

**EXH. PKW-3C
DOCKET UE-17 ____
PCA 15 COMPLIANCE
WITNESS: PAUL K. WETHERBEE**

**BEFORE THE
WASHINGTON UTILITIES AND TRANSPORTATION COMMISSION**

**In the Matter of the Petition of
PUGET SOUND ENERGY
For Approval of its April 2017 Power Cost
Adjustment Mechanism Report**

Docket UE-17 ____

**SECOND EXHIBIT (CONFIDENTIAL) TO THE
PREFILED DIRECT TESTIMONY OF**

PAUL K. WETHERBEE

ON BEHALF OF PUGET SOUND ENERGY

**REDACTED
VERSION**

APRIL 28, 2017

PUGET SOUND ENERGY

**SECOND EXHIBIT (CONFIDENTIAL) TO THE
PREFILED DIRECT TESTIMONY OF PAUL K. WETHERBEE**

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PUGET SOUND ENERGY

**ILLUSTRATION OF PSE'S PORTFOLIO AND
RISK MANAGEMENT ACTIVITIES FOR PCA PERIOD 15 POWER
SUPPLY FOR THE SINGLE MONTH APRIL 2016**

I. PUGET SOUND ENERGY'S HEDGING PLAN

The purpose of this exhibit is to illustrate the manner in which Puget Sound Energy ("PSE") manages its electric portfolio, including risk management activities, by describing how PSE managed power supply and costs for a single month during Power Cost Adjustment Mechanism ("PCA") Period 15: April 2016.

In accordance with PSE's Energy Risk Policy, the Energy Management Committee ("EMC") is responsible for providing policy-level and strategic direction on energy supply portfolio risk issues and significant new long-term resources and contracts. Energy Supply Merchant department staff ("Employees") follow the EMC approved Programmatically Managed Hedge strategy, which is explained in detail in Exh. PKW-1CT, to guide them in the specific time periods and quantities of energy to hedge. PSE manages its short-term energy supply hedging and portfolio risk activities, the Actively Managed Hedge period, in accordance with the EMC-approved Energy Supply Transaction and Hedging Procedures Manual ("Procedures Manual").

As defined in the Procedures Manual under Schedule F - Spot Market Exposure for Gas and Power Portfolios, the Authorized Traders have an exposure authority limit up to \$ [REDACTED] monthly and \$ [REDACTED] for a rolling [REDACTED] period. Spot market exposure above the Authorized Traders limit requires notification to the EMC. The exposure is calculated individually for on-peak, off-peak, and gas for power positions with the authority limit calculated on the net spot exposure of all three positions. Spot market exposure is measured

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1 by multiplying the net open position, in megawatt hours, times the forward market price. It
 2 represents the net dollar amount that PSE has not hedged during a given timeframe, given
 3 forecasted volumes and market prices. See Exh. PKW-7C for the Schedule F excerpt from
 4 the Procedures Manual.

5 Employees use various reports, analytics and data tools to manage positions,
 6 measure specific portfolio risks, and compare hedge choices. Examples include stochastic
 7 price simulations, portfolio cost simulation and scenario analysis. The stochastic model
 8 allows varying key inputs, such as volatility, to create price distributions, which can aid in
 9 making hedge decisions.

10 The remainder of this exhibit will illustrate the executed hedging strategy decisions
 11 used by Employees for PCA Period 15. Please reference sections II through IV, which
 12 provide a summary of [REDACTED] and review the analyses relied upon by
 13 Employees to make hedging decisions for April 2016. Section V provides a description of
 14 Exh. PKW-4C through Exh. PKW-9C, which collectively provide additional detail
 15 supporting this narrative.

16 **II. PROGRAMMATICALLY MANAGED HEDGE PERIOD**

17 [REDACTED] **THROUGH** [REDACTED]

18 In [REDACTED], [REDACTED] rolled into the Programmatically Managed Hedge period.
 19 At the time, the April 2016 net exposure was [REDACTED] with a [REDACTED] MW on-peak power
 20 [REDACTED] position, a [REDACTED] MW [REDACTED] power [REDACTED] position and a [REDACTED] MMBtu/day natural
 21 gas [REDACTED] position. The unhedged on- and off-peak power positions, valued at the forward
 22 market price at the time, resulted in an on- and off-peak power exposure of [REDACTED]
 23 and [REDACTED], respectively. This power exposure, combined with the [REDACTED]

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1 natural gas exposure totaled a net exposure of [REDACTED]. See Exh. PKW-4C for the
 2 April 2016 exposures over the entire [REDACTED] hedging period. In [REDACTED], with [REDACTED]
 3 [REDACTED] remaining until April 2016 would roll into the Actively Managed Hedge, the
 4 maximum monthly exposure reduction was \$ [REDACTED] [REDACTED]) and the
 5 minimum monthly exposure reduction was \$ [REDACTED] million [REDACTED]. See Exh.
 6 PKW-1CT for a detailed explanation of the minimum and maximum exposure reduction
 7 parameter calculations. During May 2013, Employees purchased [REDACTED] MW [REDACTED]
 8 [REDACTED] for the [REDACTED] to reduce April 2016
 9 exposure. Employees also [REDACTED] MMBtu/day of gas for April 2016 delivery.
 10 These hedges, in addition to changes in commodity prices and heat rates, resulted in a [REDACTED]
 11 [REDACTED] reduction of net exposure over the month. Often a power hedge transaction spans a
 12 full quarter or full calendar year due to the fact that quarterly and calendar strips are more
 13 liquid than single month markets and the pricing and volume reflect the availability at that
 14 time. Many of the power hedge transactions for April 2016 were either quarterly or
 15 calendar year strips. See Exh. PKW-5C for the power and gas hedges for April 2016.

