

# **Puget Sound Energy**

## **2019 Gas Hedging Plan and 2018 Purchased Gas Adjustment Retrospective**

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Shaded information is designated as confidential per WAC 480-07-160

Table of Contents

1	Objectives and Goals.....	3
2	Oversight and Controls .....	4
3	Hedging Strategies .....	6
3.1	Programmatic Strategy .....	6
3.2	Risk Responsive Strategy.....	7
3.3	Discretionary Strategy.....	10
4	2018 PGA Retrospective .....	10
4.1	Market Price History .....	11
4.2	Hedging Strategies .....	12
4.2.1	Programmatic Strategy .....	12
4.2.2	Discretionary .....	13
4.2.3	Risk-Responsive Strategy .....	14
4.3	Active Storage Management .....	15
5	Conclusion.....	16

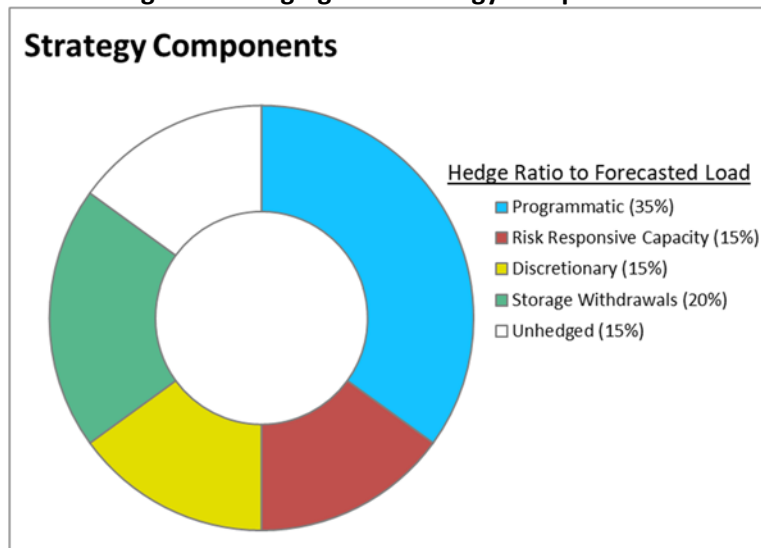
# 1 Objectives and Goals

The goal of Puget Sound Energy’s (“PSE”) natural gas hedging program is to balance the benefit of price stability for our customers with the cost of hedging. Two primary measurable objectives relate to hedging volume and diversity of strategies.

One of the biggest challenges in designing a hedging program for a local distribution company (“LDC”) is determining an appropriate hedging volume. Demand forecasts given normal weather conditions are reasonably accurate, but during abnormal weather conditions an LDC’s demand can vary substantially from forecasts. PSE’s hedges are entered into based on long-term load forecasts which by their nature cannot account for short-term weather abnormalities. PSE can reasonably predict its minimum load with a high level of confidence based on historical weather data. PSE attempts to avoid over-hedging to actual load because this scenario can result in large hedging losses as prices tend to be lower when system demand is below plan. Therefore, PSE’s objective is to create a program with enough hedging capacity to match the high-confidence minimum load forecast<sup>1</sup>. This approach could result in a hedge ratio of approximately 85% of normal load, which provides a balance between effective price risk management and the costs associated with hedging. Typically, PSE does not hedge to the full 85% capacity unless risk responsive and discretionary protocols, which are described later in this document, are fully transacted.

PSE has a diversified gas hedging program that includes a combination of programmatic, risk-responsive and discretionary protocols along with storage assets. This results in a program with diversified strategies that balance the stability of having ratable risk reduction, along with flexibility to respond to changes in market prices and volatility. Figure 1 illustrates the strategy components of PSE’s hedging plan.

**Figure 1. Hedging Plan Strategy Components**



<sup>1</sup> The terms low load forecast and high confidence minimum load are used interchangeably.

The high-confidence minimum load forecast reflects the same demand conditions and forecast methodology as PSE’s normal load forecast, with an adjustment to weather assumptions. Rather than using normal or average heating degree days (“HDD”) to determine the load forecast, the model was adjusted to use the lowest average HDD from the 1950-2018 historical period for each month. Shown in Table 1, the low load forecast is approximately [REDACTED] of the expected load.

**Table 1. Low Load vs. Normal Load Forecast (MMBtu/day)**

Month	Normal Load Forecast	Low Load Forecast	Low Load as Percent of Normal Load
Nov '19	389,451	[REDACTED]	[REDACTED]
Dec '19	483,160	[REDACTED]	[REDACTED]
Jan '20	451,329	[REDACTED]	[REDACTED]
Feb '20	427,160	[REDACTED]	[REDACTED]
Mar '20	350,203	[REDACTED]	[REDACTED]
Apr '20	267,454	[REDACTED]	[REDACTED]
May '20	165,394	[REDACTED]	[REDACTED]
Jun '20	120,507	[REDACTED]	[REDACTED]
Jul '20	88,850	[REDACTED]	[REDACTED]
Aug '20	86,841	[REDACTED]	[REDACTED]
Sep '20	116,322	[REDACTED]	[REDACTED]
Oct '20	226,684	[REDACTED]	[REDACTED]

PSE’s program<sup>2</sup> considers seasonal and monthly load variability, price volatility, and asset optimization, including natural gas storage and pipeline transportation contracts. PSE mitigates its exposure to price volatility in the winter by injecting into storage when prices are generally low in the summer and withdrawing when prices are high in the winter. Transportation assets provide access to multiple supply basins in the region which promotes price diversity and adds to hedging flexibility. In addition to the hedging benefits, unutilized storage and transportation capacity are further optimized in the wholesale market to reduce commodity costs.

