Northwest Natural's Hedging Strategies

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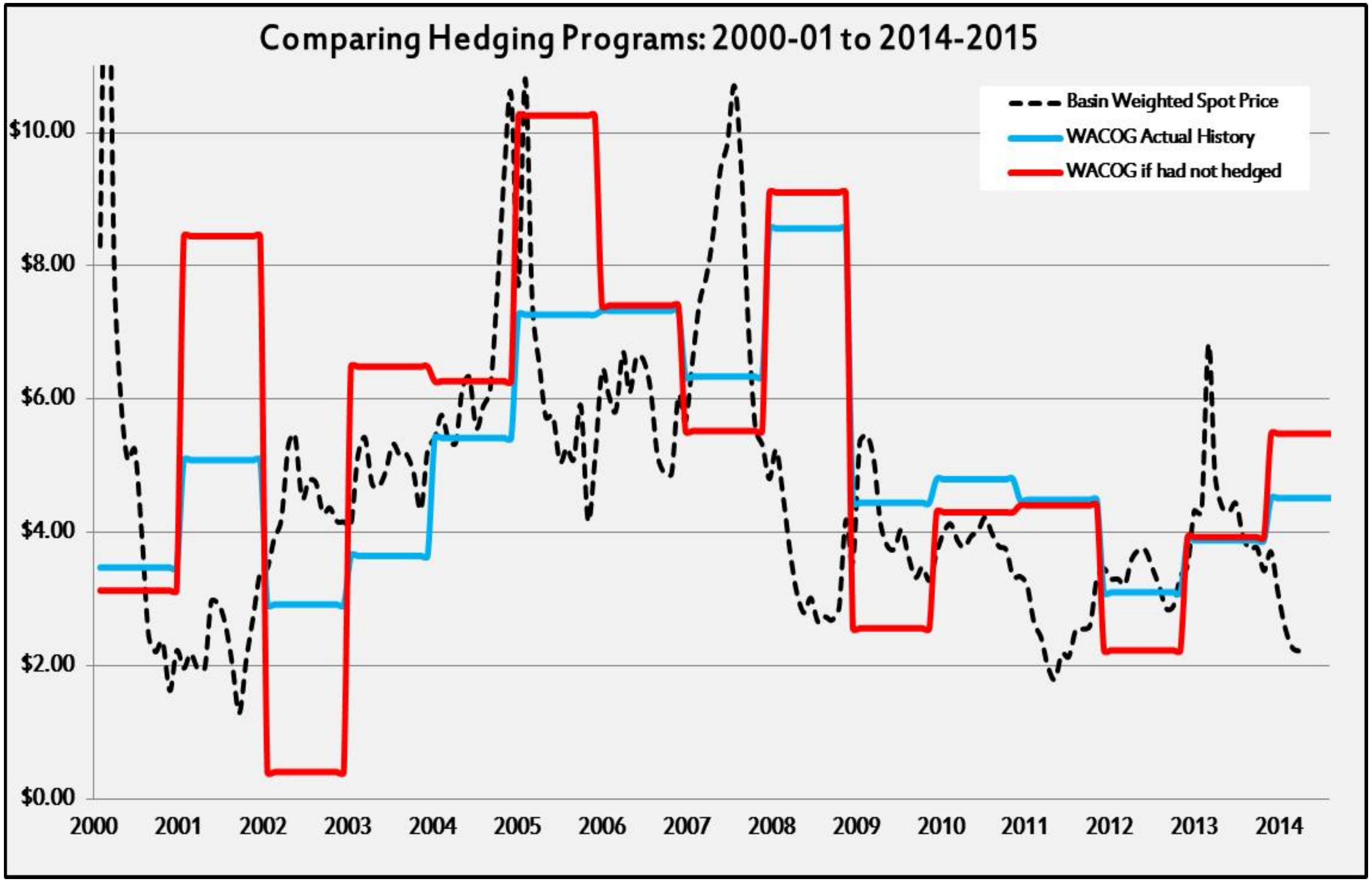
NW Natural®

Primary Purpose of Hedging

- Hedging helps manage gas commodity price risks faced by customers.
- Reducing rate volatility has been our primary objective, not “beating the market.”

