expansion projects through 2009. These projects had the effect of increasing storage deliverability from 210,000 (core utility storage) to 515,000 Dth/day. The net increase of 305,000 Dth/day came at investment costs, shown in the table below, of about $54 million.

Mist At-Risk Additions and Costs (2000 – 2009)

	Reichhold	317 Project	Sapphire	Pearl Phase I	Pearl Phase II	Total
Deliverability (Dth/day)						
Reservoir	45	65	65	50	80	305
Compression	0	180	0	0	0	180
Dehydration	0	0	195	0	0	195
Pipeline	130	0	0	0	75	205
Incremental Working Gas Capacity (Bcf)	2.00	0.00	2.35	0.23	2.71	7.28
Plant Additions						
Wells	$ 1,723,231	$ -	$ 1,999,699	$ 4,571,676	$ 8,957,955	$17,252,560
Storage Leasehold & Rights	332	-	207	-	541	1,081
Reservoirs	3,515,437	-	2,191,143	2,061,311	(14,020)	7,753,870
Lines	-	366,144	152,724	498,368	579,406	1,596,641
Compressor Station Equipment	-	9,106,333	3,798,383	729,455	-	13,634,171
Measuring / Regulating Equipment	1,681,220	-	618,828	1,776,018	5,124,333	9,200,398
Other Equipment					63,256	63,256
Cushion Gas	704,273	-	1	-	3,800,190	4,504,464
Total Mist Non-Utility Capital Additions	$ 7,624,493	$ 9,472,477	$ 8,760,983	$ 9,636,827	$18,511,661	$54,006,442

At-Risk Cumulative Development[v]



In addition to the Mist capital investments shown in the preceding table, NW Natural also spent about $7.7 million on the Molalla Gate Station transmission compressors in 2008. Installing Molalla Gate increased compression, which enhanced deliverability by 75,000 Dth/day. Management also spent about $1.3 million in capital dollars on compressor station equipment at the Deer Island Gate Station in 2003, and about $0.9 million on Port Westward distribution mains in 2007.[vi] The major period of At-Risk investments stopped in 2008, but NW Natural made smaller capital investments annually through 2016. These later additions added an additional $4.4 million in capital, bringing total At Risk investment to about $67.0 million.[vii]

Management also considered other, larger at-risk investments in the 2002-2003 period. These larger investments would have expanded Mist's deliverability capability well beyond the 515,000 Dth/day total that exists today.[viii] However, several considerations led management to deem additional expansion economically unattractive, and to decide not to pursue those other expansions. Reasons cited included: (a) the higher cost of developing additional reservoir capacity, and (b) the accompanying need for additional Miller Station compression and additional pipeline capacity.[ix]

E. The Importance of Recall in Mist Development

1. Connection to the IRP Process

"Utility recall" forms a core element of Mist development strategy and of the allocation of costs and revenues arising from Mist expansion. Through a long-standing integrated resource planning (IRP) process, management forecasts NW Natural's core utility needs, and presents and analyzes means for meeting them. Facing a period of high growth in core customer needs at the beginning of this century, the utility faced projected needs for and value from significant expansion of Mist storage capability for an extended period. Expansion at Mist over this period (whether or not At-Risk) followed consideration through the integrated resource planning process, and recognized that development would temporarily put some portion of the resulting capacity additions temporarily beyond utility needs. The following central elements have existed for these At-Risk portions since their creation and through today:

- Their investment and operating costs remain excluded from rate base prior to recall
- Ownership bears the risk of recovery of those costs from margins (revenues net of costs) that management succeeds in securing from the storage markets in which Mist operates
- Customers receive a 20 percent share of those margins
- As needed, and in the amounts required currently, portions of the At-Risk Mist capability can be recalled for use in serving core NW Natural customers
- Rate base expanded upon recall by the depreciated original costs of the assets.
- Ownership opportunity for market gains or losses remain, limited to the amount of yet-to-be-recalled At-Risk capability.

In effect, utility recall provides two benefits generally absent when a utility invests in gas supply assets:

- "Just-in-time" capacity additions through the ability to recall just the amounts needed presently and from a pool of resources designed to exist "in advance" of core utility needs.

- Reduced costs through the ability to bring the assets into rate base at their depreciated original costs at the time of recall.

2. The Significantly Lower than Expected Pace of Recall

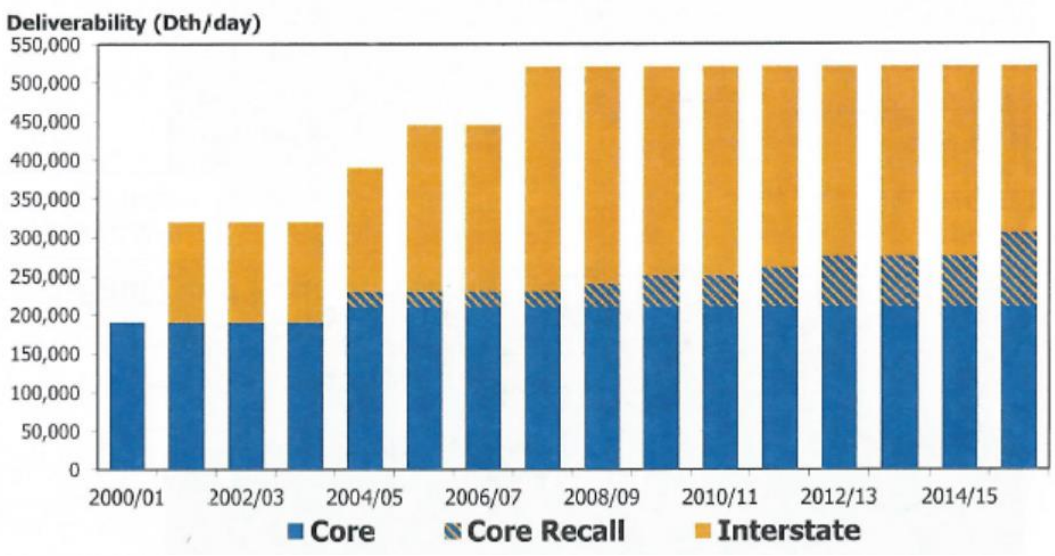
The integrated resource plans in existence at the time of original capital investments in At-Risk storage capacity showed high utility gas-supply growth rates. Management's expectations in 1999/2000 called for utility recall each year of Mist storage capability of about 20,000 Dth/day. Capacity developed at the Reichhold reservoir would provide 110,000 Dth/day of deliverability from storage. Consequently, management expected recall of the full 110,000 Dth in At-Risk Reichhold capability in about 5.5 years. The next major Mist expansion in 2003/2004 came at a time of an appreciably lower rate of recall, given reduced expectations about growth in utility supply needs. By 2007/2008, the annual pace of expected recall had fallen to about 10,000 Dth/day per year. Even that halved rate of recall did not occur. Expected to be fully recalled in 5.5 years, 15,000 Dth/day of Reichhold storage deliverability remains unrecalled (some 16 years later).[x]

Utility recalls of Mist capability occurred throughout the past 16 years, specifically, in 2004, 2008, 2009, 2011, 2012 and 2015. The next table shows that NW Natural had 210,000 Dth/day in storage deliverability for core customers when At-Risk storage expansion commenced. Utility recall of 95,000 Dth/day of reservoir and compression deliverability has brought "total available core capacity" to 305,000 of the 515,000 Dth/day in Mist total deliverability. Thus, about 210,000 Dth /day remains in At-Risk capability in 2017. Utility recalls have added about $6.0 million to utility rate base (of the $67 million total invested by NW Natural) since 2000.[xi]

Mist Recall

Source	**Capability (Dth/day)**							
	Core 2002 Availability	***2004***	***2008***	***2009***	***2011***	***2012***	***2015***	***Core 2017 Availability***
Reservoir	*210,000*	*20,000*	*10,000*	*10,000*	*10,000*	*15,000*	*30,000*	*305,000*
Compression	245,000			5,000	10,000	15,000	30,000	305,000
Dehydration	315,000							315,000
Rate Base Transfers		**2004**	**2008**	**2009**	**2011**	**2012**	**2015**	**Total**
		$1,180,274	$601,064	$648,541	$725,361	$1,024,492	$1,801,429	$5,981,161

Mist Storage Development and Recall[xii]



F. Margin Sharing Mechanisms

1. Mist Interstate Storage Margins

NW Natural's report "Annual Report of Interstate/Intrastate Gas Storage and Optimization Activities to the Commission sets forth the financial and "net revenue" results of: (a) Interstate Storage Service (ISS); (b) Mist Optimization; and (c) Other Optimization. This annual report calculates the customer margin sharing for each of these categories following its submission.

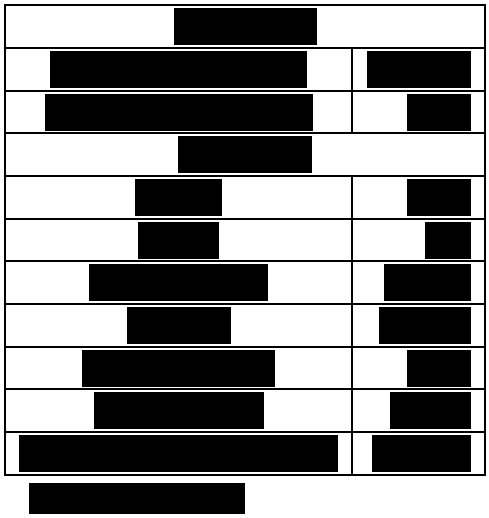
The process of sharing the margins produced by providing Interstate Storage Service (ISS) from the At-Risk portion of Mist requires the assignment of the capital installation costs of storage "incremental" facilities and equipment to the interstate storage business. Ownership bears the incremental costs pending utility recall. Moreover, Net ISS revenue calculations subtract the capital, O&M and administrative costs of the Mist expansion facilities funded by NW Natural shareholders (*i.e.*, not yet recalled) from gross revenues. The resulting net revenues then get shared between utility customers (20 percent) and shareholders (80 percent).

Management records the interstate storage business capital investments in separate accounts from those of the utility business. Management calculates annual depreciation, property taxes and interest on the incremental, At-Risk investments. Management also calculates incremental payroll, legal and other operating costs related to the storage business. For 2016, personnel-related costs so assigned included:

- One full-time employee at the Miller Station
- One full-time scheduling employee in NW Natural Gas Supply
- One half of the time of the NW Natural Director – Gas Supply.[xiii]

Management allocates incremental capital and incremental operating costs to the storage business, using these costs to calculate the "net revenue" to which it applies customer margin sharing percentages. The next table summarizes the capital and expense assignment and margin sharing calculations for the 2016 storage business.[xiv]

2016 Storage Margin Sharing
(confidential)



2. Optimization of Mist Storage

In 2002, NW Natural began realizing significant net revenue from the optimization of Mist storage by a third-party asset manager retained by management. The next chapter details the services and costs of this asset manager. Optimization activities included both portions of Mist capability - - "rate-based" and "At-Risk." At the time, sharing mechanisms in place provided customers with only 20 percent of the margins from such optimization, even insofar as they involved "rate-based" (*i.e.*, not At-Risk) portions of Mist capability. Management recommended a change in the sharing formula. The Commission Staff reported as follows in 2003: [xv]

> *... the company has added new language to Rate Schedules 185 and (Schedule) D that adds a credit to customers for their share of the net margin revenues received by the company for core storage optimization activities. These margin revenues are shared on a 67/33 basis; 33 percent will be retained by NW Natural, and 67 percent will be shared with customers through the credit provided for in these schedules. Beginning in 2003, the net margin from storage optimization will be determined by the marketing/trading company that has the ability to accurately allocate the optimization activities between storage and pipeline capacity activities.*

Management has therefore applied a layered method for calculating margin sharing on Mist optimization net revenues, in accordance with the Rate Schedule 185 changes:

- For the rate-based portion of Mist deliverability capability, sharing percentages are 67/33 (customer/ ownership)
- For the At-Risk portion, sharing percentages are 20/80 (customer/ ownership).