## 2 Oversight and Controls

The hedging program is governed by PSE’s Energy Risk Policy (“Policy”) and associated Energy Supply Transaction and Hedging Procedures Manual (“Procedures”). PSE’s Policy and Procedures lay out the

<sup>2</sup> The materials from the Michael Gettings workshops hosted by the WUTC guided the refinement of PSE’s hedging program. Specifically, Gettings’ Natural Gas Utility Hedging Practices and Regulatory Oversight (2015) provided the framework for assessing changes to the hedging program.

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policies that govern energy portfolio management activities and define roles and responsibilities of various departments. In addition, PSE's Board of Directors provides executive oversight of these areas through the Audit Committee. The Policy and Procedures are approved by PSE's Energy Management Committee ("EMC").

The EMC is composed of five PSE officers, and oversees the activities performed by both the Energy Supply Merchant ("ESM") and Energy Risk Control departments. The EMC is responsible for providing oversight and direction on all portfolio risk issues in addition to approving long-term resource contracts and acquisitions. The EMC provides policy-level and strategic direction on a regular basis, reviews position reports, sets risk exposure limits, reviews proposed risk management strategies, and approves policy, procedures, and strategies for implementation by PSE staff.

Energy Risk Control is responsible for independently monitoring, measuring, quantifying and reporting official risk positions and performing credit analysis. Energy Risk Control is led by the Corporate Treasurer.

PSE's ESM department is responsible for all Front Office activities including developing and implementing portfolio management strategies and transacting in the markets for power and gas within the requirements of the Policy and Procedures, including the hedging program. ESM department is composed of energy market analysts, energy traders, and other professionals. ESM also makes recommendations for policy changes, which must be incorporated into the Policy and Procedures by Energy Risk Control and approved by the EMC. The ESM Director informs Energy Risk Control in writing which staff members are Authorized Traders, and of any special limitations on any such person's authority. All Authorized Traders who transact on behalf of PSE must operate within approved limits set forth in or pursuant to the Procedures, including any applicable credit or transaction limits.

ESM provides the EMC with a monthly update of market conditions, hedging activity, and a forecast of hedging costs or gains. The update includes the following information:

- (i) Current market prices and changes from previous update
- (ii) Hedge mark-to-market
- (iii) Options premiums
- (iv) Hedge prices (including fixed price and option strikes)
- (v) Risk responsive market prices and volatility in relation to the tiered tolerance boundaries

For the 2019-2020 Purchased Gas Adjustment (PGA) year PSE has not made changes to its hedging policies or practices. PSE has maintained its programmatic, risk-responsive, and low price discretionary strategies. PSE is in the process of engaging a third party consultant to perform an independent evaluation of the hedging plan including an assessment of the risk-responsive strategy outlined in the policy statement.

There is no relationship between natural gas hedging gains or losses that are included in electric power costs and hedges that are part of the natural gas operations. All transactions between PSE's power and

natural gas operations are done at prevailing market prices consistent with the guidelines provided in the Procedures.

PSE's natural gas customers are only in the state of Washington, therefore there is no need to allocate costs between jurisdictions.

### 3 Hedging Strategies

#### 3.1 Programmatic Strategy

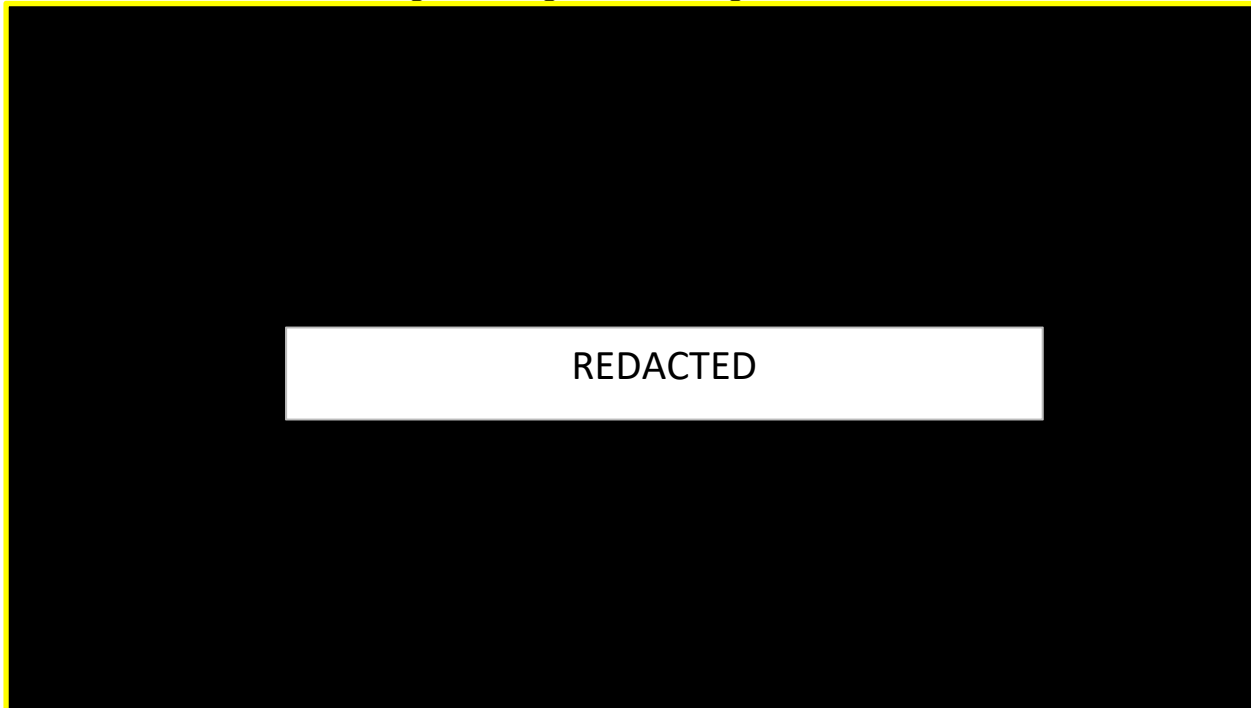
The goal of the programmatic strategy is prescribed ratable risk reduction. In response to the Policy Statement issued by the Washington Utilities and Transportation Commission ("WUTC" or "Commission"), PSE reduced its programmatic strategy from 50 percent to 35 percent of forecasted annual demand. This reduction improved the flexibility to lower hedging costs. This program change was implemented in November 2017 starting with the November 2018 – October 2019 PGA year. The strategy is a prescribed dollar cost averaging approach where hedges are added consistently over a three year time horizon. Hedging volumes are added seasonally in eight, four-month hedging periods.