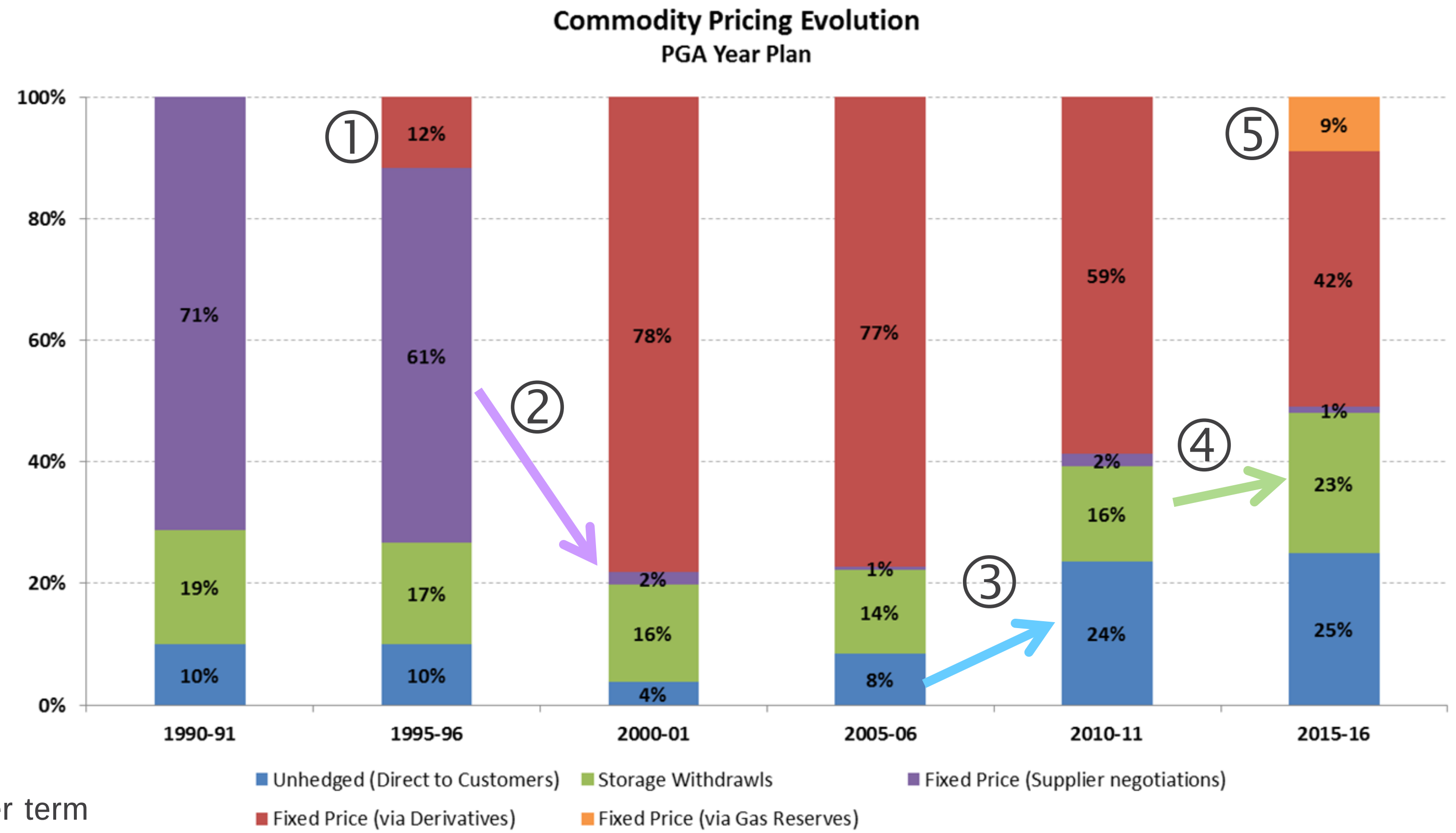


NW Natural's Hedging Strategies have evolved over time

① Natural Gas Futures (NYMEX) trading started in 1990. NW Natural executed its first financial swaps in 1995.

