EXH. PKW-3C
DOCKETS UE-22___/UG-22___
2022 PSE GENERAL RATE CASE
WITNESS: PAUL K. WETHERBEE

BEFORE THE
WASHINGTON UTILITIES AND TRANSPORTATION COMMISSION

WASHINGTON UTILITIES AND TRANSPORTATION COMMISSION, **Complainant,** **v.** **PUGET SOUND ENERGY,** **Respondent.**	**Docket UE-22____** **Docket UG-22____**

SECOND EXHIBIT (CONFIDENTIAL) TO THE PREFILED DIRECT TESTIMONY OF

PAUL K. WETHERBEE

ON BEHALF OF PUGET SOUND ENERGY

REDACTED VERSION

JANUARY 31, 2022

Collaborative: Power Hedging and Intra-company Transactions

Puget Sound Energy
Power Cost Only Rate Case, Docket UE-200980

November 16, 2021

Settlement calls for a collaborative workshop

The Settlement Stipulation and Agreement in PSE's 2020 PCORC[1] states:

> "The Settling Parties agree to participate in a collaborative workshop on electric and natural gas hedging for power cost management and natural gas intra-company transactions."

[1] Power cost only rate case

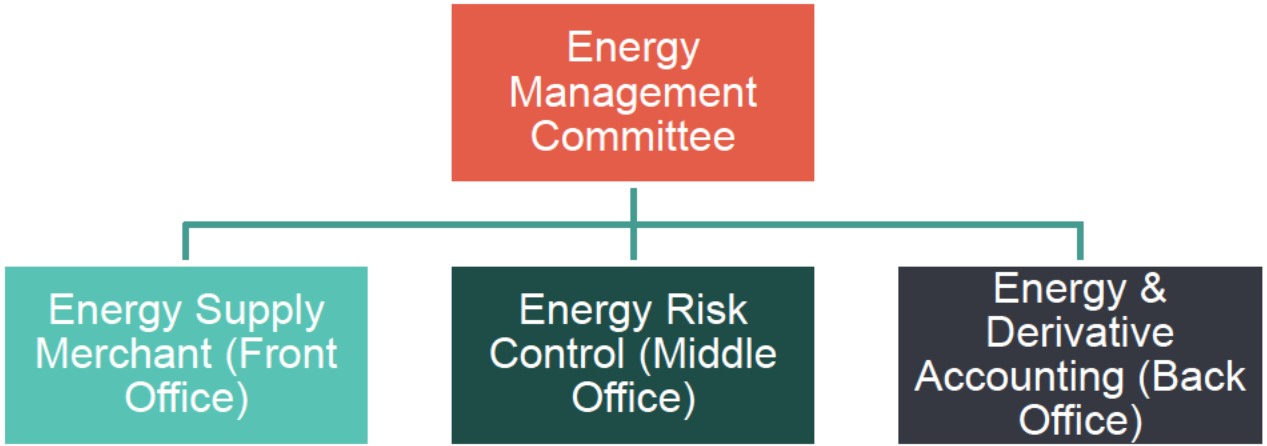
Agenda

Governance | Hedging & optimization | Intra-company transactions | Gas prices | Rate case modeling

- Energy supply governance, oversight, roles and responsibilities
- Power hedging and optimization
- Intra-company transactions
- Source of natural gas prices
- Hedges and natural gas prices in power cost projections

Energy Management Committee oversees energy supply decisions

Governance | Hedging & optimization | Intra-company transactions | Gas prices | Rate case modeling



Energy Risk Policy describes risk philosophy

Governance | Hedging & optimization | Intra-company transactions | Gas prices | Rate case modeling

Describes PSE's philosophy of energy supply risk assessment, treatment and mitigations

Risk Management Objectives:

- Ensure physical energy supplies are available to serve retail customer requirements
- Manage portfolio risks to serve retail load efficiently while limiting undesired impacts or risks
- Optimize the capacity value of PSE energy supply assets.