The four month hedging periods provide trading staff some flexibility to respond to market liquidity within any given four month period, although generally, hedges are typically transacted proportionally through the time horizon. Because PSE's load is uneven across the months within the summer and winter seasons, staff hedge with a combination of seasonal and monthly transactions.

The hedged volume weighting increases over time to reduce the risk of hedge costs over the three year time horizon. Three years in advance of delivery, approximately [REDACTED] of load is hedged. Two years in advance of delivery another [REDACTED] is hedged. One year out the remaining [REDACTED] is added to attain 35% of load. PSE has some flexibility to accelerate programmatic hedging in the first year of hedging, which is three years in advance of delivery, while still maintaining the 35% of load target. Discretion to accelerate programmatic hedging is allowed when forward prices fall below the current PGA commodity cost. Figure 2 illustrates the ratable flexibility of the programmatic strategy.

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**Figure 2. Programmatic Hedge Timeline**



### 3.2 Risk Responsive Strategy

In response to the Policy Statement issued by the WUTC, PSE added a risk responsive strategy to the hedging program. This change was implemented in November 2017 starting with the November 2018 – October 2019 PGA year. The goal of the risk responsive strategy is to defend against price volatility with a risk view. Risk responsive hedges are added in response to the risk of higher prices. If hedges are not required then hedge losses will not be incurred. The risk responsive strategy hedges up to approximately 15 percent of demand, measuring and monitoring market risk conditions.

Exposure for the risk responsive strategy is measured and monitored through a Risk Responsive Model by ESM and Energy Risk Control. The current exposure calculation and the potential for future price movement (value-at-risk, or VaR) govern hedge execution in this strategy, prescribing hedging when necessary based on a risk view. On a weekly basis, PSE’s Energy Risk Control updates the model ensuring that all executed transactions are captured and that the output is validated with current prices and volatility metrics.

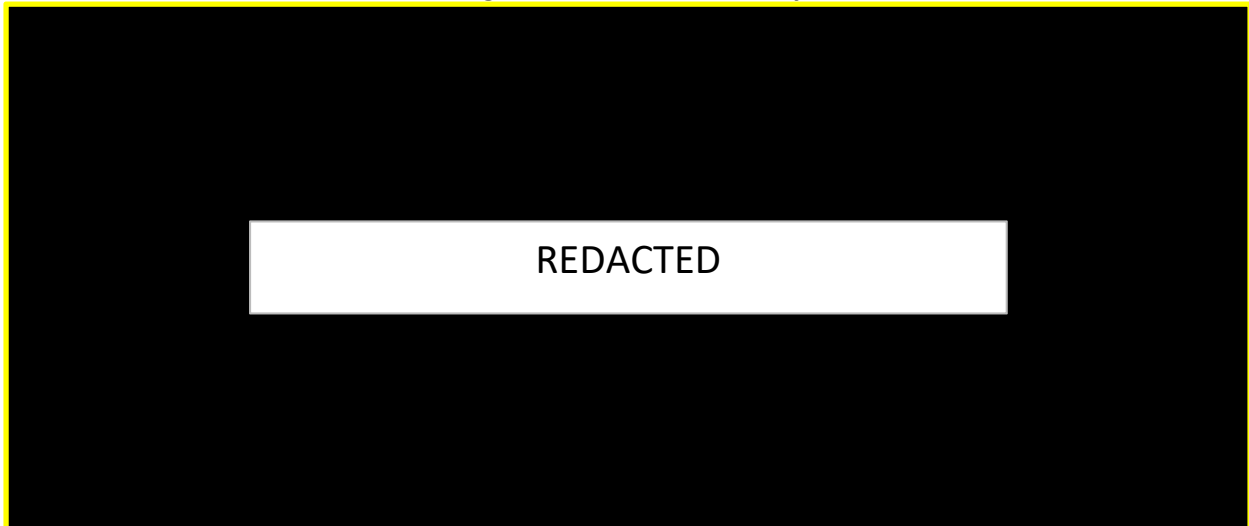
Updating the model weekly allows ESM sufficient time to analyze market liquidity for the best way to strategically transact in the market to stay within risk tolerance boundaries<sup>3</sup>. Updating the model more frequently would not provide ESM sufficient time for strategic hedge execution.

<sup>3</sup> This is consistent with the “holding period” concept described by Michael Gettings in Natural Gas Utility Hedging Practices and Regulatory Oversight (2015).

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PSE established the risk tolerance boundary by using an annualized volatility to measure the potential increase in future market prices at a 98 percent confidence level (2 standard deviations). Using the historical average volatility creates an exposure boundary that triggers hedging to protect against severe increases in market prices. The volatility used for the 2019 PGA is [REDACTED]. Figure 3 illustrates volatility during the year prior to delivery for the last three years in comparison with the volatility used to derive PSE's risk tolerance boundary.