② Diminishing interest in fixed price physical term contracts from both buyers and sellers; financial instruments fill the void.

③ Unhedged and shorter term purchases grow in response to Shale Gale and Great Recession.

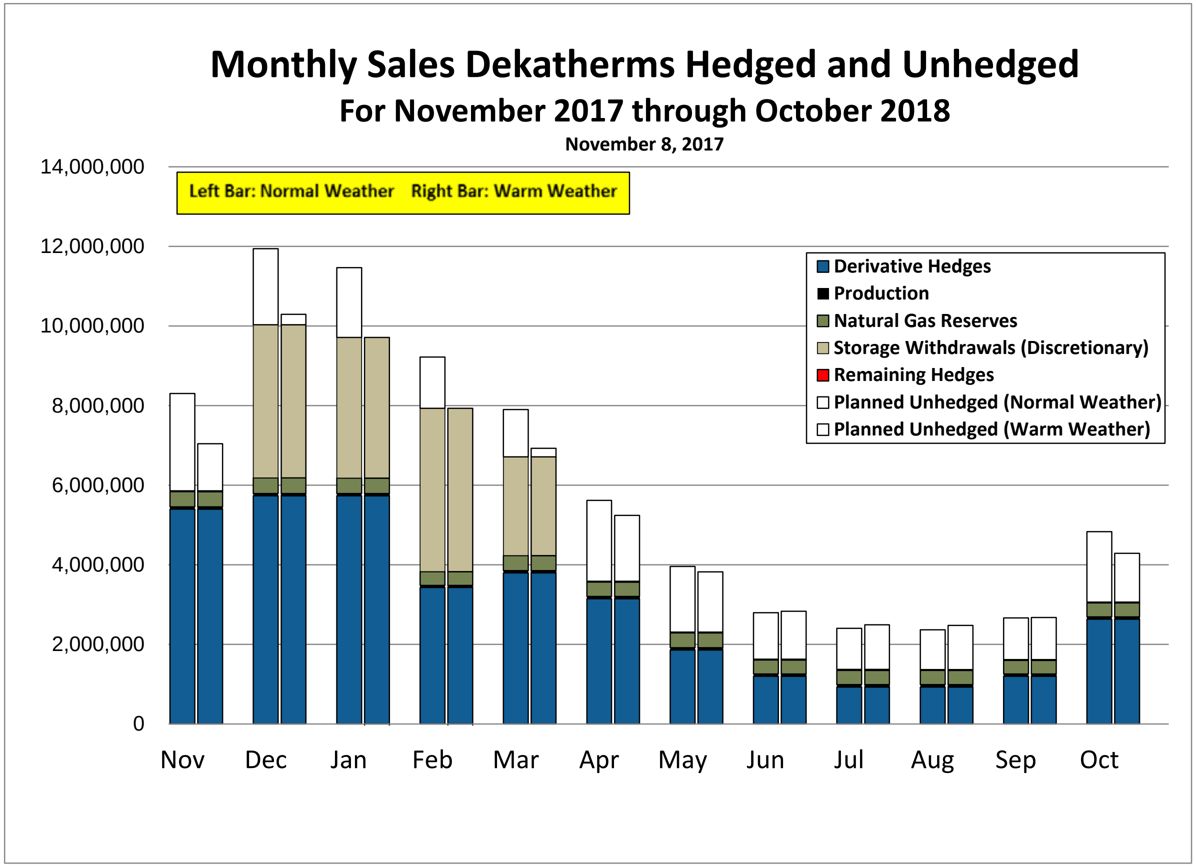


④ Increasing use of storage both at Mist and in Alberta.