3. Mist Optimization Sharing Example

The following table, using 2016 data as an example, illustrates the layered approach to margin sharing at Mist for optimization.[xvi]

Mist Optimization Example – 2016

	Mist Optimization	
1	[redacted]	[redacted]
2	[redacted]	[redacted]
3	[redacted]	[redacted]
4	[redacted]	[redacted]
5	[redacted]	[redacted]
6	[redacted]	[redacted]
7	[redacted]	[redacted]
8	[redacted]	[redacted]
9	[redacted]	[redacted]
10	[redacted]	[redacted]

[redacted]

NW Natural also calculates Washington margin sharing separately in the Annual Reports. The 2016 Washington share totaled about $744,000 for the ISS and Mist Optimization categories, producing combined Oregon/Washington total margin sharing of $3,822,000.

G. Benefits Produced by the At-Risk Mist Sharing Mechanism

1. Purpose in Examining Results to Date

More than 15 years have passed since the initiation of Mist expansion activities designed to meet utility requirements, while providing to investors market opportunities to compensate them for investment amounts not yet recalled and then included in utility rate base. We found it appropriate to examine Mist expansion beginning around 2000 in addressing "how we got here," recognizing that our purpose for doing so involves forward-looking alternative sharing mechanisms.

Our evaluation compares actual results with historical and contemporary market expectations. We did not make the comparison to re-evaluate what we believe to have been transparent, accepted, and mutually beneficial sharing methods. Rather, we did so to provide a basis for determining to what degree realistic expectations for customers and ownership have been met across the period from 2000 to 2016 (*e.g.,* do large imbalances exist?). An historical perspective can shed light on whether balances or imbalance may exist, providing impetus (or not) to changing long-standing margin sharing. Other considerations include whether Mist has changed operating characteristics, operates in a different market environment, or faces changed investment requirements or conditions.

2. Customer Margins Produced by Mist through 2016

The margin sharing calculations shown above have resulted in cash benefits through 2016 to NW Natural customers through 2016 in the amounts we calculated. The next chart shows those amounts. The total cash margin sharing benefit for Oregon and Washington customers from storage and Mist Optimization has amounted to about $54 million over 16 years, which has come in the form of credits to gas-supply costs billed to customers. [xvii]

Customer Margin Sharing Benefit from Storage and Mist Optimization

(confidential)

3. Indirect Savings from Recall

Deferring recall of capacity until needed has avoided the "lumpiness" typically categorizing large capital investments made to serve customers across multiple decades. Large, expensive investments like those associated with Mist frequently require customers to pay from the start for resources into which their utility supplier will only "grow" over time. The sharing arrangements that have supported ownership "participation" in Mist have produced two sources of economic benefit associated with what is akin to something not generally available in introducing such resources - - "just-in time delivery." The two benefits comprise:

- Keeping the costs of storage capacity out of rate base until needed
- Using depreciated original costs at the time of recall and placement of investment costs in rate base.

The rate-based customer costs of recalled capacity ($6.0 million) represent marginally less than 10 percent of total Mist storage investments of about $67 million. Management made investments in anticipation of eventual core-utility needs. Support exists for an argument that the absence of a sharing agreement benefitting ownership would have produced less rapid Mist expansion. However, had that been the case, customers may well also have lost benefits gained by continuing depreciation pending recall, and perhaps even economics of scale in storage development.

In any event, growth in customer needs much slower than those underlying the pace of Mist expansion substantially increased both sources of recall-based benefits. Investments stayed

entirely out of rate base longer. Moreover, when they came into rate base, they did so at significantly more depreciated costs. We calculated the revenue requirements offset produced by these benefits. Our calculation compared actual recall dates and cost amounts with those associated with an assumed inclusion in rate base of the At-Risk investments. We calculated that differential as a $54 million revenue requirement benefit to customers from 2000-2016, resulting in a total customer benefit from storage of about $108 million.

4. 2000-2016 Financial Results for Ownership

In the 1999 to 2000 period when considering At Risk Mist expansion, management estimated that an initial capital investment of about $11 million would generate about [redacted] in annual net storage revenues, with storage customers lined up for the first three years.[xviii] Rather than employing the industry's more typical investment hurdle rates, senior NW Natural leadership and the Board of Directors evaluated short-term (pending recall) storage investments on the basis of whether they would generate positive incremental earnings per share (EPS) for NW Natural in the first five years (roughly commensurate with the time then expected for full recall to occur).

Management beneath the senior executive level also analyzed expected storage business returns on an annual, return-on-equity basis. That method comprises a standard one for utility rate base investments and was familiar to the NW Natural decision-makers. The minimum annual ROE "hurdle rate" for the storage investments was [redacted] percent, with a heavy emphasis on the first three to five years, given recall expectations at that time.[xix]

United States and Canadian markets witnessed development of other, independent, unregulated storage projects in the same general time frame. A 2004 FERC Staff report, among other sources, observed that developers tended to evaluate such projects using net present value, internal rate of return and other discounted cash flow measures. Common expectations for unregulated storage projects at the time set returns on equity exceeding 20 percent (on a discounted cash flow basis), reflecting perceived market, geologic, and development risks.[xx]

Management originally envisioned interstate storage contracts as the only source of revenue supporting storage investments. At that time, management reports identified a second source, Mist optimization revenues, as "possible." Analysis of Mist expansion, however, gave no quantified consideration of this source. No such revenue had yet been realized, and management considered it too uncertain to quantify in analyzing storage investments.[xxi]

We analyzed the financial results of the NW Natural interstate storage investments using the "utility rate base method" (return on equity, or ROE) on an annual basis. This method, similar to one used by NW Natural, reflects a utility method for examining a fully "customer-funded" investment from the outset as an alternative financial means for Mist expansion. The net revenues we used to model this alternative use the net revenues, after margin sharing, from interstate storage and Mist Optimization actually produced, and described above. The results this alternative generated varied widely over the 16 years from 2000-2016. Annual ROEs ranged from the [redacted] and produced an overall weighted average ROE of about [redacted] percent over the full period. Had we limited revenues to those only from interstate/intrastate storage revenues (as originally analyzed by NW Natural), the weighted average annual ROE returns fall to [redacted] percent. Modeled either way, these results met or exceeded the "minimum

hurdle rate" criteria of NW Natural, and provided returns in line with the expectations and risks that NW Natural perceived.

However, those considering investments in storage relying on markets more typically would be expected to evaluate results under discounted cash flow techniques, as noted in the FERC Staff report. The utility annual ROE method places reliance on a regulatory recovery mechanism to provide an opportunity for a reasonable return on depreciated rate base for the life of the asset - - in this case 30 to 40 years. This utility return measure does not consider the substantial risks of a shorter, temporary interstate storage investment period expected in NW Natural's case. It also does not consider storage market risks that lead investors to seek quicker paybacks than come following utility investments.

Liberty performed various discounted cash flow (DCF) analyses that addressed the full 16-year investment period from 2000-2016. [redacted].[xxii]

The negative DCF returns of the early years eventually gave way to offsetting returns for the much longer time period enabled by the slower-than-expected pace of utility recall of Mist capability. [redacted].

Storage IRR 2000 to 2016: Varies by Time Periods

(confidential)

[redacted]

NPV and Discounted Payback for 2000 to 2016: at 20% ROE

(confidential)

[redacted]

H. Expected Future Results Under the Current Sharing Mechanism

1. Management's Storage Forecasts for 2017-2021

Management provided five-year forecasts for 2017-2021 for the storage and optimization business segment, which includes interstate storage, Mist optimization and other NW Natural optimization. Prices expected to replace those set by interstate storage contracts expiring in 2017 and beyond drive important expected variations when compared to historical levels. [redacted]

[redacted] [xxiii]

Ownership Returns	2017	2018	2019	2020	2021
ISS and M/O Net Income	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
Annual ROE for ISS & Mist Optimization	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]

We examined what overall effect on historical results would result from the application of management's forecasts for the coming five years. The graphics below illustrate the 21-year review that results from this addition of the five forecast years. [xxiv]

Storage IRR 2000 to 2021

(confidential)

[redacted]

NPV and Discounted Payback for 2000 to 2021: at 20% ROE

(confidential)

[redacted]

[redacted]

2. Lower Recall Forecast

Management's forecast shows recall of interstate storage deliverability increasing dramatically -- producing 90,000Dth/day of recall over the three-year period from 2019 through 2021. Intuitively, such a large amount of deliverability recall would seem to produce a detrimental financial impact. Management also prepared five-year forecasts reducing the 90,000Dth/day to 50,000 Dth/day from 2019 through 2021. [redacted]

3. ISS Revenue Ranges

Liberty also prepared a range of revised forecasts that varied the interstate storage revenue significantly in 2019-2021. [redacted]

[redacted]

ISS Revenue Ranges: Five- Year Impacts

	5-Year Margin Sharing	5-Year Storage Net Income
[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]

[redacted]

I. Storage Margin Sharing Alternatives

We sought to measure the likely impacts of changes in storage margin sharing, in order to provide stakeholders with a basis for crafting and measuring alternatives. We analyzed the impacts of alternatives for margin sharing on interstate storage and Mist optimization, utilizing NW Natural's five-year forecasts and current margin sharing as a base case. The specific alternatives and variations we have modeled include:

- Continue sharing ratio to 20/80
- Set a $1 million floor on annual customer share
- Set a $2 million floor on annual customer share
- Change sharing ratio to 10/90
- Change ratio to 30/70
- Accelerate management's forecasted 90,000 Dth/day recall (gives customers greater exposure to market risks and opportunities)

1. Continue 20/80 Sharing Ratio

The first alternative, the status quo, or "base case" assumed continuation of a 20 percent customer margin share for interstate storage and Mist Optimization for 2017-2021, using management's five-year forecasts. The following annual results show results the same as those expected under the management forecasts that we discussed above. [redacted]

	2017	2018	2019	2020	2021
Margin Sharing: ISS and M/O	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]

Millions of dollars

[redacted]

[redacted]

	2017	2018	2019	2020	2021
ISS and M/O Net Income	[redacted]				

[redacted]

	2017	2018	2019	2020	2021
Annual ROE	[redacted]				

2. Set a Dollar Floor on Customer Share

Establishing floors on customer benefits presents another alternative margin sharing method. We modeled floors of $1 million and $2 million per year. Reducing the sharing percentage for customers rebalances risks and opportunities to recognize the certainty that a floor on recovery offers for customers. We used a 10 percent factor for margin sharing on ISS and Mist Optimization net revenues. [redacted]

Customer Margin Floors: Five-Year Impacts

	5-Year Margin Sharing	5-Year Storage Net Income
[redacted]		

3. Customer Margin Sharing Ranges

This alternative simply substitutes alternative margin sharing percentages of 10 percent and 30 percent for the current 20 percent sharing of interstate storage and Mist optimization. [redacted]

Margin Sharing Percentage Ranges

	5-Year Margin Sharing	5-Year Storage Net Income
[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]

4. Accelerate Utility Recall

This alternative would accelerate the 90,000 Dth/day deliverability recall from the forecasted 2019-2021 to 2017. "Accelerated Recall" would produce an immediate rate base investment of about $14.7 million (90/210 of NW Natural's current storage investment of $34.3 million). NW Natural core customers would be taking on the increased risk of storage investments for an increase in margin sharing of net revenues from 20 percent to 42.86 percent (also 90/210 of NW Natural's current interstate storage). The concept is that, in order to receive a larger share of storage net revenue, core customers must invest in a larger share of the Mist storage capacity. The analysis will determine if this is a reasonable risk proposition for customers, testing the concept with NW Natural's forecasts.

A capital investment of $14.7 million in 2017 would require increased revenues from customers of about $9.8 million over the following five years. This investment and increased revenue requirements would entitle customers to margin sharing on ISS and Mist Optimization net revenues at 42.86 percent (also 90/210 of remaining interstate storage investments), and increase the percentage of Mist storage allocated to core customers to 76.7 percent. [redacted]. This result indicates that such an accelerated recall would be a net detriment to future customer benefits, using NW Natural's forecasts. More favorable interstate storage pricing in the future could make "accelerated recall" a somewhat better investment for core customers, but would require interstate storage markets significantly more favorable than forecast by management.

5. Comparison of Alternatives

The amounts available for storage sharing in the future are smaller, especially as compared to other (*i.e.*, non-Mist optimization). Changing margin sharing percentages or establishing a $1 million floor does little to shift dollars significantly. A $2 million margin sharing floor "moves the needle," but comes with a significant penalty to NW Natural's future net income. For the accelerated recall alternative, rate base investment costs may be greater than increased margin sharing for customers, as shown above. It also transfers market risk from ownership to customers.