**Figure 3. Historical Volatility**

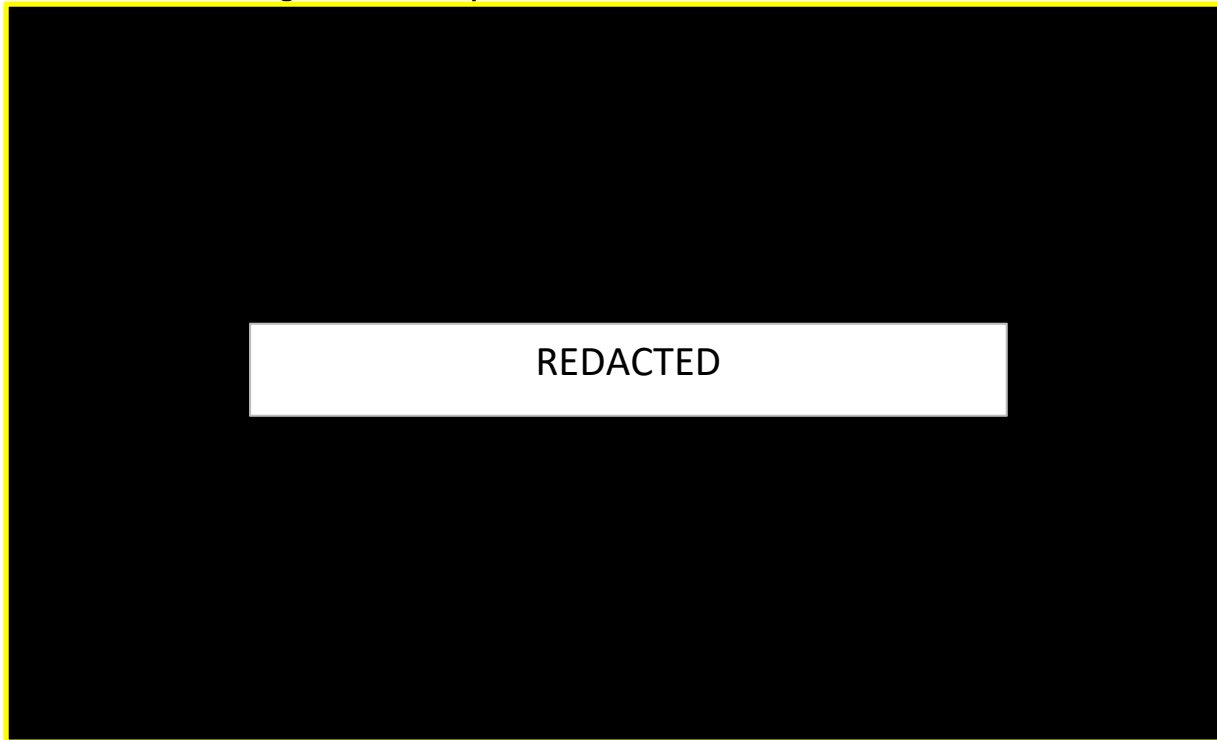


The strategy includes three defined tiers that protect against adding a large tranche of hedging in one interval, i.e., in response to a short term increase in market prices. The three tiers are set as equal price movements between the market price and the risk tolerance boundary, providing one third of the risk responsive hedging capacity in each tier. When the first tier is breached up to one third of the capacity may be hedged; when the second tier is breached up to two-thirds of the capacity may be hedged; and when the risk tolerance boundary is breached, the whole capacity is available to reduce risk to higher prices. Figure 4 shows sample tiered tolerance boundaries for November 2019 – March 2020.

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**Figure 4. Risk Responsive Model Tiered Tolerance Boundaries**



The weekly measurement in the Risk Responsive Model compares current market prices and volatility to the threshold tiers constraining costs to a 98 percent confidence level (2 standard deviations). The Risk Responsive Model informs ESM of the potential for higher prices (VaR-C) and displays the weekly measurements including prices and volatility. To assess risk to higher prices, the Risk Responsive Model compares the sum of portfolio price and VaR-C (2 sigma portfolio price) against the tiered threshold boundaries. In the weekly measurement, if the 2 sigma portfolio price exceeds the threshold boundaries hedges will be executed. Table 2 presents Risk Responsive Model output for a sample of weeks in the November 2019 – March 2020 period.

**Table 2. Risk Responsive Model Sample Output for VaR-C**

	Winter Nov 19 - Mar 20							
Report Date	Portfolio Price	Volatility	VaR-C	2 Sigma Portfolio Price	Boundary 1 Price	Boundary 2 Price	Boundary 3 Price	Hedge Required