⑤ Oregon only - Gas reserves approved as a new form of hedging (still Derivatives in Washington).

Seasonality of Hedging and the "Duality" of Storage

- Weather drives huge swings in the usage of natural gas and is a major consideration in our approach to hedging.
- Large demand fluctuations and price spikes typically are a winter phenomenon.
- Storage withdrawals are a key tool in managing winter load variations and capping price exposure.
- Duality of Storage - gas is unhedged when purchased for injection, but a mostly known price when dispatched in the PGA.



Current Key Hedge Strategies

NW Natural seeks to financially hedge ~50% of its demand for the coming PGA year, with lesser amounts in subsequent years.

Storage and other forms of hedging bring this total up to ~75% for the coming year. This falls within the range recommended by an independent third party consulting firm that reviewed NW Natural's hedging program in 2014.

To this overall target, NW Natural applies the following key strategies:

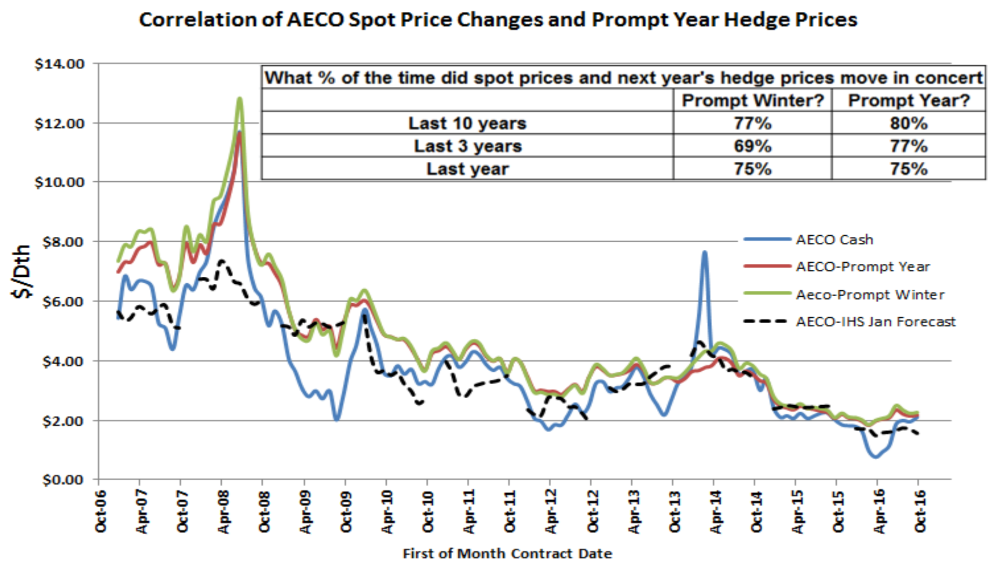
- Hedge a greater percentage of monthly demand during the heating season when customer demand and commodity price volatility are highest.
- Hedge non-heating season sales volumes at a lower percentage due to the relative lack of demand and price volatility during those months.
- Fill storage inventories with unhedged gas purchases.
- Perform almost all financial hedges as swaps since storage typically possesses some amount of optionality as to its usage.
- Target more multi-year financial hedges due to the flatness of the forward curve.
  - Current creditworthiness criteria limit "normal" financial swaps to no more than 3 years.
  - Accordingly, one-third of the total financial hedges to be executed each year is set as the limit for multi-year transactions.
- Acquire supply-basin storage when justified through an economic comparison of winter/summer spreads and inventory carrying costs versus the costs of such storage services.

Hedge Execution Process

- Hedging plans are developed by the Front Office (the Gas Supply department) and are subject to the approval of an executive oversight team called the Gas Acquisition Strategy and Policies (GASP) Committee.
  - GASP also annually reviews the Gas Supply Risk Management Policies, which is the governance document for performing financial hedges and physical gas transactions. For example, this is where authorization levels for internal employees are set, as well as the criteria for authorizing the addition of new external counterparties.