Policy Components:

- Governance Structure
- Delegations of Authority
- Authorized Transactions
- Energy Management Committee
- Risk Management Objectives
- Functional Responsibilities (3LOD Model)
- Market Risk Identification and Control
- Risk Monitoring and Reporting
- Regulatory Compliance
- Policy Administration

Energy Risk Policy identifies five primary risks that are managed to ensure reliability and cost effectively serve customer loads

Governance | Hedging & optimization | Intra-company transactions | Gas prices | Rate case modeling

Market Risk	Risk of increases to portfolio costs resulting from adverse commodity price movements
Asset Operation Risk	Risk associated with an asset's inability to perform as planned such as a forced outage or unplanned reduction in capacity
Liquidity Risk	Risk of market being or becoming illiquid during periods of heightened market reliance
Operational Risk	Risk of losses resulting from inadequate or failed internal processes, people, systems and controls, resulting in inefficiencies
Model Risk	Risk that inappropriate actions or decisions are made as a result of model error, misapplication or inadequate management

Energy Supply Transaction & Hedging Procedures Manual

Governance | Hedging & optimization | Intra-company transactions | Gas prices | Rate case modeling

Defines roles and responsibilities, operational controls, and outlines guidelines and processes for transactions within and the hedging of PSE's energy portfolio. PSE maintains separate power and gas portfolios to meet customers' energy demand.

Delegations of Authority:

- Schedule A – Authorized Transactions
- Schedule B – Approved Locations and Price Indices
- Schedule C – Execution of Approved Hedge Strategies
- Schedule D – Margin and Collateral Posting
- Schedule E – Gas and Power Position Limits (volumetric)
- Schedule F – Gas and Power Market Exposure Limits (financial)
- Schedule G – Officer and Department Oversight

Appendix:

- Credit Risk Management Policy
- Derivative Accounting
- Environmental Attributes (Renewable Energy Credits, California Carbon Allowances)
- Escalation Policy

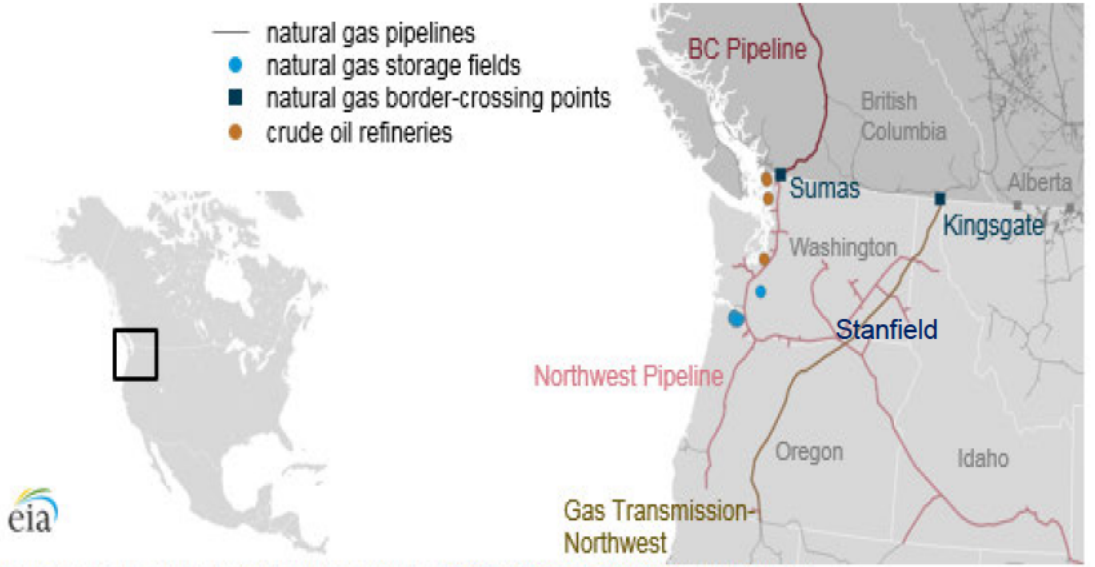
*Both governing documents are reviewed annually and acknowledged by all covered employees

Term trading's price risk management objective is to reduce price volatility, not to earn trading profits

- Strategies are developed to reduce price volatility in a regulated electric portfolio
  - Transactions balance to load
  - Resources are optimized to reduce commodity risk between natural gas and power exposure
  - Transactions are executed in the wholesale market at prevailing market prices
- Front Office does not enter into risk positions for the purpose of earning trading profits
  - All forward hedging transactions are executed in the Northwest at the Mid-C or locations connected to our system
  - Forward transactions do not include spreads between market hubs

The power book has a diversified portfolio of natural gas supply

- Natural gas is sourced from Alberta and British Columbia supply basins and at the Sumas and Stanfield market hubs



Source: U.S. Energy Information Administration Energy Mapping System and IHS Markit
Note: Canadian pipeline map layer is copyright IHS Markit 2018 (all rights reserved).