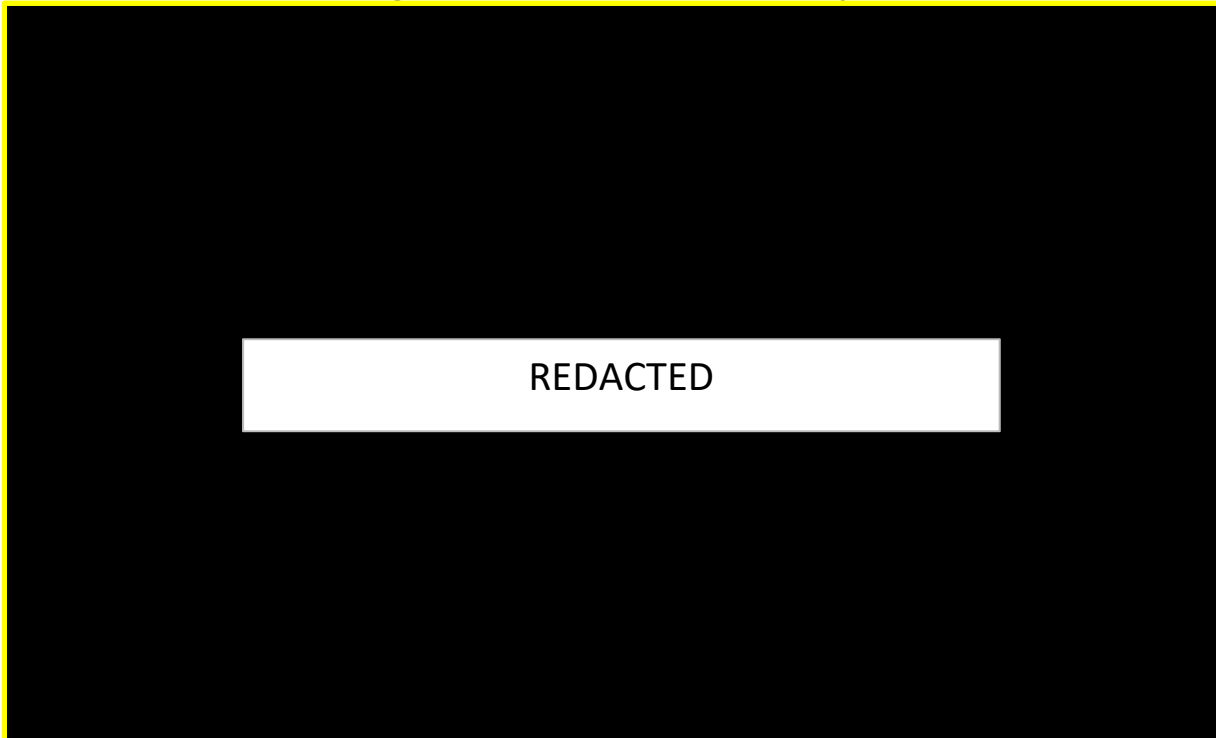
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The Risk Responsive Model also measures VaR-L, which is the risk to higher hedge costs. PSE uses this Risk Responsive Model output to review and evaluate potential hedge losses and hedge execution strategies.

### 3.3 Discretionary Strategy

The goal of the discretionary strategy is to increase hedging at low cost opportunities. In this strategy, hedge volumes change with market prices. This strategy includes a benchmark, which is the [REDACTED]. Hedging is not transacted until prices reach this benchmark. Hedges may be transacted beginning 18 months before delivery. To prevent transaction concentration at one price, PSE uses a ratable approach in hedge accumulation. Figure 5 shows the [REDACTED]. The discretionary strategy hedges up to approximately 15 percent of demand.

**Figure 5. Historical Settled Price History**



## 4 2018 PGA Retrospective

PSE's implementation of the hedging plan in the 2018 PGA provided winter price risk management to the high-confidence load forecast due to execution in the risk-responsive and discretionary strategies and storage management. Actual system demand in the winter ranged from the low load forecast in November to significantly above the normal forecast in February. The summer hedging capacity starting in April is typically lower than the winter as it is the start of the lower-cost injection season for next winter's storage withdrawals. Figure 6 illustrates how much volume was hedged by strategy relative to the low load forecast and actual load, by month from November 2018 through July 2019.

**Figure 6. Monthly Hedging Profile**

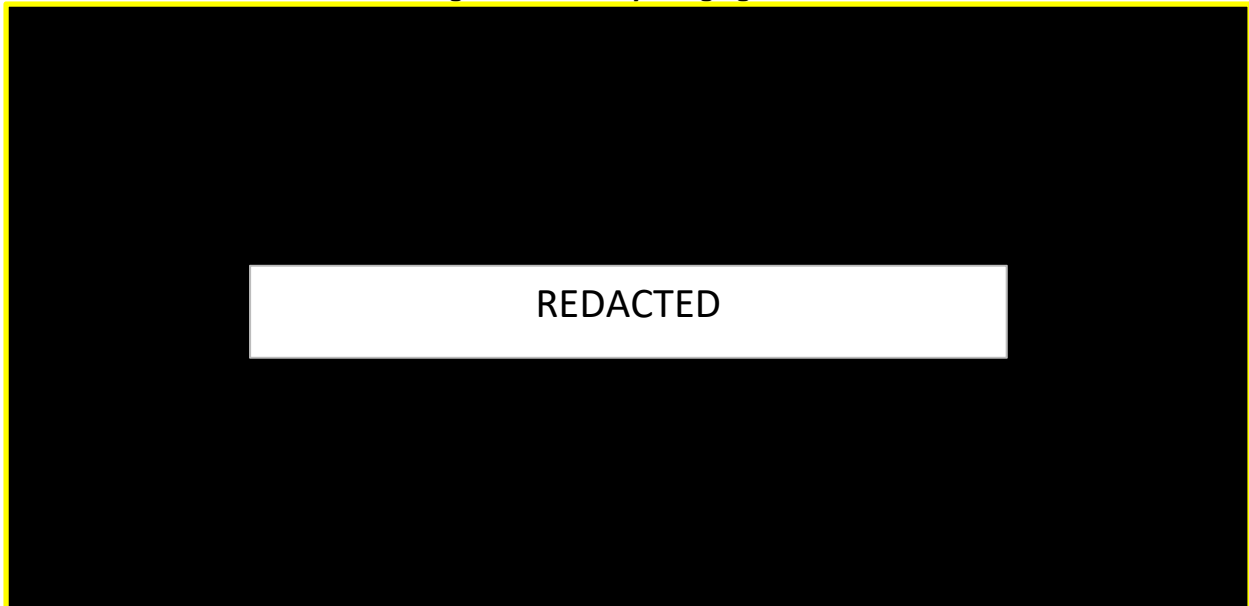


Table 3 presents hedging financial results for November 2018 through July 2019. The October 9, 2018 Westcoast Pipeline rupture caused high price volatility, which resulted in hedging gains that helped offset commodity costs.