Overall, the data shows that continuation of the status quo will continue benefits for customers and ownership of the nature and at levels that have produced roughly balanced results to date. A large increase in the market value of storage would be required to alter these relationships significantly, and warrant a material change from the status quo.

III. Asset Management and Other Optimization

A. Background

The previous chapter addressed revenues associated with operation of Mist storage, focusing primarily on interstate and intrastate storage services. Those services rely on the portions of Mist not yet recalled for core utility service. That chapter also addressed revenues and margins produced from optimizing the use of Mist. That optimization, performed by third-party asset manager Tenaska Marketing Ventures (TMV) contracted by management, exploits both "sides" of Mist's capabilities - - the recalled portions included in rate base and the remainder, which can be measured financially by the portion of depreciated investment costs associated with Mist capability yet-to-be recalled for use in providing core service (and thus remaining outside rate base).

Asset management and margin sharing have become common among local gas distribution utilities across the country. The "split" nature of Mist, however, presents an unusual feature in that context. The assets "managed" and the margins "shared" in the industry generally involve rate base assets, which, applies only to a portion of Mist, from a financial separation perspective.

This chapter addresses optimization generally, which means that it focuses operationally on activities performed by TMV, the third-party asset manager NW management has retained for many years. A robust treatment of the financial and ratemaking consequences of asset management requires consideration of the activities for which an asset manager earns compensation. The compensation structure under which TMV has operated involves optimization of non-Mist assets, which account for by far the largest share of margins produced from optimizing the entirety of NW Natural's asset portfolio, including Mist. TMV services, however, also include optimizing frequently available capacity from two portions of Mist:

- Rate-Based Portion: capability excess to core customer needs in periods of lower than peak core-customer demand
- At-Risk Portion: capability excess to storage-service customers served from the non-rate-based, yet-to-be-recalled portions of Mist capability.

Optimization of storage assets (where they exist) would ordinarily form, as it does here, part of utility asset optimization, whether performed internally or by a third-party asset manager. Deconstructing the Mist and non-Mist portions of asset management at NW Natural would complicate the treatment of optimization, TMV's role in it, and how the asset manager's compensation affects margins available for sharing. For simplicity, therefore, this chapter includes a discussion of storage optimization - - producing some overlap with the content of the preceding chapter. An important distinction to bear in mind lies in the purposes of the resulting repetition:

- The Mist chapter addresses optimization primarily to give a perspective on its role in producing revenues and returns associated with the financial ownership "stake" in Mist pending recall for core utility service
- This chapter addresses optimization primarily to compare sharing percentages with the broad range of other sharing arrangements our work has identified.

This chapter thus examines optimization activity risks, costs, benefits, and comparisons of customer/ ownership sharing percentages with an extensive group of local gas distribution utilities across the country.

B. Summary of Key Conclusions

1. *Asset management agreements have evolved, expanding the scope of activities involved over the several decades during which gas distribution utilities have commonly employed them.*
2. *NW Natural's relationships and agreements with asset managers have developed in line with industry experience.*
3. *Management has worked diligently to negotiate and improve the conditions of its asset management relationships and agreements, but best practice suggests more frequent opening of the relationship to competition.*
4. *Management engages substantially and effectively in day-to-day and longer-term activities that promote robust optimization of its portfolio of assets.*
5. *The relationship with TMV has clearly produced substantial value for customers.*
6. *TMV has taken a generally industry-competitive share of the total value it produces - - value that it must produce to earn material compensation for the optimization services it provides.*
7. *TMV optimizes a comparatively robust range of assets, but not one characteristically different from what we would expect, given the size and configuration of NW Natural's portfolio of supply and transportation assets.*
8. *TMV has proven particularly effective in optimizing activities associated with extracting and marketing natural gas liquids (NGLs) from Canadian-sourced gas; those activities are less common, not because it is exceptional to optimize for NGLs where they are found in purchased gas, but because NGLs are not commonly found in gas at utility purchase locations.*
9. *NW Natural management remains well-engaged in overseeing the TMV relationship and the asset manager's activities, but again not to a degree outside our experience with the industry.*
10. *NW Natural management does not bear unusual risk associated with the optimization activities that TMV undertakes and that management oversees.*
11. *Optimization comprises a core responsibility of prudent management by gas distribution companies who, like NW Natural, have significant supply and transportation portfolios.*
12. *The core nature of optimization as a management responsibility presumably lies behind the decisions by a significant number of states to apply all margins produced by optimization to reducing core-service revenue requirements; i.e., not to share those margins with ownership.*
13. *That view has theoretical merit, but we observe that optimization takes active management, constant attention, effective risk management, a willingness to explore and pursue as many alternatives as market conditions permit, and a dynamic approach to identifying and responding to inconstant market opportunities and threats.*

14. *This view, which emphasizes the complexity of optimization presumably underlies the more common approach of sharing margins from optimization between customers and ownership.*
15. *Our scope did not include another important form of optimization, which involves measuring purchased-gas costs against some form of market benchmarks; all gas distribution companies in Oregon engage in this activity, pursuant to processes and procedures determined in OPUC Docket No. UM 1286.*
16. *We have examined optimization sharing arrangements across the country - - some from our direct experience and others through an extensive set of contacts with knowledgeable public service commission staff members*
17. *We conducted a very broad, nationwide survey of margin-sharing arrangements, against which we could perform robust comparisons of NW Natural's optimization sharing methods and proportions.*
18. *Those comparisons demonstrated that the percentage share available to offset NW Natural core-customer rates falls at the lowest end (least remunerative for customers) of the observed range for jurisdictions that provide for sharing.*
19. *While many of the comparators do not operate significant storage assets subject to optimization, the data do not demonstrate that those having such assets operate under a sharing structure substantially more compensatory to ownership.*
20. *Moreover, we do not find clear how the existence of owned storage, with optimization managed by an outside firm, would serve to increase internal management's level of effort or risk or ownership contribution of assets whose costs core customers do not bear.*
21. *A small number of jurisdictions allow sharing under a sliding scale of percentages, through which the ownership share increases as total dollar margins produced increase. NW Natural has such a sharing arrangement for its service territory in Washington, but not in Oregon.*
22. *Those mechanisms complicate the ability to measure the percentages that final, actual customer and ownership shares produced at the companies for which we secured meaningful data, but we are confident that the information we succeeded in securing and the assumptions we made in applying sliding scales we found support confidence in the shares we present in this report.*
23. *Reducing ownership's share of margins to a level that would substantially diminish its incentive to maximize optimization benefits would appear inconsistent with experience in Oregon across a period approaching two decades.*
24. *Ownership has received from* [redacted] *for its share of optimization benefits over the five years from 2012 through 2016, leaving, in our judgment, a fair degree of room for reducing ownership's share without substantially diminishing the incentive to maximize optimization benefits.*
25. *Accordingly, meaningful opportunity exists for bringing NW Natural ownership's share of optimization benefits into significantly closer alignment with national experience.*
26. *Such opportunity exists even should stakeholders and the Commission determine that the importance of maintaining a successful optimization track record merits a share above the norm.*

C. The Use of Third-Party Asset Managers

Some gas utilities use subsidiaries of their holding companies, particularly where the parent holds multiple operating utilities. Companies operating in this type of structure often use their affiliates' gas-supply assets to serve their respective requirements, but also as a base portfolio of assets for engaging in broader market activities. Some third-party asset managers operate as affiliates of gas-producing companies, which offers the ability to use their optimization activities for local gas distribution utilities to sell more of their own gas. A third group of outside asset managers operates independently of both local gas distribution utilities and producers. They specialize in gas marketing and trading. TMV, NW Natural's third-party optimization provider partner, exemplifies this third category.

Outside firms specializing in gas markets can bring knowledge, resources, and contacts superior to those available to a local gas distribution utility - - particularly one that operates outside a holding company structure that includes a significant number of operating utilities. These comparative strengths can enhance flexibility, produce economies of scale, and widen the geographic and market reach of optimization, serving to generate additional revenues, while moderating the risks of engaging in dynamic gas markets.

As a 2008 study for the Colorado Public Utilities Commission[xxv] noted:

> *Both the Federal Energy Regulatory Commission and natural gas utilities recognize the benefits from outsourcing, especially in the form of what is called asset management. Late in 2007, FERC proposed rules ... that would facilitate asset management arrangements, recognizing their benefits in improving the efficiency of capacity markets and transactions tailored to customer needs. The American Gas Association (AGA), in comments before FERC, expressed the view that asset management arrangements provide benefits by increasing the load-responsive use of gas supply, increasing liquidity in the capacity markets, and more efficiently utilizing capacity.* (Pages 4-5)

The management of NW Natural has taken a similar view of the benefits of using a third-party asset manager - - a view whose soundness our experience in the industry confirms:[xxvi]

> *As a Local Distribution Company ("LDC"), our focus and expertise was and still is dedicated to acquiring gas and meeting the more direct needs of our customers. While these typical gas utility activities require very significant knowledge and skill, they are qualitatively different from the much more complicated and speculative Optimization Activities ... For this reason, the Company decided to contract with a third-party wholesale natural gas trading company to partner with on these new Optimization Activities. ... The Company has found it important to work with a national marketing/trading company because they have the capability and expertise required to maximize the value of these Optimization Activities, as well as the regulatory understanding to avoid potential pitfalls.*

D. Optimization Structure at NW Natural

Optimization of natural gas supply assets includes those activities that seek means to adjust delivery routes and methods for gas supplies in ways designed to reduce costs without adding price or reliability risks. Natural gas storage facilities comprise part of the supply portfolio of many gas utilities. Optimization of such assets commonly involves injecting gas into them, and withdrawing gas from them, in ways that offer advantage from differences in the value of natural gas at different times and places. Storage managers can enhance the margins produced and mitigate risks involved by buying and selling financial instruments related to the value of gas at different times.

Management describes[xxvii] NW Natural's optimization activities as taking two forms, both of which lower costs for customers, at the same time providing an incentive form of compensation (*i.e.,* above base-rate recovery) for the benefit of ownership:

- "Base" utility optimization
- "Enhanced" optimization.

Management performs base optimization internally, receiving compensation in the form of a share of savings measured against an annually-established purchased-gas-cost target. TMV acting under contract as management's third-party asset manager performs the activities associated with the second (enhanced) form of optimization. Direct ownership economic benefits from enhanced optimization come in the form of a share of margins that those activities generate. The agreement provides for compensation to TMV in the form of shares of those margins. After determining those shares first, the remainder of the margins benefit customers and ownership in pre-set percentages.

The Oregon Commission settled many years ago[1] the nature of, and ownership's compensation for, base utility optimization. Ownership compensation for enhanced optimization comprises the focus of our work scope, as guided by OPUC Docket No. UM 1654. We present a brief description of base utility optimization activities in this chapter to distinguish them from enhanced optimization ones, and we report some aspects and results of NW Natural's purchased-gas-adjustment (PGA) mechanism as context for considering the overall economic structure created by all sharing mechanisms associated with natural gas and means for getting it reliably to customers.

1. Base Utility Optimization

Management applies the term "little o" or "first level" to the four basic types of base optimization activities that it performs internally (*i.e.*, not through TMV):

- Mix of purchases among the supply basins (and from trading hubs within each basin) from which NW Natural buys gas (Alberta and British Columbia in western Canada, and the Rocky Mountains in the U.S.)
- Mix of contract terms: spot versus monthly term purchases, base-load versus "swing" supplies.
- Storage injection timing: daily, monthly and seasonal decisions, including possible winter refill

[1] See, *e.g.*, OPUC Order No. 08-504, issued in Docket No. UM 1286 on October 21, 2008.

- Storage utilization: decisions whether to withdraw from storage in lieu of making spot-market purchases.[xxviii]

Management has also described its use on some occasions of a fifth "little o" category - - pipeline capacity releases. These releases occur when management contracts NW Natural's unused capacity to third parties, subject to recall when needed to serve core utility customers.[xxix] Only one of that type of arrangement exists presently. A long-term release entered in 1993 serves to share a portion of NW Natural's legacy capacity on Northwest Pipeline with Portland General Electric (PGE). NW Natural has the power to recall that capacity for limited periods during the heating season. Arrangements that create such a long-term division of capability do not constitute "optimization" as we have seen the term used generally in the industry.