Lacima is PSE's risk system

- Lacima Analytics is an application used globally to perform valuation, optimization and risk assessment across a whole portfolio of physical assets & complex financial contracts
- Lacima is used for:
  - Modeling, valuation and optimization of physical assets and financial contracts
  - Creating a probabilistic, risk-based view of PSE's portfolio with simulation results
  - Calculation of volumetric and financial portfolio exposure
  - Reporting and ad-hoc analysis

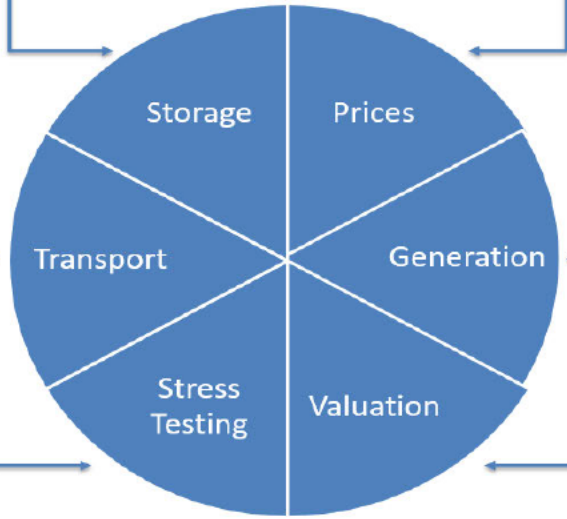
Lacima requires inputs and simulates economic dispatch

Governance | Hedging & optimization | Intra-company transactions | Gas prices | Rate case modeling

Structure, value and hedge gas storage assets to maximise profit. Inputs include storage capacity, stored gas price, storage level, injection rate.

Value and optimise gas transportation contracts. Inputs include pipeline capacity, gas prices spread, pipeline maintenance schedule etc.

Scenario analytics for adding/removing assets/hedges, price curve shifts etc. Inputs include base data set, scenario data set, scenario type and operating type, etc.



Simulate forward market prices, price spreads based on historical spot price volatility. Inputs include forward curve and historical settled prices.

Using variety of models to simulate economic dispatch to optimize portfolio performance. Inputs include capacity, ramping rate, heat rate, outages, fuel costs, river flow, wind speed, forecasted generation etc.

Valuate portfolio or contract level EaR, VaR, FPE, physical and financial exposures etc.

Term trading has a systematic approach to decision making

- Position output from our risk management system is the benchmark for decision-making
  - This sample output is from the close of business on September 8, 2020
- Volumetric risk is governed by prescribed limits

REDACTED VERSION

Lacima model is not used for power cost forecasts

- PSE uses Aurora model to forecast power prices, resource dispatch, and portfolio costs (including volume and cost of incremental market purchases and sales)
- Existing power and gas-for-power hedges and physical index price supply contracts as of forecast pricing date are the same used in Lacima

Term trading positions flow into the short term timeframe

Governance | Hedging & optimization | Intra-company transactions | Gas prices | Rate case modeling

	Day Ahead and BOM	Real Time
Time Horizon	From next day through balance of current calendar month	Participation in real time hourly market
Role and Function	Prepares the next day generating plan and balances to load in an economic manner. Transacts physical trades in the day-ahead and balance of month to optimize the portfolio.	Manage day-ahead positions as they flow into the hourly market. Responsible for submission of bids into the CAISO EIM Market.