**Table 3. Hedging Gains / (Losses) and Option Premiums**

	Nov-18	Dec-18	Jan-19	Feb-19	Mar-19	Apr-19	May-19	Jun-19	Jul-19
Hedge Gains / (Losses)	████████	████████	████████	████████	████████	████████	████████	████████	████████
Option Premiums	████████	████████	████████	████████	████████	████████	████████	████████	████████

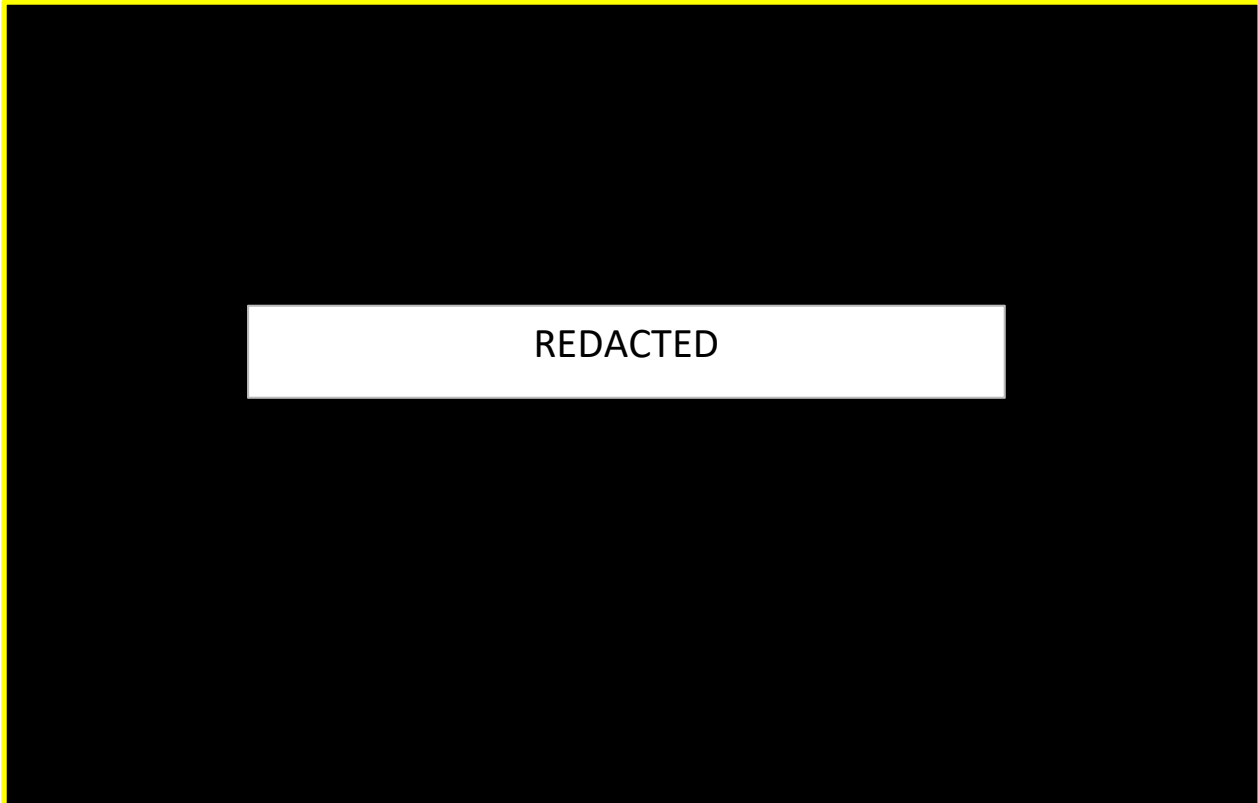
The list of hedging transactions for November 2018 through July 2019 is provided in Attachment A. This attachment includes all transaction data available. PSE does not use third party brokers for the natural gas hedging program.

#### 4.1 Market Price History

Over the course of the three year hedging timeline, prices trended lower until the October 9, 2018 Westcoast Pipeline rupture, as illustrated on Figure 7. After the rupture, price volatility at Sumas and Rockies increased significantly while the Western Canadian Basin (AECO) remained stable.

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**Figure 7. Historical Forward and Settled Monthly Index Prices**