NW Natural's PGA mechanism contains a provision addressing capacity-release revenues, but management has not used it, preferring to place unused portions of pipeline capacity into the enhanced optimization category, which falls under the responsibility of TMV.

2. Enhanced Optimization

Enhanced optimization activities rely upon the use of gas-supply assets assembled to ensure core-service reliability at all times. Variability in customer usage makes portions of those assets unneeded at certain times - - sometimes comprising major portions of the year. These portions underlie the ability to make physical and financial transactions that generate margins (revenues in excess of transaction costs). These margins benefit customers by offsetting the costs of carrying the assets.

NW Natural's experience has paralleled that of the industry generally, in expanding the scope of activities that seek to optimize the value of the portfolio of assets required to serve core customers under peak conditions. In the Company's Direct Testimony in UM 1654, a NW Natural witness stated that:

> *In the early years, these Optimization Activities included the sale and trading of excess gas, existing Mist storage, and excess capacity on upstream pipeline contracts on the Northwest Pipeline and other upstream pipeline systems. Later, as opportunities arose, we added new wholesale trading activities such as the exchange of gas commodity contract purchases at different trading locations ("portfolio" optimization), the use of off-system underground storage contracts at Jackson Prairie and in Alberta, and the extraction of natural gas liquids.*[xxx]

Peak-day demands for gas distribution companies like NW Natural far exceed those that management must serve on most days of the year. Meeting conditions expected on those "design days" requires substantial gas-supply resources that include:

- Pipeline capacity to transport gas from production sites to local distribution company city gates
- Storage capacity to allow gas purchases at comparatively low prices and withdrawal for customer consumption at periods of high prices (which generally correspond to periods of high customer usage)

- Peaking capacity from on-system facilities or from specialized supply services designed for use on peak days.

The ability to secure value from supply resources when they have capacity available has driven the industry widely to develop programs and structures for supply portfolio optimization. Such optimization began in the industry with off-system sales (often *ad hoc*) and simple capacity-release arrangements. Expanding greatly, optimization by NW Natural and others has come to employ sophisticated schemes that employ:

- Networks of pipelines to minimize the variable costs of gas transportation
- Physical exchanges that reduce costs
- Time swaps that take advantage of differences in the value of gas at different times
- Financial instruments to hedge risks in all types of transactions.

The enhanced optimization activities we encountered in our examination here conform to those described in NW Natural testimony from about four years ago: [xxxi]

- Mist Storage Optimization: Using some of the ability to inject into and withdraw from storage to buy from and sell to customers outside the utility's system, when those abilities exceed requirements for serving core customers. Storage optimization also frequently includes the purchase and sale of financial instruments backed by the parts of the storage system that TMV uses for optimization.
- Natural Gas Liquids (NGLs) Extraction: With gas purchased in Alberta typically containing more NGLs than typical for pipeline-quality gas, management has had the opportunity to extract and sell those NGLs for more than the costs required to make those sales.
- Commodity Contract (Portfolio) Optimization: TMV uses exchanges to move NW Natural's gas to a location where that gas has higher value, replacing it with gas bought at a lower price. The sale and purchase locations for such transactions may include ones to which TMV, but not NW Natural, has access.
- Pipeline Capacity Optimization: Through optimization services for other clients and some of its own contracts, TMV has access to a network of pipeline capacity. TMV finds occasions when it can use that network to reduce costs to all of its clients by aggregating purchases, and then moving gas to them in manners that minimize transportation costs. TMV sometimes can also use any remaining capacity to move gas for others, or to release capacity (through short-term transactions) with parties that can make effective use of it for their own purposes temporarily.
- Off-System Storage Optimization: In addition to Mist, NW Natural holds capacity in Washington's Jackson Prairie Storage Field. NW Natural also contracts for storage in production areas (such as Alberta) when market conditions prove favorable. Those additional storage resources permit the same kinds of optimization activities that exist for Mist; *e.g.*:
    - Inject into and withdraw from storage, to buy from and sell to off-system customers
    - Buy and sell financial instruments backed by available storage capacities.

We find such activities commonly performed among the range of gas industry participants whose operations we have examined. Provisions of the contracts between a utility and its asset manager

protect the reliability of service to on-system customers, most often by restricting the asset manager's access to the client's gas-supply resources to the portions of resources not likely to be needed under load conditions when optimization occurs. NW Natural's agreement with TMV, for example, restricts TMV to three billion cubic feet (Bcf) of Mist storage capacity in any year.[xxxii] Mist has a total capacity of 16 Bcf. The design basis for that capacity and its associated injection and withdrawal capabilities seeks to meet NW Natural's "core" customer[2] peak-day and peak annual requirements, and those of its on-system and off-system customers for storage services. Management has found that, in a typical year, the 3 Bcf TMV capacity limit and the attendant injection and withdrawal capabilities will not prove required for meeting those customers' requirements. Accordingly, it makes that quantity available to TMV for optimization.

NW Natural's Gas Supply Department negotiates the terms of the asset-management agreement with TMV, which then seeks to maximize value to NW Natural without threatening reliability standards that management seeks to maintain for the benefit of core-utility and Storage Service customers. The arrangement with TMV combines with NW Natural tariff provisions to produce entitlements by three main parties - - customers, ownership, and TMV - - to share in the margins produced by those optimization activities that the asset manager conducts. Moreover, these provisions combine to induce both TMV and management to increase the margins achieved, increasing benefits for customers as margins grow.

3. TMV's Role and Responsibilities

NW Natural works closely with TMV to maximize the resources available for optimization while protecting the reliability of service to its customers. Continuing with the storage example, NW Natural will "tune" the storage capabilities that it makes available to TMV as the heating season proceeds. When weather proves warmer than normal, NW Natural will make slightly more of Mist's capabilities available to TMV; conversely, colder-than-normal weather will require TMV to work with slightly lower levels of Mist capability.[xxxiii]

TMV works with NW Natural to plan and conduct day to day activities. NW Natural's Gas Supply Department makes daily estimates of its customers' requirements, and selects sources of supply to meet those requirements. TMV then may make sourcing adjustments to capture any available operating-cost reductions. TMV works within the limits set by NW Natural customer requirements to use available resources to serve other markets economically. TMV assumes the risks of operating performance requirements, such as pipeline penalty provisions, title transfer, liability, and *force majeure*.

TMV also works closely with management outside the day-to-day context, seeking to identify longer-term options for supply-resource acquisition, and negotiating arrangements for ancillary services (such as NGLs extraction). TMV also works with NW Natural to identify and exploit additional opportunities to generate margins. TMV optimization activities for NW Natural include the following specific areas, and include the trading of related financial instruments to enhance margins and moderate risk:

- Mist Storage Optimization
- Natural Gas Liquids (NGLs) Extraction

[2] NW Natural's "core" customers are its customers for utility sales service.

- Commodity Contract Optimization
- Pipeline Capacity Optimization
- Off-System Storage Optimization.

TMV conducts these activities in coordination with, but separately from, management's performance of its utility gas-supply function. NW Natural's Gas Supply Department carries out those supply functions pursuant to its own reliability criteria, and under a PGA mechanism that incents efficient and effective management.

TMV operates as a significant market participant in its own right, owning or controlling its own gas-supply resources. TMV also has other asset-management clients in the Pacific Northwest and in other gas-producing and consuming regions in the U. S. and Canada. TMV uses a broad array of gas-supply resource networks to serve its customers and its asset-management clients reliably. TMV's business depends upon its ability to use those networks and customer resources at lower costs (or with higher revenues) than its customers could achieve on their own.

Keeping in mind that our scope did not include an assessment of the effectiveness of the agreement with TMV, but rather an analysis of sharing methods, we believe it is nevertheless clear that management has created an effective relationship with TMV at a cost that produces benefits commensurate with its costs.

E. Optimization Revenues and Margins

TMV's reports to NW Natural detail the shareable margins generated by each activity performed by the asset manager. The next table summarizes margins produced by activity for the last five TMV contract years (April 1 – March 31). The table shows that margins from other sources have far outrun those from Mist - - making any potential changes in sharing arrangements between customers and ownership for those other sources far more significant economically for customers. The total margins from storage optimization have comprised less than [redacted] percent of total margins produced by TMV optimization activities.

Storage and Other Optimization Revenues[xxxiv]

($ millions) (confidential)

[redacted]

[redacted][3]

F. TMV Compensation

TMV receives compensation commensurate with the margins its optimization activities have produced for NW Natural and its customers. [redacted]

[redacted]xxxv

[redacted]xxxvi

Management began its relationship with TMV in 2005, based on a competitive solicitation. A later, 2009 competitive solicitation process retained TMV. Since that time, management has extended TMV's contract on a year-by-year basis until 2016, when the parties executed a three-year agreement for contract years 2016-17, 2017-18 and 2018-19. [redacted]

[3] April 1 through the following March 31.

G. Optimization Margin Sharing

Two separate mechanisms govern the sharing of optimization savings or margins. First, the PGA mechanism flows through gas-cost savings. Second, revenues obtained under Rate Schedules 185 and 186 get credited against customer bills.[xxxvii] Different margin-sharing between customers and ownership apply to each of these two mechanisms:

- PGA sharing of gas costs below targeted levels
  - 90 percent to customers and 10 percent to ownership, or
  - 80 percent to customers and 20 percent to ownership, at management's election in each year's PGA proceeding
  - This election determines the width of a "deadband" in the NW Natural's Spring Earnings Test.[4]
- Sharing of margins produced by enhanced optimization:
  - 67 percent to customers and 33 percent to ownership for margins produced from the use of Mist assets in rate base
  - 67 percent to customers and 33 percent to ownership for optimization of all non-Mist optimization
  - 20 percent to customers and 80 percent to ownership for margins produced from optimization of Mist assets not in rate base.

[4] The deadband creates a range around the authorized return on equity (ROE). If realized ROE falls within the deadband when extra revenues from PGA sharing are included, the extra revenues go to ownership. If not, ownership must share the excess with customers. For companies electing 80 percent/20 percent sharing, the deadband is plus or minus 150 basis points; for 90 percent/10 percent sharing, it is 100 basis points.

The preceding chapter explained the ownership financial stake in the portion of Mist capability not yet recalled for utility use. This ownership contribution drives the significantly reversed contribution ratio when compared with the rate-based portion of Mist investment.

A legacy (1993) long-term capacity release pre-dates development of the current PGA mechanism. All margins produced by that release offset core-customer rates. NW Natural credits 100 percent of revenues from this release against capacity costs when it develops the gas-cost target in the PGA. Schedule P of NW Natural's tariff provides for 80/20 sharing for other capacity-release revenue, but such transactions have produced little revenue. Instead, NW Natural places all available pipeline capacity into its asset-management arrangement.[xxxviii]

The Oregon Commission established the sharing regime for PGA savings in proceedings that involved a broad range of stakeholders. The sharing regime for optimization began in 2000, as part of the early arrangements to address accelerated investment in the Mist Storage facility. Management revisions made in 2002 matched the PGA sharing percentage in effect at that time.[xxxix]

1. PGA Sharing

The PGA mechanism allows NW Natural to retain (*i.e.*, not flow through to customers) a share (10 to 20 percent) of the amount by which actual gas commodity costs fall beneath a cost target established annually. Demand cost reductions are not shared. Management must credit 100 percent of the revenues generated by the legacy capacity release against supply-capacity costs in setting the target. Therefore, the PGA effectively requires that all these release margins flow through to customers.

The Oregon PGA mechanism reflects an "incentive" PGA that has found significant use in the U.S. Studies of such mechanisms show some common features: [5]

- Target total gas cost ("benchmark") set annually, occasionally every two years
- Fixed-cost portions based on contracts, commodity portions based on market prices
- Careful specification of calculations.[6]

The current Oregon PGA mechanism arose originally from a generic proceeding conducted in 1998 and 1999, with revisions in 2008, 2009 and 2010. NW Natural proposes its target by August 31 of each year. The target undergoes review over the next two months, and the finally approved amount becomes effective for November 1. All parties have a full opportunity to participate in those proceedings.