Portfolio hedging program has programmatic and actively managed strategies

REDACTED VERSION

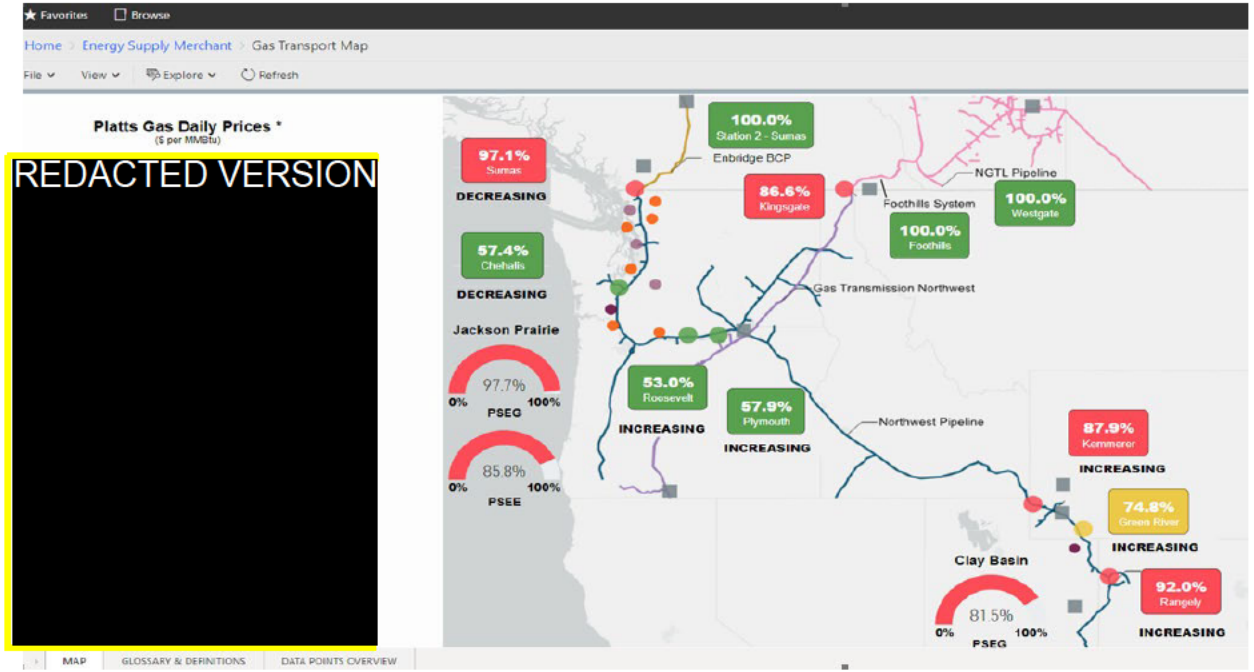
Price discovery helps establish fair market prices

- PSE's trading program transacts in the wholesale market
- Natural gas spot and forward prices are traded through bilateral counterparties and on the ICE platform allowing price discovery for both buyers and sellers
- Price discovery helps establish whether the market price is fair for both sellers and buyers
- Below is a view of the natural gas contract attributes for buying and selling on the ICE trading platform

REDACTED VERSION

Intra-company traders transact with each other when it is mutually beneficial for both the buyer and the seller

- Gas (PSEG) and power (PSEE) traders share open, transparent communication in the department
- Here is a view of the natural gas pricing dashboard that is reviewed at the morning market briefing



Accounting for intra-company transactions is consistent with accounting for transactions with other counterparties

		ETRM[1] System	Accounting System - SAP	
	Market Price	Endur	Seller JE	Buyer JE
PSEG sells to 3rd party	$2.00 / Dth	Price + volume	Dr. AR (14300062) Cr. 804xxx order (PGA)	n/a
PSEE sells to 3rd party	$2.00 / Dth	Price + volume	Dr. AR (14300141) Cr. 456xxx order (PCA)	n/a
PSEG sells to PSEE	$2.00 / Dth	Price + volume	Dr. AR (14300062) Cr. 804xxx order (PGA)	Dr. 151xxx account** Cr. AR (14300062)
** PSEE commodity costs go into 151xxx account, and then are moved out to 547xxx orders (for burned gas) and 456xxx orders (for wholesale sales) which are included in the PCA.				
PSEG buys from 3rd party	$3.50 / Dth	Price + volume	n/a	Dr. 804xxx order (PGA) Cr. AP (23200242)
PSEE buys from 3rd party	$3.50 / Dth	Price + volume	n/a	Dr. 151xxx account** Cr. AP (23200031)
PSEG buys from PSEE	$3.50 / Dth	Price + volume	Dr. AP (23200242) Cr. 456xxx order (PCA)	Dr. 804xxx order (PGA) Cr. AP (23200242)