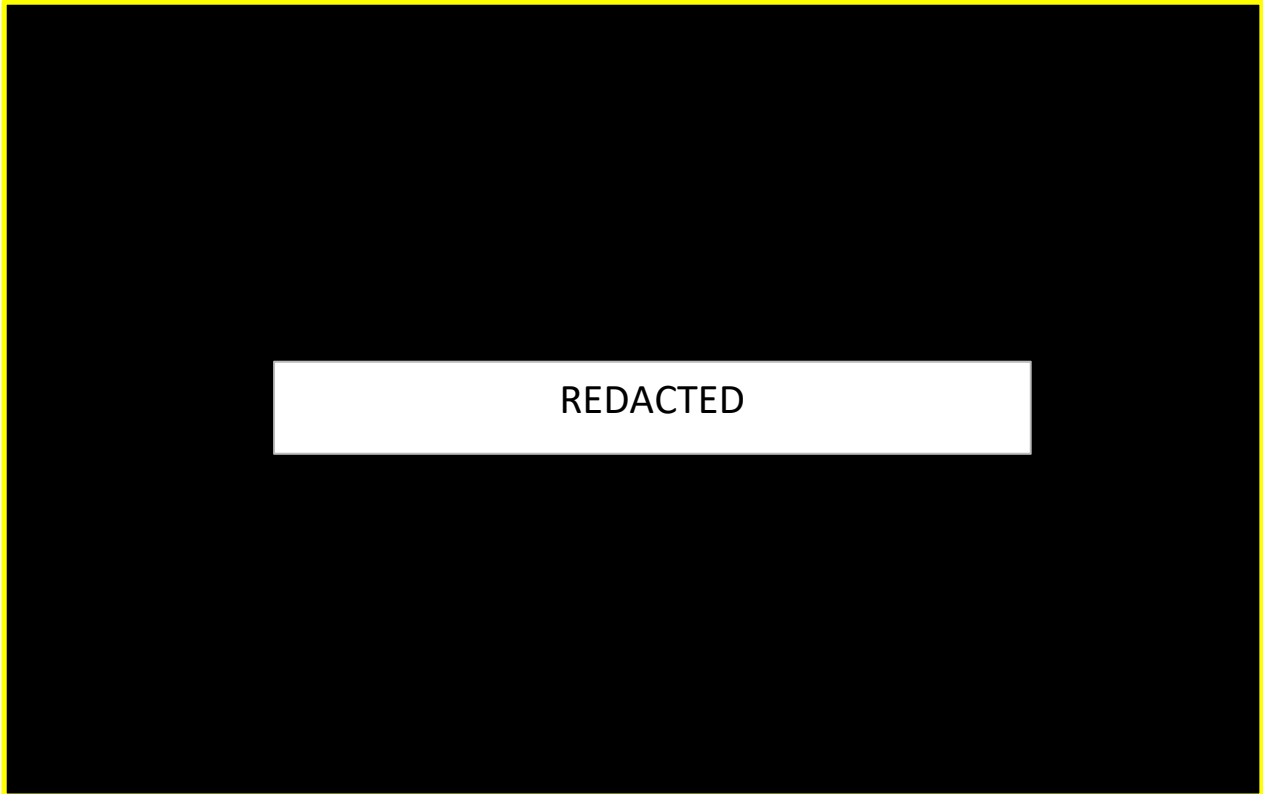
## 4.2 Hedging Strategies

### 4.2.1 Programmatic Strategy

For the 2018 PGA hedges were added ratably in the programmatic strategy over the 3 year time horizon beginning in March 2016 for the rate year. This strategy provided a defined hedge volume of approximately 35% prior to the start of the Nov18-Mar19 winter and before the Westcoast Pipeline rupture. Hedges were added within eight four-month windows, providing a dollar cost averaging approach. In October 2016, a small volume of additional programmatic hedges were added to accelerate the strategy. Hedges were executed in consideration of pipeline assets and seasonal and monthly loads, using a mix of fixed-price financial swaps and call options. Figure 8 illustrates the timeline of hedge execution in the programmatic strategy.

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**Figure 8. Programmatic Strategy Execution and Timeline**

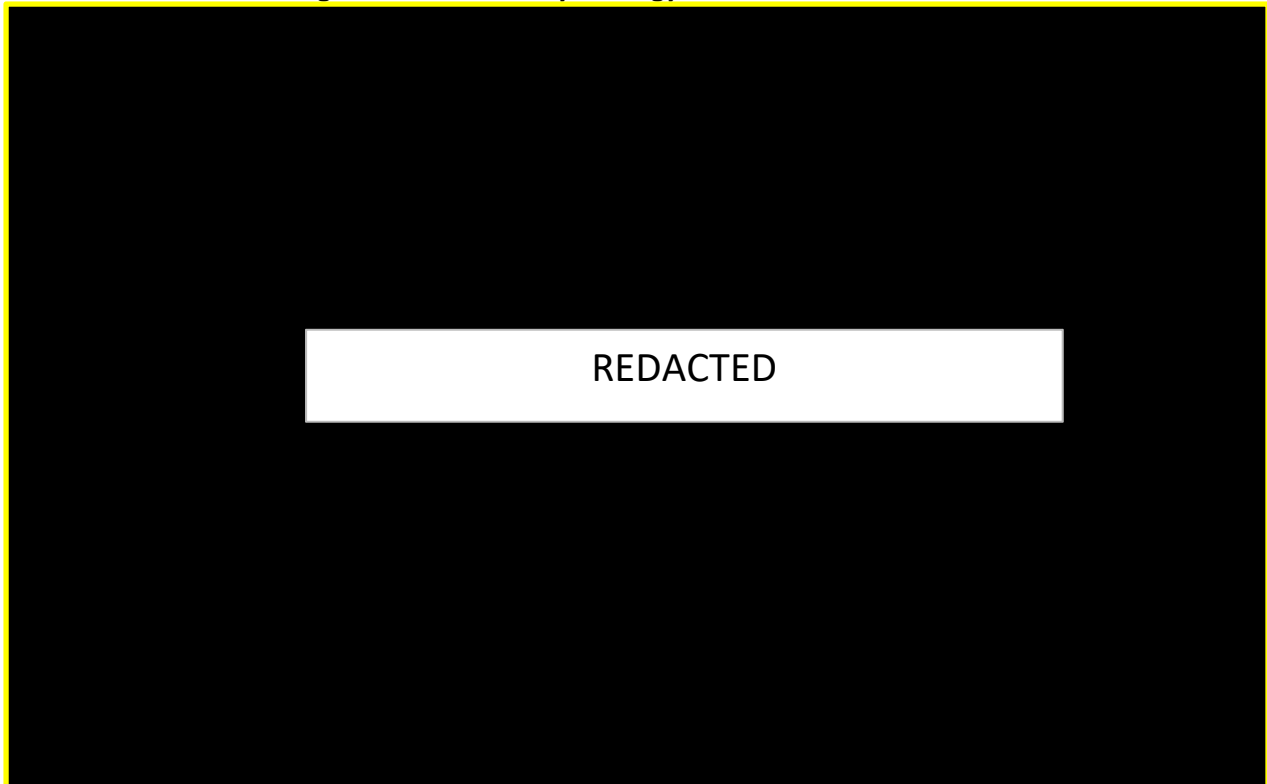


#### 4.2.2 Discretionary

In the discretionary strategy, low price triggers 10 months prior to the start of the 2018 PGA provided additional hedging. Hedges were added gradually over 14 months, beginning in January of 2018, for the winter and summer seasons increasing the hedge ratio towards the 15% capacity as prices remained below the trigger. Adding hedges over the 14 month period allowed the flexibility to participate in further low prices after hedge capacity was initially triggered. Figure 9 illustrates the timeline of hedge execution in the discretionary strategy.