[5] We have found studies on this subject by the National Regulatory Research Institute as far back as 1991. A somewhat more recent article is at https://www.fortnightly.com/fortnightly/2006/02/natural-gas-procurement-hard-look-incentive-mechanisms.

[6] The Washington Utilities and Transportation Commission web site includes "Guiding Principles for the Development and Implementation of Purchased Gas Adjustment Incentive Mechanisms" and a link to its PGA Policy Statement. See https://www.utc.wa.gov/regulatedIndustries/utilities/energy/Pages/PGAIncnetivePolicy.aspx The Oregon Public Utility Commission web site has a similar but shorter description. See www.puc.state.or.us/Pages/whatispga.aspx

The following table summarizes results under the PGA sharing mechanism for the last five PGA periods. Positive amounts represent savings; the negative amount indicates a year in which realized commodity costs exceeded target. Ownership and customers shared the excess.[xl]

PGA Mechanism Sharing

	2011-2012	2012-2013	2013-2014	2014-2015	2015-2016
Customer Share	$40.65	$2.48	$(21.58)	$21.11	$19.55
Company Share	$4.51	$0.28	$(2.40)	$2.35	$4.89
Total	$45.16	$2.76	$(23.98)	$23.46	$24.44

Millions of dollars

Management reported that it elected to share 90 percent of the savings with customers in the first four PGA years, including the one (2013-2014) in which savings were negative, but changed to 80 percent for the 2015-2016 year.

2. Rate Schedules 185 and 186

TMV calculates optimization revenues under Rate Schedules 185 and 186, using its transaction-tracking systems to identify the transactions executed for NW Natural's account and to calculate the margins produced by each transaction. Summing the margins generated by all transactions for NW Natural's account produces the sharable revenues amount. The terms of the asset-management agreement (AMA) with TMV allows NW Natural to audit the asset manager's accounting. NW Natural's Internal Audit Department conducts the audits, completing one in 2011 and a second one recently.

The first step in dividing the margins involves reducing them by the share to which the asset management agreement entitles TMV as compensation for serving NW Natural. The agreement provides a formula for calculating this compensation. The formula has changed over time; for contract years 2016-17 and 2017-18 it provides that:

[redacted]

3. Mist Optimization Margins

After deducting the compensation to TMV (if any) the amounts assigned to NW Natural first get divided between margins generated through: (a) optimization of the Mist Storage facility, and (b) those generated by all other optimization activities. The Mist Storage margins then become divided further between: (a) those generated using rate-based assets, and (b) those generated with the portion of Mist assets not yet recalled (*i.e.*, provisionally funded by ownership).

There exists no means for physically separating margins produced by these two sets of Mist investments (rate-base versus not-yet-rate-base). Consequently, separation requires a calculation, which occurs on the basis of the proportion of the storage field's deliverability considered dedicated to NW Natural's "core" customers (*i.e.*, customers for utility sales service) and rate-based, versus the remaining percentage dedicated to interstate and intrastate storage-service customers (the not-yet-recalled portion). The total margins produced get divided into two portions strictly on the basis of deliverability. Recall drives that proportion, meaning that the share assigned to core customers changes in those years where some amount of recall occurs or when deliverability might for some reason change. For the most recent calculation year, the core customer share was 305,000 Dth/day of deliverability (58.637 percent of total), leaving 215,000 Dth/day (41.363 percent) to storage-service customers.

Customer/ ownership margin sharing occurs for each of these two Mist deliverability portions, but in different ratios:

- Rate-based portion (58.637 percent) - - customers receive 67 percent of the margins and ownership 33 percent
- Not-yet-recalled portion (41.363 percent) - - customers receive 20 percent of the margins and ownership 80 percent.

This method means that customers receive 67 percent of 58.637 percent of Mist optimization margins, plus 20 percent of the remaining 41.363 percent. Summing these two components means that customers receive 47.6 percent of Mist optimization margins net of TMV compensation. Rate Schedule 185 governs this element of sharing.

4. Margins from Other Optimization

Non-Mist storage, portfolio[7] and transportation[8] optimization also produce margins shared between customers and ownership. Customers receive 67 percent of these margins and ownership 33 percent, both net of TMV compensation. NW Natural's Rate Schedule 186 governs this element of sharing. The following diagram illustrates this process, using optimization revenues from the 2016-2017 contract year:

[7] Primarily gas-for-gas exchanges, to take advantage of location differentials in gas prices. This category also includes margins earned from natural-gas-liquids extraction.
[8] TMV uses this category for off-system sales, using pipeline capacity under contract to NW Natural, and for short-term capacity releases.

Demonstration of Net Customer Share of Mist and Non-Mist Optimization

(confidential)

5. Results of Sharing Calculations

The next two tables show the results of NW Natural's optimization margin-sharing for the past five TMV contract years, listing TMV compensation, customer shares and ownership shares. [xli]

Mist and Other Optimization Sharing Results in Dollars

Recipient	2012-13	2013-14	2014-15	2015-16	2016-17
OR Customers					
WA Customers					
Ownership					
TMV Compensation					
Total					

Mist and Other Optimization Sharing Results in Percentages

Recipient	2012-13	2013-14	2014-15	2015-16	2016-17
OR Customers					
WA Customers					
Ownership					
TMV Compensation					

H. Benchmarking NW Natural's Sharing Percentages

NW Natural has provided testimony referring to "the incentives available to gas-only LDCs for similar forms of optimization" as providing "reference points" for assessing the reasonableness

of NW Natural's sharing proportions.[9] Liberty collected margin-sharing information from a broad range of local gas distribution companies covering a broad U.S. geographic range. The information sources include company tariffs, rate filings, filings with the U. S. Securities and Exchange Commission (SEC), and, in some instances, discussions with company personnel and utility regulatory body staff. The next chart summarizes the results of Liberty's review of margin-sharing experience.

Our review disclosed a variety of sharing mechanisms, including incentives for reducing the weighted-average-cost-of-gas (WACOG) and mechanisms for sharing capacity-release revenues and optimization margins. Some utilities employ only PGA-type mechanisms that focus on WACOG. Others, like NW Natural, have such PGA mechanisms, but also broader sharing that includes margins generated by optimization. A third group applies one mechanism that addresses the sharing of both purchased-gas-cost savings and optimization margins.

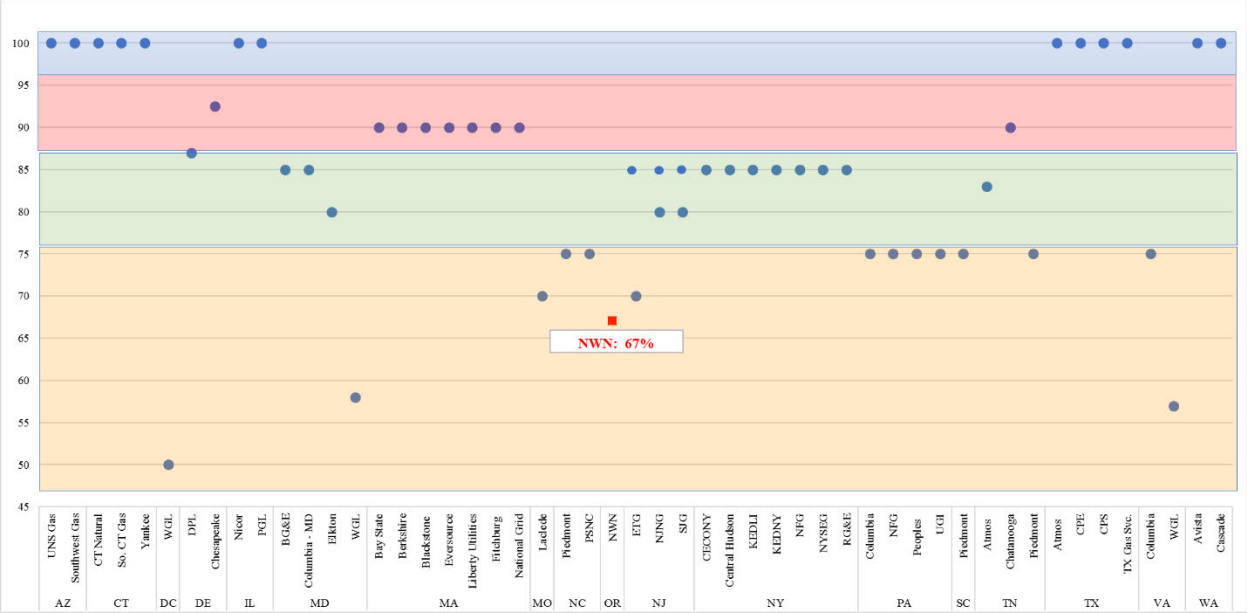
Not all companies employ asset managers. Some perform optimization activities internally; others employ an affiliate. In such cases, no asset manager compensation comes "off the top." We have observed instances where the use of an affiliate produces a single non-customer share, unifying ownership and asset-manager rewards into a single, combined factor. When compared with NW Natural, the absence of a third-party asset manager increases the effective shares going to customers above the nominally-stated customer percentages reported. This factor does not indicate a foregone opportunity at NW Natural. The commonality of asset-manager use supports a conclusion that they bring added value commensurate with their added costs. We certainly observed no failing in the performance of TMV or excessiveness in the compensation earned for work for NW Natural.

Our comparisons sought to recognize factors complicating direct comparisons. First, we removed any company with PGA-only mechanisms from the data. The local distribution companies reflected in our data points include optimization-only mechanisms, like NW Natural's. We also included joint PGA savings and optimization margins that peg sharing percentages at the same level for both benefits. Second, the data presented shows the customer/company split of optimization revenues net of any asset-manager share. Thus, our comparisons come as close to comparing the same things as the available data allows.

A third complication arises from the fact that some utilities operate under tiered sharing structures. NW Natural's sharing formula for Washington customers, for example, employs this structure. In those cases, the levels of net optimization margins produced drive the ultimate customer/company percentage splits of those margins. We also found cases where differing sharing percentages applied to different optimization activity types. When we found such arrangements, we used company reports to estimate the composite sharing percentages for all optimization activities considered together, for the latest year that we could find. Most of the data reports 2016 conditions.

[9] See pages 19-20, and Exhibit 103, Docket No. UM 1654, Witness Keith White.

Customer Shares of Optimization Margins



Each dot shows the customer share for the utilities for which we succeeded in securing reliable data. A blue dot indicates the customer share of optimization revenues after removing any external asset-manager share. The red square highlights NW Natural's Oregon customer share. The different colors in the bands in the diagram divide the data set into roughly equal "quartiles". For example, tan shading shows the 25-percent band encompassing the lowest post-asset-manager customer shares we observed; green highlights the next-lowest 25 percent. Only one company provides customers a lower share than does NW Natural in Oregon.

In considering the results of comparisons like the one at issue here, one needs to consider how truly comparable the data points are; *e.g.*, whether additional details might change relationships among them. We considered it appropriate to assume that each company's optimization activities are those appropriate to its market circumstances. For example, companies that buy gas in U.S. producing areas do not have NGLs extraction as an optimization activity because the gas they buy has already been stripped of marketable NGLs. Other companies have pipeline-capacity optimization arrangements that differ from those of NW Natural, due to the characteristics of their particular loads and service obligations.[10] Whatever each company's optimization activities include, the data plotted represents the public-utility-commission-approved sharing arrangement for those activities.

Significant investment and market risk have characterized and continue to characterize the position of ownership in unrecalled Mist capability. The same cannot be said for the optimization at issue here. Core-customer rates provide for recovery of the capital and operating costs of the assets whose value management optimizes. As do others, management here takes strong action to ensure that optimization does not involve taking a market position. While some individual

[10] Example: The New Jersey LDCs typically have a combination of in-house and externally-managed optimization arrangements due to adjustments in their service obligations to industrial customers made as part of that state's Conservation Incentive Program.

transactions can produce negative results, there is not material risk that optimization on the whole will produce losses. Moreover, customers share in losses from the small number of "losing" transactions to the same degree they share in the many more that produce "wins." The prevalence of optimization in the industry shows that whatever risks it entails, commissions have found them to be within the scope of normal utility operations.