- Analysis of market trends has led to the practice of executing financial hedges <u>primarily in spring and fall</u>, with lesser amounts in summer, and typically very little forward hedging activity during the winter months.

- Each transaction for the coming PGA year is subject to real-time competitive bidding.
  - Multi-year financial transactions are subject to the same general process but potential counterparties get additional scrutiny prior to bidding.



Recent PGA Results for Washington customers

- WACOG dropped from $3.08 to $2.81/Dth eff. 11/1/2016, then further dropped to $2.59/Dth eff. 11/1/2017

- WACOG deferrals = $1.5 million credit to customers for 2016/17 PGA year, $0.3 million credit for 2017/18 PGA year

- As requested, <u>total OR and WA</u> PGA year hedge gains and losses are shown in the table below for the last 12 months (~18% would be the WA allocation). These gains/losses had zero impact on the numbers shown above.

	Oct-16	Nov-16	Dec-16	Jan-17	Feb-17	Mar-17	Apr-17	May-17	Jun-17	Jul-17	Aug-17	Sep-17	TOTAL
Swap losses	979,027	1,391,783	944,020	-	625,107	2,662,892	85,838	48,104	3,375	113,049	236,840	647,775	7,737,809
Swap gains	-	(329,730)	(102,719)	(2,920,208)	(48,258)	-	(149,160)	(86,327)	(186,975)	-	-	-	(3,823,377)
	979,027	1,062,053	841,301	(2,920,208)	576,849	2,662,892	(63,323)	(38,223)	(183,600)	113,049	236,840	647,775	3,914,433

Some Key White Paper Concepts

Michael Gettings, a consultant for RiskCentrix, developed a White Paper in July 2015 for the WUTC in docket UG-132019 titled "Natural Gas Utility Hedging Practices and Regulatory Oversight". This paper outlined several concepts including:

- Making sure market observations and changes are reflected in hedging strategies, from which the phrase "risk-responsive" has tended to be the shorthand term.
- The use of more quantitative metrics in the development of such risk-responsive hedging strategies.
- Hedge transactions tend to trade cost risk for loss risk, and both types of risk need to be considered in the development of hedge strategies.
- A well-structured plan should have a mix of defensive hedges (which mitigate the threat of increasing costs) along with contingent hedges (which reduce the risk of incurring losses).

Concepts requiring Further Study

NW Natural submitted comments in May 2016 dealing with several areas of the White Paper that need further refinement, including:

- The White Paper focused on commodity costs; we believe that gas rates (WACOG as well as deferrals) should be the primary focus when considering impacts.
- The methodology extended only 24 months from the current month, potentially increasing price changes within a current PGA year and so leading to more rate volatility from larger deferrals.
- The analysis was based on NYMEX transactions, so more research is needed to determine the effectiveness of similar techniques for the far-less-liquid trading points in the Pacific Northwest.

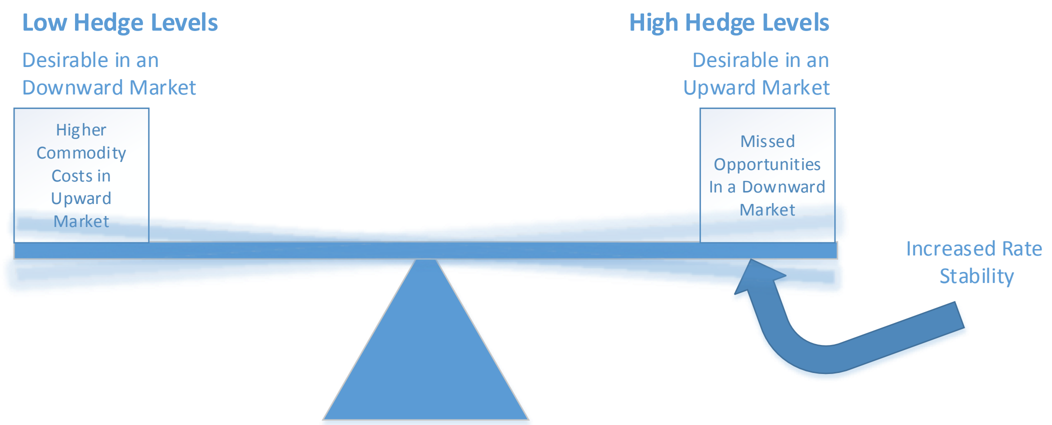
In recognition of the comments filed by NW Natural and other parties, the WUTC issued a Policy Statement in March 2017 that allowed considerable flexibility around the development of new risk-responsive hedging strategies.