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**Figure 9. Discretionary Strategy Execution and Timeline**



#### 4.2.3 Risk-Responsive Strategy

In the risk responsive strategy, PSE developed exposure and tiered tolerance boundaries consistent with the methodology described in the hedging plan. The ultimate exposure boundary was developed using a 30% annualized volatility and the three tiered boundaries were developed to equally split the difference between the current market prices and the ultimate boundary.

The Risk Responsive Model first triggered hedging on October 15, 2018 following the increase in prices and volatility after the Westcoast pipeline rupture on October 9, 2018. Upon triggering, PSE added hedge transactions for December through March delivery periods. Over next five months, the Risk Responsive Model triggered hedging eight more times for the December through October delivery periods as prices remained volatile, as illustrated in Figure 7 and measured volatility increased, as illustrated in Figure 3. Throughout this time period, multiple threshold boundaries were triggered prescribing incremental hedging and limiting the weekly concentration of hedges. Table 4 shows the timeline of transactions measured against the tiered tolerance boundaries and the bolded boundary cells represent the boundary that was triggered each week.

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**Table 4. Risk Responsive Triggers and Transactions.**

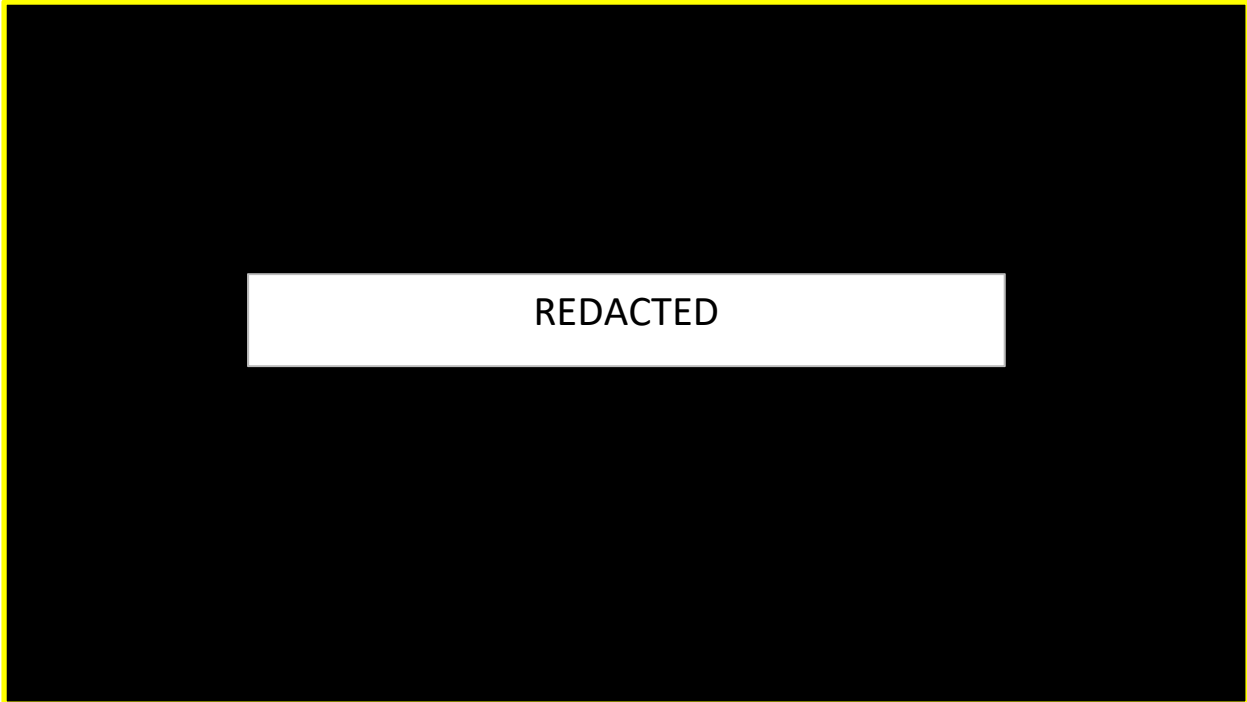
Report Date	Settlement Month	Portfolio Price (\$/MMBtu)	Volatility	VaR-C (\$/MMBtu)	2 Sigma Portfolio Price (\$/MMBtu)	Boundary 1 (\$/MMBtu)	Boundary 2 (\$/MMBtu)	Boundary 3 (\$/MMBtu)	Weekly Volume Hedged (MMBtu/d)
10/15/2018									
10/15/2018									
10/15/2018									
10/15/2018									
10/15/2018									
10/15/2018									
10/15/2018									
10/22/2018									
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2/15/2019									
2/25/2019									
2/25/2019									
3/4/2019									
3/4/2019									
3/11/2019									
3/11/2019									
3/18/2019									
3/18/2019									
3/18/2019									

### 4.3 Active Storage Management

The Procedures allow for hedging in addition to the programmatic, discretionary and risk responsive strategies. Due to cold weather in February and price volatility that resulted from the Westcoast Pipeline rupture, PSE executed hedges to manage the risk of lower than normal end of season storage inventory. Hedges were executed between February 6th and March 20th for the February through July delivery months. These transactions offset the risk of below normal storage inventory for the balance of the winter and the risk to potentially higher prices in the summer refill period. Figure 10 presents forecasted and actual storage levels and the hedges associated with the active storage management.

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**Figure 10. 2018 PGA Storage Inventory Management**



## 5 Conclusion

In summary, PSE has the hedging capacity to meet our high-confidence minimum load forecast with a diversified program that includes a combination of programmatic, risk-responsive and discretionary protocols along with storage assets to manage costs. This results in a program that balances price stability with the cost of hedging. For the 2019-2020 PGA year PSE has not made changes to its hedging policies or practices. PSE continues to monitor market conditions and evaluate potential strategy improvements.

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