We have examined the scope of asset optimization at many gas utilities. Comparing them with what management does here, we have not identified any material sources of risk here that do not exist elsewhere in our experience. We also did not find anything in the asset management agreement with TMV or in our discussions with management and TMV about activities here that suggest particularly extraordinary efforts to optimize. We certainly have no reason to question the commitment of management to optimization or to doing so with due regard for risk. Neither do we have any reason to criticize the performance of either management or TMV, although we do note that our work scope did not include a management audit of performance.

We also note that the FERC has standardized asset management to a considerable degree. In its Order No. 712, issued June 19, 2008, the FERC revised its regulations governing natural gas pipelines to facilitate asset-management arrangements, among other things.[11] Those regulations were further clarified in 2015.[xlii] As a result, the terms and conditions governing asset-management agreements (AMAs) are generally similar.[xliii]

I. The Goal of Sharing - - The Customer Perspective

The purpose for rewarding management for optimization performance has substantial bearing on determining its magnitude. Incentive mechanisms are common, but not universal. Many utility regulatory commissions appear not to consider shareowner incentives a necessary element of securing strong performance in optimizing utility assets. The data points from our benchmarking activities show five of the 17 states plus the District of Columbia for which we have information direct all margins from optimization to the benefit of customers. Presumably, they rely upon the obligation to act prudently, leaving after-the-fact reviews of performance, where they even exist, as the principal oversight mechanism.

Therefore, one cannot consider a change that would flow all margins through to customers outside the range of normal experience. After-the-fact reviews (particularly when accompanied by periodic forward-looking examinations of supply procurement and management) can be effective tools. Nevertheless, we place substantial weight on how the dynamic nature of natural gas markets affects optimization. Finding and exploiting opportunities in such markets requires special diligence, flexibility, sophistication, risk mitigation, and adaptability. It takes a multi-pronged strategy and many transactions to optimize effectively in such circumstances.

Consequently, a positive inducement to do so has, in our view, substantial logic. It also reflects the majority view among those for whom we collected meaningful data. Moreover, the significant margins that NW Natural has produced under a long-standing sharing approach

[11] Exhibit NWN/306, attached to the Reply Testimony and Exhibits of Keith White and Randolph Friedman in Docket No. UM 1654, shows that the number of FERC enforcement cases related to asset-management-type transactions declined dramatically soon after the issuance of the order.

underscores its value to Oregon customers. Whether a smaller sharing percentage for shareowners would produce similar net customer benefit levels comprises a fair question, but our experience supports the use of at least some meaningful level of sharing - - defining meaningful as a level that gives management a clear incentive to perform at a high level.

J. Magnitude of the Incentive

The percentage that NW Natural ownership receives stands as a clear outlier among the population for which we have been able to secure information. We examined the existence of any:

- Exceptional market uncertainties or dynamics (risks)
- Unusual optimization scope or activities (benefits)
- Asset or operating expense contributions by ownership (costs).

The existence of such distinctions could justify variances from the sharing norms our work has disclosed.

Our discussions with management disclosed no exceptional risks. Management has in the past offered testimony confirming this view.[xliv] We found no exceptional risks produced by the asset-management agreement with TMV. We queried management about risk through data requests addressing the division of risks and responsibilities,[xlv] and we followed up responses to those requests with interviews addressing the risk environment associated with optimizing under the asset-management agreement.[xlvi] We did not find any risk exposure that, in our judgment, would justify an unusually large share of optimization margins.

With respect to the question of optimization scope and activities, management directly observed that it does not undertake activities that are unusual. Our review confirms this view. Management does, however, believe that it pursues a range of optimization activities that, while typical, it seeks out more vigorously. That belief is necessarily subjective. Without criticizing in any respect the aggressiveness (with accompanying care) of management's optimization efforts, we find it difficult to separate in a tangible way the quality or intensity of its efforts from what we have observed elsewhere. Moreover, even with the recognizably strong and commendable efforts that management has undertaken consistently over a long period, there remains the question of whether moving sharing mechanisms in the direction of more common industry experience would materially diminish the strength of those efforts.

With respect to costs, the assets at issue here all fall into rate base. Ownership contributes no assets whose costs rate base fails to include. Investments in as-yet unrecalled Mist capability present a different case, but one not relevant to the sharing under discussion here. TMV compensation is effectively a shared cost already. We reviewed management's operating responsibilities under the asset-management agreement. Management remains directly responsible for operating the gas-supply function for its customers, and in informing TMV about those operations. Management stays in continuous contact with TMV regarding gas market conditions on and outside its system, and about possibilities for current and future optimization activities. Compensation for management's activities in these areas comes primarily through recognition of the personnel and related costs in its rates, and through sharing of gas-cost savings

under its purchased-gas-adjustment (PGA) mechanism. We did not find any operational responsibilities or costs that would justify an unusually large share of optimization margins.

K. Alternative Sharing Mechanisms

We identified three main alternatives to the current sharing structure for stakeholder consideration:

- Increase the customer share from the current 67 percent to a more-typical 75 to 85 percent
- Take the asset-manager's share from both Mist and Non-Mist Optimization margins, rather than only from Non-Mist Optimization, as is done currently
- Introduce a declining-block structure into determination of NW Natural's customers' share, analogous to the declining-block structure in NW Natural's AMA with TMV.

We developed a simple spreadsheet model to test these (and other) alternatives for their effect on optimization margin-sharing at NW Natural. The next part of this section describes the model, and presents results that it produced in tests designed to illustrate the effects of changing the sharing structure pursuant to the variations identified above. While we present a limited number of variations within each of the three alternatives, our model permits stakeholders to adjust them to consider the likely effects of more variations.

We explain below that estimating results of alternative sharing schemes is complicated. We selected the three alternative structures listed above for testing. A large range of values for key assumptions can be postulated. We have not done so, but we have constructed a simple model that will permit Steering Committee members to do so, based on variations whose results they may wish to consider. We first tested the three alternative sharing structures for a historical period: actual results for the 2016-17 contract year. Going forward, two key input parameters will change:

- Total optimization revenues, and
- The Tier 1 tranche in the AMA with TMV.

Our tests used the following range of assumptions about total optimization revenues:

- A "base case" using a management-provided forecast showing significant declines in optimization revenues over the next five years
- A "moderated decline case using another management-provided forecast showing less pronounced optimization-revenue declines
- A "constant case" using actual 2016-2017 optimization revenues.

[redacted]

The next sections of this chapter describe our tests and their results. They include:

- Tests 1-3: Examine sharing alternatives with 2016-17 optimization revenues [redacted]

- Tests 4-5: Examine sharing alternatives with forecast optimization revenues and [redacted]
  - Test 4: No change in sharing; sub-Tests A and B examine alternative optimization revenue forecasts
  - Test 5: Declining-block sharing: sub-Tests A and B examine alternative optimization revenue forecasts
- Test 6: 2016-17 optimization revenues, [redacted]
  - Sub-test 6A: No change in sharing
  - Sub-test 6B: Declining-block sharing.

1. Designing a Model for Alternatives Testing

Our spreadsheet model simulates the workings of NW Natural's sharing of optimization revenues. Four features complicate that modeling.

a. Computing the TMV Share of Margins

The asset-management agreement governs the asset manager's share. TMV's compensation, calculated as a share of total optimization revenues, changes as those total revenues change. TMV's share does not result from applying a simple, fixed percentage of the total. Thus, changing total revenues for purposes of modeling potential future results must recognize that the percentage going to TMV will change. However, if total modeled optimization revenues do not change, but one distributes shares differently between among customers and ownership, the asset manager's share does not change. If, on the other hand, changing the Tier 1 tranche (as the TMV contract provides for contract years following 2017-18), then TMV's share will change.

b. The Washington Share

Computing Washington customers' share uses revenues after removal of the asset manager's share. That calculation operates as follows:

- Take the sum of
  - 100 percent of the first $1.5 million, plus
  - 80 percent of $1.5 million to $4.0 million
  - 50 percent of amounts above $4.0 million
- Multiply that sum by the proportion of NW Natural's customers located in Washington (currently 10.931 percent).

c. The Oregon Share

Computing the Oregon customer share operates as follows:

- Divide gross optimization revenues (i.e., do not first deduct the asset manager's share) into Mist and Non-Mist segments
- Subtract the asset manager's share from the Non-Mist segment
- Divide the Mist segment into the portion generated with rate-base assets (currently 305/520ths of the total) and the portion generated with non-rate-base assets (currently 215/520ths of the total).

- Multiply the portion generated with rate-base assets by 67 percent
- Multiply the portion generated with non-rate-base assets by 20 percent
- Add the two.

- After subtracting the asset manager's share from the Non-Mist segment, multiply the remainder by 67 percent.
- Add the resulting shares of Mist and Non-Mist revenues.

d. NW Natural Share

Ownership's portion equals gross optimization revenues, minus the asset manager's share, minus the Washington and Oregon customers' shares. The ownership portion does not require allocation between Oregon and Washington; it simply consists of the remainder after deducting the asset manager's share, and the Oregon and Washington customers' shares.

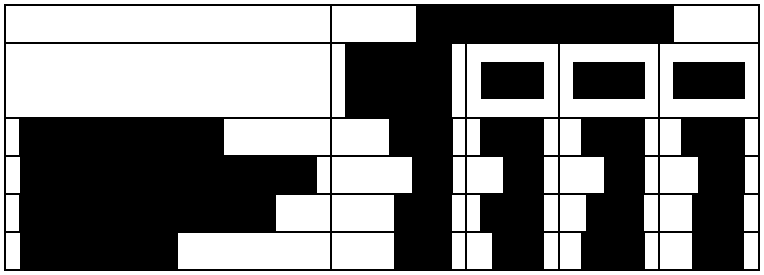
2. 2016-17 Results

[redacted]

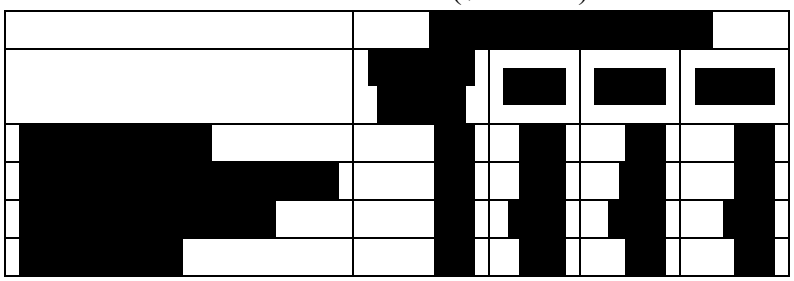
3. Test 1: Increase the Oregon Customers' Share

[redacted]

Test 1 Results (%)



Test 1 Results (\$ million)



4. Test 2: Take Asset Manager's Share from Mist and Non-Mist Revenues

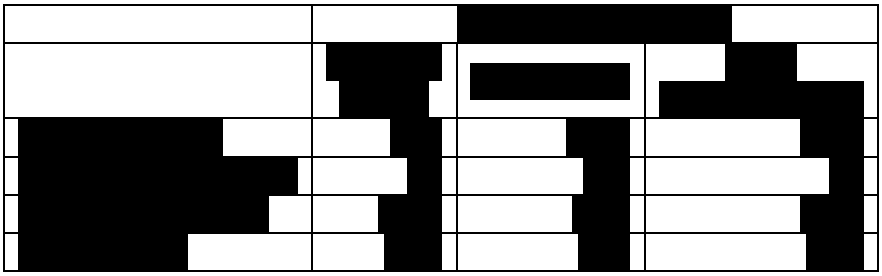
When calculating the Oregon customers' share, NW Natural takes the asset-manager's share only from Non-Mist optimization revenues. Mist optimization revenues get shared by the different sharing percentages afforded rate-base assets and non-rate-base assets, but NW Natural takes no portion of the asset-manager's share from those revenues. This test took portions of the asset manager's share from both Mist and Non-Mist optimization revenues when calculating the Oregon customers' share. Sharing for Washington customers does not differentiate between Mist and Non-Mist optimization revenues. We tested the following alternatives:

- Split the asset manager's share evenly (50/50) between Oregon customers and the Company
- Split the asset manager's share between customers and the Company in proportion to the amounts of those revenues before the asset manager's share is taken.