With the above in mind, NW Natural developed a Work Plan for 2017-2018 that was submitted with the 2017 PGA filing. For the 2017-2018 PGA year itself, we are continuing to follow previously approved hedging strategies.

The Balancing Act

The overall objective is to *balance cost benefits to customers while also minimizing rate volatility*.

Both lower and higher hedge levels will weigh us down in different ways, but the swings need to be dampened if we are to achieve some amount of rate stabilization.



In a **downward trending market**:

- High hedge levels will lead to missed opportunities to buy at a lower price because the purchase prices will have been hedged previously.
- Low hedge levels will mean we can seize opportunities to purchase at the lower market prices.

In an **upward trending market**:

- High hedge levels will lock in prices and avoid later market purchases at the higher price levels.
- Low hedge levels will result in more purchases at the higher market prices.

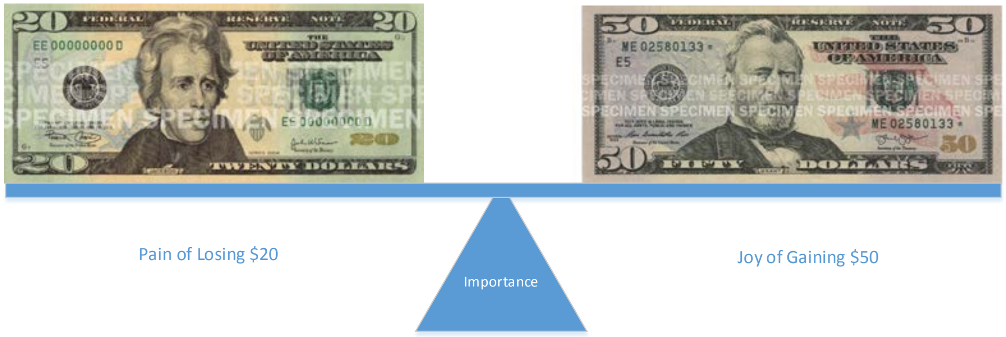
Minimizing rate volatility:

- While difficult to quantify, reducing volatility in gas rates provides benefits to customers, e.g., for effective budgeting.

Considering Loss Aversion

- In addition to some level of rate stability, we believe customers view rate increases with much more dissatisfaction as compared to the satisfaction they receive from equivalently-sized rate decreases.
- We did not have a technical basis for this belief until our recent discovery of <u>loss aversion</u> research.
- Such studies* indicate an appropriate 2.5-to-1 relationship between gains and losses. In our case, with current rates being the "break-even" line, a rate decrease would be viewed as the gain to the customer while a rate increase would be the loss.
- To better analyze our hedge strategies from the customer perspective, NW Natural will look into the theory and possible application of loss aversion to our metrics.

* Based on research from D. Kahneman, A. Tversky et al:
- The Loss Aversion Coefficient (2015)
- The Effect of Myopia and Loss Averision on Risk Taking: An Experimental Test (1997)
- Prospect Theory: An Analysis of Decision under Risk (1979)