[1] Energy Trading & Risk Management

Intra-company transactions are not affiliated transactions

- PSE's Energy and Derivative Accounting reviews monthly deal reports and ensures intra-company purchases and sales between gas and power books net to zero before closing the books

- The gas and power books are not legal entities and therefore are not qualified as affiliates of PSE. There is no requirement for disclosure of intra-company transactions by GAAP[1] or FERC[2].

[1] Generally Accepted Accounting Principles
[2] Federal Energy Regulatory Commission

PSE relies on forward market natural gas prices for hedging decisions and power cost forecasts

Governance | Hedging & optimization | Intra-company transactions | **Gas prices** | Rate case modeling

- Forward prices are obtained via subscription with S&P Global Platts
- PSE's Energy Supply Merchant does not create, subscribe to or use any forecast of natural gas prices
- Near term gas for power transactions and resource dispatch decisions rely on actual spot market gas prices (not necessarily "forwards")

Forward natural gas prices and executed contracts are inputs to PSE power cost forecasts

- Three-month average forward natural gas prices as of a pricing cut-off date are used as the forecast of rate year gas prices
  - Input to Aurora model as price of gas at various hubs throughout the WECC[1]
  - Used outside of Aurora model to calculate "mark-to-model" value of existing gas-for-power contracts
- All previously executed hedges (fixed-price) and physical supply (index-price) contracts as of the same pricing date are included in power cost forecasts
  - The type of contract (gas-for-power vs power, fixed-price vs index-price) determines how it is included in the forecast (input to Aurora model or added as an adjustment outside of the model)

[1]Western Electricity Coordinating Council

The Aurora model uses gas price inputs as the price of fuel for gas-fired power plants

- PSE inputs three-month average forward gas prices for key hubs throughout the WECC
  - WECC-wide Aurora model dispatch is used to determine forecasted power prices in PSE's zone
- The dispatch of PSE's gas-fired resources and resulting Aurora model fuel costs are based on gas price inputs for Sumas and Stanfield hubs
  - Aurora fuel cost outputs assume all gas-for-power purchases are executed at the input gas prices
  - The prices of any previously executed gas-for-power contracts are not the same as the model input gas prices, so adjustments are needed outside of the model to account for these transactions

Fuel cost from Aurora is adjusted to align with the actual cost of executed gas-for-power contracts

- Outside the model adjustments[1] ensure power cost forecasts reflect the known and measurable costs PSE will pay for existing gas supply contracts
- A calculation of mark-to-model cost or benefit relative to rate year gas prices accounts for the actual cost of fixed-price gas-for-power contracts. For example:
  - Executed purchase of 1,000,000 MMBtu @ Sumas in December for $2.50/MMBtu
  - December Sumas rate year price: $3.00/MMBtu
  - 1,000,000 X ($3.00 - $2.50) = $500,000 reduction to December fuel costs
- For index-priced contracts, we assume the index price will be the rate year gas price, so the adjustment equals only the incremental cost or benefit relative to index. For example:
  - Executed purchase of 1,000,000 MMBtu @ Sumas in May for index + $0.02/MMBtu
  - 1,000,000 X $0.02 = $20,000 increase to May fuel costs

[1]Actual rate year adjustments for existing gas-for-power contracts were presented in Exh. PKW-31C, "Gas MTM" in PSE's 2020 PCORC Supplemental filing

Fixed-price power contracts are an input to the Aurora model

Governance | Hedging & optimization | Intra-company transactions | Gas prices | Rate case modeling

- Existing fixed-price power contracts (hedges) are input to the Aurora model at the actual prices and quantities of the contracts
- Aurora treats contracts as firm portfolio resources which, in general, displace spot market purchases or sales that otherwise would have been calculated by the model
- The cost and volume of fixed-price power contracts are included in Aurora model output[1] and any mark-to-model costs or benefits are implicit in total portfolio cost results