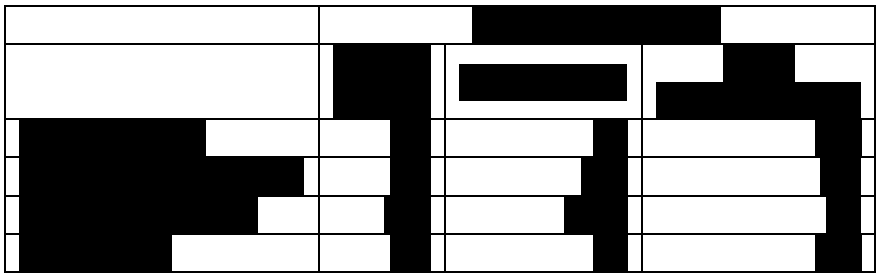
We again used actual optimization revenues for the 2016-2017 contract year.

This test required changing the order of the sharing calculation somewhat. The current method of Oregon sharing takes the asset manager's share out before calculating the customer share of Non-Mist optimization revenues (67 percent). For this test, we reversed that calculation order, calculating the customer share before extracting the asset manager's share. We then split the asset manager's share as indicated: 50/50 for the first case, and proportionately to revenues for the second. The following table shows the results.

Test 2 Results (%)



Test 2 Results ($ million)



5. Test 3: Declining Block for Customer Share

The current Oregon structure does not vary the customer share of Mist and Non-Mist optimization revenues as the level of revenues changes. A method used in other places (including Washington) guarantees customers a base level of revenue, with sharing between customers and ownership of revenues above the guaranteed level. We tested a declining-block approach using a

guaranteed level of $8 million to Oregon customers, then split revenues above that level 60 percent to customers and 40 percent to ownership. The 60/40 split applied to instances where the 67/33 split exists under the current structure. We tested this alternative at various levels of total optimization revenue:

[redacted]

We needed to make several assumptions to apply this test:

- The current AMA remains, causing TMV's share to change with changes in total revenue
- The current structure for Washington customers' share continues. TMV's share would change with the change in total revenues, which would affect the amount of Washington customers' share, but not the method for calculating that share.
- Mist and Non-Mist optimization revenues each increase proportionately with total revenues; *i.e.*, if total revenues go up by 10 percent, then both Mist and Non-Mist revenues increase by 10 percent, using their relationship in 2016-2017 as a base.

[redacted]

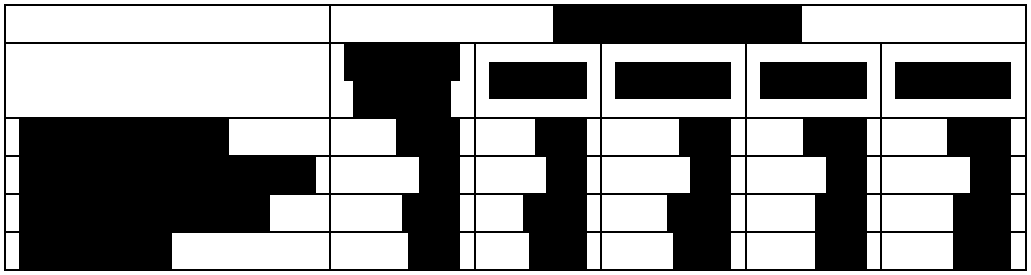
Our calculations proceeded as follows:

- We first calculated the Oregon share of adjusted Mist and Non-Mist revenues (multiply by 0.89069).
- Next, we extracted the Mist share (16.9 percent) of the $8 million guarantee.
- We then split remaining Mist revenues
  - 60 percent to customers and 40 percent to ownership for the rate-base-generated share of those revenues[12]
  - 20 percent to customers and 80 percent to ownership for the non-rate-base-generated share.[13]
- We continued to take the asset manager's share from Non-Mist revenues. Accordingly, Oregon customers' share of those revenues equaled the Oregon share (0.89069), minus the Non-Mist share of the base guarantee (83.1 percent of $8 million), minus the asset manager's share, times 60 percent.

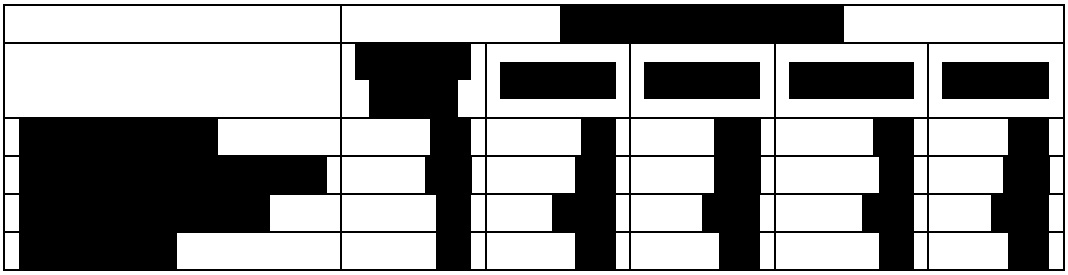
The following table shows the results of this test. Each alternative used a base guarantee to Oregon customers of $8 million. The difference among the alternatives thus lies in the amount of total optimization revenue.

[12] 305/520ths in 2016
[13] 215/520ths in 2016.

Test 3 Results (%)



Test 3 Results ($ million)



6. Test 4: Sharing Under Alternative Revenue Forecasts

[redacted]

14xlvii

[redacted]

15

[redacted]

[14] Previously in this chapter, optimization-revenue information has been presented as TMV presents it to NW Natural: by contract year (April 1 through March 31). NW Natural's forecasts are presented by calendar year, however. For the calculations in this section of this chapter, we show actual results for the most recent contract year (2016-17), but calculate test results by calendar year, in order to match NW Natural's forecasts.

[15] Recalls are effective on May 1 of the indicated years.

[redacted]

[redacted]

[redacted][16] [redacted]

Test 4A: NW Natural Base Forecast, New AMA Sharing (%)

	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]

Test 4A: NW Natural Base Forecast, New AMA Sharing ($ million)

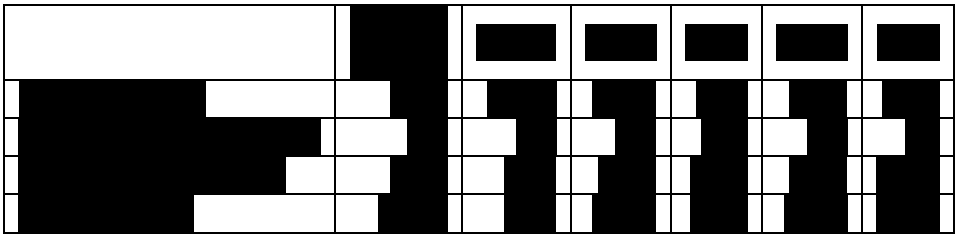
	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]

[redacted]

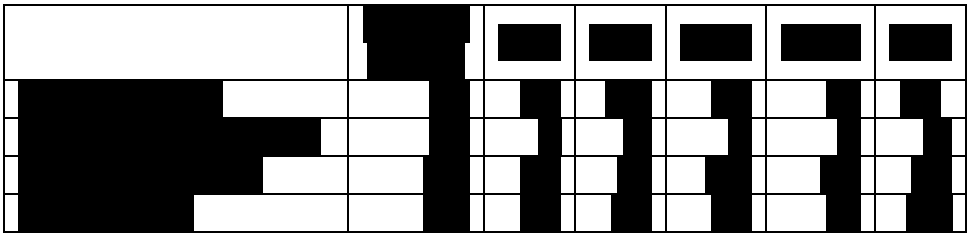
16 [redacted]

[redacted]

Test 4B: NW Natural Lower Recall Forecast, New AMA Sharing (%)



Test 4B: NW Natural Lower Recall Forecast, New AMA Sharing ($ million)



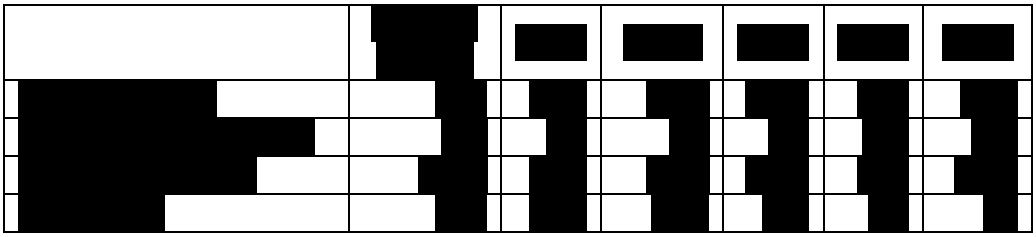
7. Test 5: Alternative Forecasts with Declining Block Customers' Share

For comparison, we applied the declining-block sharing mechanism tested for 2016-17 actual results in the previous section of this chapter, assuming:

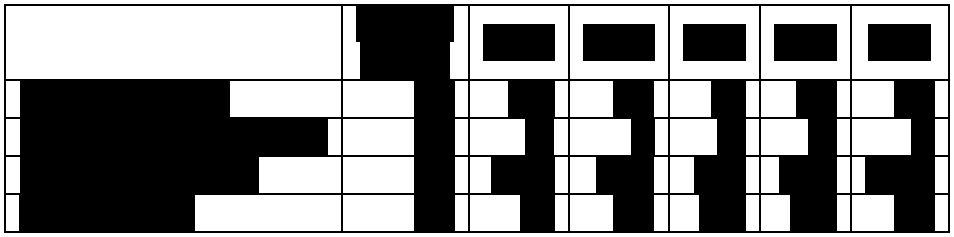
- No change in sharing for Washington customers
- Oregon customers get a guaranteed $8 million of optimization revenues
- If Oregon's share of Mist and Non-Mist optimization revenues exceeds $8 million, then split the excess:
    - 60 percent to customers and 40 percent to ownership for Mist rate-base-generated revenues and Non-Mist revenues
    - 20 percent to customers and 80 percent to ownership for Mist non-rate-base-generated revenues.

First, we used management's base forecast for optimization revenues. We put the forecast through our calculation model for shares of optimization revenues, using the declining-block structure for Oregon customers' share. The following table shows the results.

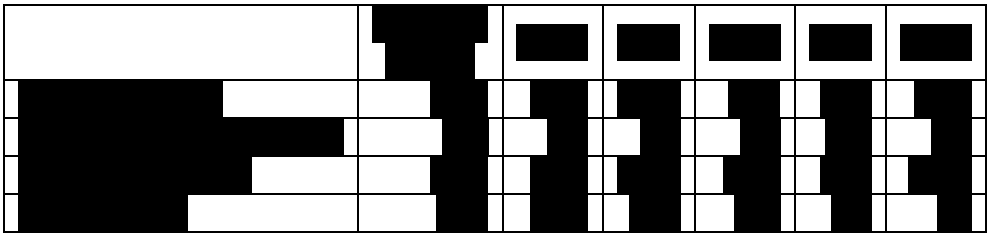
Test 5A: NW Natural Base Forecast, New AMA, Declining-Block Sharing (%)



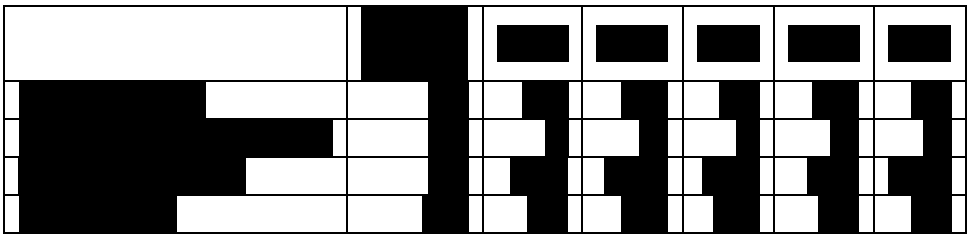
Test 5A: NW Natural Base Forecast New AMA, Declining-Block Sharing ($ million)



Test 5B: NW Natural Lower Recall Forecast, New AMA, Declining-Block Sharing (%)



Test 5B: NW Natural Lower Recall Forecast, New AMA, Declining-Block Sharing
($ million)



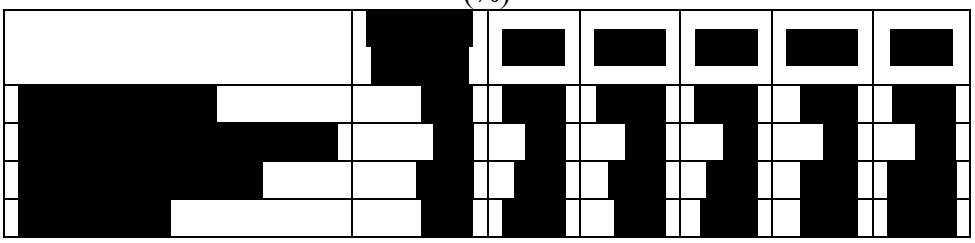
8. Test 6: Sharing under Constant Revenues but Different Core/ISS Split

Our two final tests examined results in cases where total optimization revenues stay the same, but forecasted Mist recalls occur. The recalls would serve to dedicate a larger share of Mist deliverability to customers for utility sales service. Thus, the share of Mist optimization revenues generated with rate-base assets would increase. The customer sharing percentage for the share generated with rate-base assets amounts to 67 percent of optimization revenues; the share generated with non-rate-base assets at 20 percent.