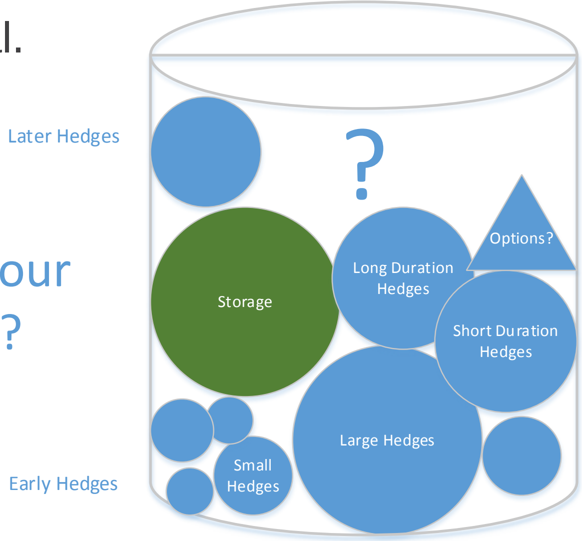


Key Work Plan Variables

The Work Plan involves several key variables:

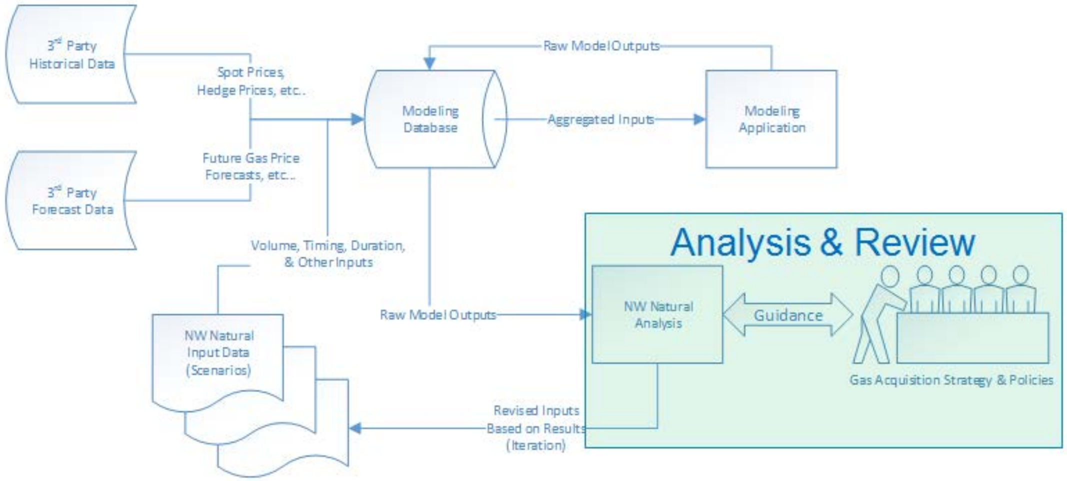
- Total volume of purchases to hedge
- When to execute the hedges, given unknown future performance
- Duration of the hedge (6-month, 3-year, etc.)
- The best mixture of different durations of hedges to purchase (long vs. short)
- Adjustments to the plan as the year goes on in response to new data regarding market performance becomes available
- The types of hedges to use: swaps, options, et al.
- The role of storage as a hedging mechanism

How do we fill up our Hedge Portfolio?



Work Plan Approach

- The objectives and variables are combined and modeled based on a variety of different scenarios and sensitivities in order to drive a data-driven approach to enable better decision making.
- An iterative approach will be taken, incorporating guidance from internal experts as well as from external stakeholders.
- Implementation will necessitate additional staffing and software to perform the additional analyses, and NW Natural already has taken steps in this direction.



Conclusion

- Over the next year, NW Natural will pursue the development of robust revised hedging strategies that are risk-responsive and leverage opportunities to maximize cost benefits to customers while also reducing rate volatility.

- Feedback will be sought from external stakeholders before any substantive changes are made to NW Natural's existing hedge strategies.

- We will integrate any new strategies over the next 1-2 years.

- A comprehensive look at the new hedge plan is expected to be included in the 2018 PGA filing.

- An ultimate goal is alignment with Oregon to avoid any undue expenses being allocated to NW Natural's relatively small customer base in Washington. We would like to have a hedging program that is a win/win for both states.