[1] Fixed price power contract costs and volumes were presented in Exh. PKW-28C, "Aurora total" in the line items "PSE hedges purchases" and "PSE hedges sales" in PSE's 2020 PCORC Supplemental filing

Incremental cost or benefit of index-price power contracts is added outside of the model

- For index-priced power contracts, we assume the index price will be the Aurora-determined rate year power price, so the outside of model adjustment[1] equals only the incremental cost or benefit relative to index. For example:
  - Executed contract for 1,000 MWh in May for index + $1.00/MWh
  - 1,000 X $1.00 = $1,000 increase to May purchased power costs
- Index-priced contracts do not mitigate exposure to market price changes, they are used to ensure firm delivery of physical supply
- PSE enters these contracts relatively close to the date of delivery (generally less than one year in advance)

[1] Fixed price power contract costs were presented in Exh. PKW-29C, "Not in Aurora" in the line item "Premiums / (discount) on physical index deals" in PSE's 2020 PCORC Supplemental filing

To summarize, there are four types of forward transactions included in PSE's power costs

	Power	Gas-for-power
Fixed-price hedges	1. The actual cost and volume of fixed-price power hedges are included in the Aurora model	2. Outside the model adjustment accounts for difference between actual prices of gas-for-power hedges and model gas price inputs
Index-price physical supply	3. The incremental cost (premium or discount) relative to index is added outside the model for index price physical power supply contracts	4. The incremental cost (premium or discount) relative to index is added outside the model for index price physical gas-for-power supply contracts

Costs of natural gas transportation contracts are included in PSE's power cost forecast

- PSE contracts with pipeline operators to provide transportation of natural gas between gas supply hubs and from hubs to PSE's gas-fired power plants
- Variable transport costs are added to the price input[1] in Aurora for each PSE plant
  - Plants are dispatched based on this total *delivered* gas price
  - Aurora cost outputs include variable transport costs plus commodity fuel costs
- Fixed costs of gas transportation contracts are added outside of the Aurora model[2]

[1] "WP- PKW-Gas prices and variable transport inputs…(C)" in PSE's 2020 PCORC Supplemental filing
[2] Exh. PKW -34C, "Fixed Gas Transport"

Benefits of natural gas transportation contracts are also included in PSE's power cost forecast

- Benefits of pipeline capacity between supply hubs are calculated outside the Aurora model based on price differentials between hubs. For example[1]:
  - PSE Station 2 to Sumas capacity: 80,000 MMBtu/day
  - Station 2 price in June: $2.00 ; Sumas price in June: $2.50
  - 80,000 X ($2.50 - $2.00) = $40,000/day or $1.2 million reduction to June fuel costs

[1] Simplified example. See Exh. PKW-31C, "Gas MTM" for full calculation

PSE added additional power hedges between supplemental and compliance filings in 2020 PCORC

- Volume of hedges increases as the rate year approaches, consistent with PSE's hedging strategies

Power hedges included in PSE's 2020 PCORC

	Supplemental @ 1/12/2021			Compliance @ 5/28/2021		
	MWh	Cost	Average $/MWh	MWh	Cost	Average $/MWh
Purchases	REDACTED VERSION					
Sales						
Net						

Gas-for-power hedges included in PSE's 2020 PCORC

	Supplemental @ 1/12/2021			Compliance @ 5/28/2021		
	MMBtu / day	Cost*	Average $/MMBtu	MMBtu / day	Cost*	Average $/MMBtu
Purchases	REDACTED VERSION					
Sales						
Net						

*Total not in model adjustment for gas-for-power hedges was $12.5 million reduction to fuel costs in supplemental filing and $20.3 million reduction in compliance

PSE added index-price physical supply contracts between supplemental and compliance filings in the 2020 PCORC

REDACTED VERSION

Index-price physical power contracts

Total MWh	
Average premium per MWh	
Total incremental cost relative to index	

Index-price physical gas-for-power contracts

Total MMBtu/day	
Average premium per MMBtu	
Total incremental cost relative to index	

- Volume of index-priced physical power supply contracts increased as the delivery period approached
- Higher index premiums were driven by tighter supply and demand conditions, especially during Q3 2021.