The table below shows the results under that case, which holds total optimization revenues the same, but assumes Mist recalls of 30,000 Dth/day in 2019, 2020 and 2021. The Oregon/Washington allocation comes from management's base forecast, and the asset-manager's share is calculated pursuant to the latest agreement.

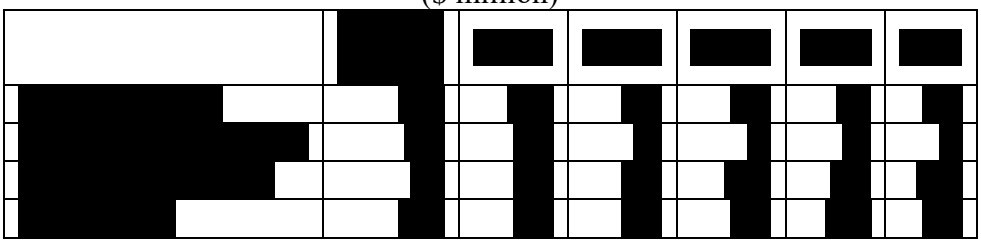
Test 6A: 2016-17 Optimization Revenues, Mist Recalls in 2019, 2020, 2021, New AMA

(%)



Test 6A: 2016-17 Optimization Revenues, Mist Recalls in 2019, 2020, 2021, New AMA

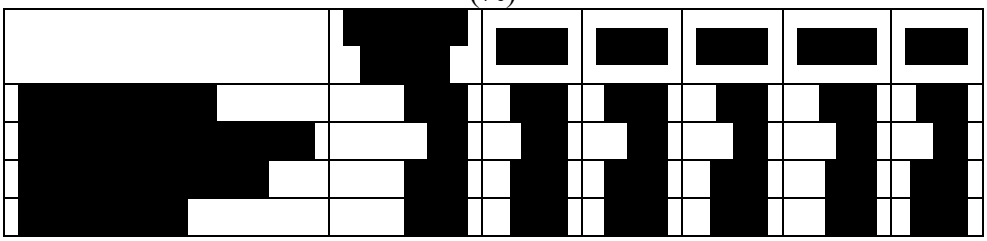
($ million)



The last case uses the same forecast -- constant optimization revenue but Mist recalls in 2019, 2020 and 2021 -- and calculates sharing using the declining-block structure for Oregon customers' share. The following table shows the results.

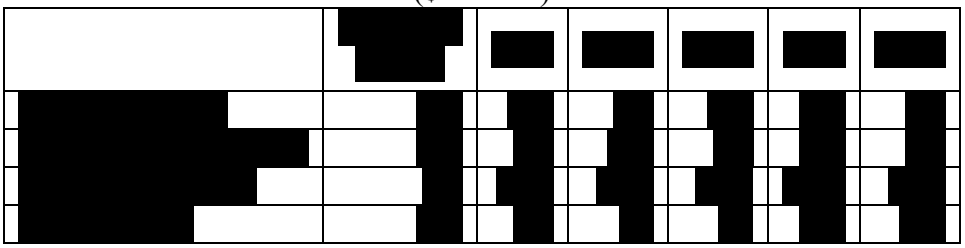
Test 6B: 2016-17 Optimization Revenues, Mist Recalls in 2019, 2020, 2021, New AMA, Declining-Block Sharing

(%)



Test 6B: 2016-17 Optimization Revenues, Mist Recalls in 2019, 2020, 2021, New AMA, Declining-Block Sharing

($ million)



L. Analysis of Optimization Benefits Sharing

Our examination of the nature of optimization activities performed by TMV for NW Natural found them to be of a nature and extent similar to what others would be expected to do given the portfolio of assets assembled for serving core customers, and given the circumstances in which that portfolio operates. The arrangements with TMV give reasonably typical roles to management and to TMV. Where experience at NW Natural differs is in the comparatively low percentage share of margins produced from optimization available to offset costs that core customers bear in rates for service. The gap between what customers have available here is very large in magnitude and in the percentile into which that percentage falls.

We determined that percentile based upon what we knew or learned about a very robust range of U.S. natural gas distribution utilities. Not all of the details about their arrangements are knowable, but the consistency of the data we assembled about sharing percentages mitigates the possibility that further details would likely change NW Natural's position much with respect to the rest of the industry.

Given the lack of large risk involved in optimization and given the lack of factors that make optimization materially more complex or challenging at NW Natural, we can postulate no reason justifying a large gap between NW Natural and the rest of the industry. If the goal in Oregon remains to provide a sufficient incentive for management to commit fully to asset optimization, then the experience of our large sample group compels a conclusion that the prevailing view is that a lower share for ownership will nevertheless provide strong incentives to maximize performance without incurring undue risk.

If significant additional in-house efforts or expertise were a requirement for the successful optimization of NWN's assets, greater justification for the share available to ownership would exist. However, TMV provides that expertise and those efforts, and takes a share of the margins generated as compensation.

We therefore believe it is appropriate for the stakeholders to look at changes that will retain a strong performance incentive, but at lower costs to customers. Management and TMV have determined the asset manager's share of gross optimization margins through negotiations, preceded in earlier years by competitive solicitations. We consider that share to have been competitively determined. TMV's management of the optimization of NW Natural's assets produces considerable margins. TMV's share of gross optimization revenues did not appear out of line with those for other asset managers in our experience.

We have presented three alternative sharing alternatives, and modeled their performance under alternative forecasts of optimization revenues. We conducted our testing with a simple spreadsheet model available to members of the Steering Committee. That model will support analysis of other sharing alternatives and other assumptions that drive results under them.

End Notes

[i] Liberty Chronology 3, Attachment 3, page 25
[ii] OPUC Staff Report dated April 18, 2000
[iii] NW Natural presentation on June 5, 2017
[iv] NW Natural Financial Overview, 1c
[v] NW Natural presentation on June 5, 2017
[vi] DR #46, Attachment 1, "Reconciliation of 2f and 6e"
[vii] DR #46, Attachment 1, "Revised 2f" Non-utility CAPEX
[viii] DR #12, Attachment 3, page 15
[ix] DR #52, Telephone interview with NW Natural personnel, August 16, 2017
[x] DR#51 and telephone interview with NW Natural personnel on August 16, 2017.
[xi] DRs #20 and #49
[xii] NW Natural presentation on June 5, 2017
[xiii] NW Natural meeting #6, June 6, 2017
[xiv] NWN Financial 4 Attachment 1
[xv] Liberty Chronology 2, Attachment 2
[xvi] NWN Financial 4, Attachment 1
[xvii] Financial information from NWN Financial 4, Attachment 1
[xviii] NW Natural meeting #6 on June 6, 2017
[xix] DR #12, Attachment 2, page 10, Telephone interview #5 on August 16, 2017
[xx] "Underground Natural Gas Storage", FERC Staff Report dated September 30, 2004
[xxi] Telephone interview #5 on August 16, 2017
[xxii] NW Natural Meeting #6 on June 6, 2017
[xxiii] Data Request #41 and revisions
[xxiv] Data Request #41 and revisions
[xxv] National Regulatory Research Institute, "Outsourcing of Gas Procurement and Related Functions, a Report to the Colorado Public Utilities Commission", June 2008.
[xxvi] NW Natural Gas Company, Direct Testimony and Exhibits of Keith White, OPUC Docket No. UM 1654, July 15, 2013. See pages 6, 7.
[xxvii] R. Friedman presentation to Liberty, June 5, 2017. Much of this material was drawn from his testimony in UM 1654, summer 2013.
[xxviii] Reply Testimony of Randolph Friedman in UM 1654, September 23, 2013, at pages 2-4.
[xxix] *Ibid.*
[xxx] Direct Testimony and Exhibits of Keith White, OPUC Docket No. UM 1654, July 15, 2013, at page 6.
[xxxi] Direct Testimony and Exhibits of Randolph S. Friedman, OPUC Docket No. UM 1654, July 15, 2013, at pages 9-15.
[xxxii] Adger interview of R. Friedman, August 30, 2017.
[xxxiii] *Ibid.*
[xxxiv] Response to DR No. 68
[xxxv] See, *e.g.*, National Regulatory Research Institute, "The Outsourcing Option: Are There Some Gas Utility Functions That Others Can Do Better?", NRRI Research Report No. 09-03, February 2009, at pages 11, 15 and 29.
[xxxvi] *Ibid.*, at page 15, and Liberty experience
[xxxvii] Response to DR No. 56a
[xxxviii] Direct Testimony in Docket No. UM 1654, NW Natural Witness Keith White. See Exhibit NWN/100, filed July 15, 2013, at page 19.
[xxxix] White Direct Testimony, at page 9
[xl] Response to DR No. 65
[xli] Response to DR No. 73
[xlii] U. S. Federal Energy Regulatory Commission, Order on Petition for Declaratory Order, issued in Docket No. RP15-1089-000 on October 15, 2015.
[xliii] Liberty Team interview of Tenaska representatives, June 8, 2017. Also, Adger interview of R. Friedman, August 30, 2017.

[xliv] See, *e.g.*, OPUC Docket No. UM 1654, Direct Testimony of Keith White, filed July 15, 2013, at page 12. See also Reply Testimony of Keith White, filed September 23, 2013, at pp. 13-16, 19; Reply Testimony of Randolph Friedman, filed the same date, at page 2; and the Supplemental Reply Testimony of Keith White, filed January 10, 2014, at page 3.
[xlv] See, *e.g.*, DR Nos. 54, 70.
[xlvi] Especially Adger interview of R. Friedman, August 30, 2017.
[xlvii] Updated DR No. 41, Attachment 6.

CERTIFICATE OF SERVICE

I hereby certify that on March 27, 2018 I have served by electronic mail the foregoing SUPPLEMENTAL DIRECT TESTIMONY AND EXHIBIT OF RANDOLPH S. FRIEDMAN upon all parties of record in docket UG 344, which is the Company's most recent general rate case.

UG 344

OPUC DOCKETS
OREGON CITIZENS UTILITY BOARD
dockets@oregoncub.org

ROBERT JENKS
OREGON CITIZENS UTILITY BOARD
bob@oregoncub.org

MICHAEL GOETZ
OREGON CITIZENS UTILITY BOARD
MIKE@oregoncub.org

MCDOWELL RACKNER & GIBSON PC
dockets@mrg-law.com

MARIANNE GARDNER
PUBLIC UTILITIES COMMISSION
Marianne.gardner@state.or.us

STEPHANIE ANDRUS
PUBLIC UTILITY COMMISSION
Stephanie.andrus@state.or.us

Brad Mullins
Mountain West Analytics
brmullins@mwanalytics.com

CHAD M. STOKES
CABLE HUSTON BENEDICT HAAGENSEN & LLOYD
cstokes@cablehuston.com

EDWARD FINKLEA
NORTHWEST INDUSTRIAL GAS USERS
efinklea@nwigu.org

BRYAN CONWAY
PUBLIC UTILITY COMMISSION
bryan.conway@state.or.us

DATED: March 27, 2018

/s/ Alisha Till
Alisha Till
Legal Assistant

McDowell Rackner Gibson PC
419 SW 11th Avenue, Suite 400
Portland, OR 97205