16 During the months of [REDACTED], Employees managed the
 17 April 2016 spot market exposure similar to [REDACTED], by hedging to [REDACTED]. Employees
 18 [REDACTED] MMBtu/day of gas for April 2016 and a total of [REDACTED] power
 19 and [REDACTED] power for the entire [REDACTED]. Then, in [REDACTED],
 20 PSE updated its customer load forecast and as a result, the April 2016 demand forecast
 21 decreased by [REDACTED] MW in the [REDACTED] and [REDACTED] MW in the [REDACTED] hours. The combination of
 22 the change in forecasted load, commodity prices, heat rates and hedges over the [REDACTED]
 23 [REDACTED], reduced total net exposure for April 2016 by [REDACTED].

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1 In early [REDACTED] Employees determined to switch from hedging at [REDACTED]
 2 exposure reduction levels to [REDACTED] exposure reduction levels for all delivery terms of the
 3 Programmatically Managed Hedge period, which included April 2016. Market liquidity in
 4 the forward power markets, especially beyond one year out, had declined. It was unclear at
 5 the time whether this was a transitory event or a longer term structural change. There were
 6 three main factors contributing to the power market illiquidity. First, there were fewer
 7 market participants. Several entities had scaled back or exited the Western regional power
 8 markets over time (e.g., [REDACTED]
 9 [REDACTED]). Second, power markets had changed as a result of Dodd-Frank regulation. Many
 10 entities moved away from transacting fixed-for-float power swaps and were instead
 11 transacting Intercontinental Exchange (“ICE”) cleared futures and/or physical power. Credit
 12 under physical enabling agreements was more restrictive and therefore PSE had fewer
 13 counterparties willing to transact beyond twelve months out. Lastly, new rules and
 14 regulations related to California Air Resource Board (CARB) were adding to the illiquidity
 15 and price uncertainty. Employees continued to hedge at [REDACTED] exposure reduction levels
 16 in [REDACTED] for April 2016 delivery. During the three months
 17 ([REDACTED]) Employees [REDACTED] a total of [REDACTED] MMBtu/day of gas.
 18 These hedges, along with the increase in market heat rates, reduced the total net exposure
 19 for April 2016 by [REDACTED].

20 In [REDACTED], Employees chose to hedge to the [REDACTED] hedging level (the
 21 [REDACTED] of the [REDACTED] hedge parameters) for the entire Programmatically
 22 Managed Hedge program. This change was due to lower gas prices resulting from increased
 23 gas production and producer hedging. By February 2014, both Sumas gas and Mid-C power

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1 prices for calendar year 2016 delivery were at similar levels as they were in November
 2 2013, prior to the cold winter. Employees hedged similarly for March 2014, at the [REDACTED]
 3 hedge level, resulting in total [REDACTED] gas of [REDACTED] MMBtu/day, over the 2-month
 4 period, for April 2016 delivery. These hedges reduced net exposure for April 2016 by [REDACTED]

5 [REDACTED]
 6 During [REDACTED], gas and power prices increased due to extended cold, winter-like
 7 weather which generated a fear premium in the forward commodity markets. Therefore,
 8 Employees elected to hedge to [REDACTED] levels for the entire Programmatically Managed
 9 Hedge period and remained at [REDACTED] through November 2014. See Exh. PKW-9C for
 10 forward prices. During the months of [REDACTED] Employees
 11 [REDACTED] a total of [REDACTED] MMBtu/day of gas for April 2016 delivery and [REDACTED] MW of [REDACTED]
 12 [REDACTED] power for the entire calendar year of 2016. Hedges during this [REDACTED] month period
 13 combined with changes in commodity prices reduced net exposure for April 2016 by \$ [REDACTED]

14 [REDACTED]
 15 By [REDACTED] both gas and power prices had retreated and calendar year 2016
 16 prices were near all-time lows. Given the price drop, Employees elected to hedge to [REDACTED]
 17 hedging levels during [REDACTED] and continued at that level through [REDACTED]. In
 18 January 2015, PSE again updated its customer load forecast and as a result, forecasted
 19 demand for April 2016 [REDACTED] aMW. During the four month period [REDACTED]
 20 [REDACTED] Employees purchased a total of [REDACTED] MMBtu/day of gas for April 2016
 21 delivery. These hedges combined with the decrease in gas prices, increase in market heat
 22 rates and the change in customer demand forecast brought net exposure to [REDACTED], a
 23 reduction of [REDACTED]

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III. ACTIVELY MANAGED HEDGE PERIOD

1 In [REDACTED], April 2016 rolled into the Actively Managed Hedge period. This
 2 hedge program allows Employees to more actively manage the April 2016 position for a full
 3 [REDACTED] prior to delivery. At the beginning of [REDACTED], the April 2016 net
 4 exposure was [REDACTED] with a [REDACTED] million or [REDACTED] MW on-peak power [REDACTED] position,
 5 a [REDACTED] million or [REDACTED] MW off-peak power [REDACTED] position and a [REDACTED] million or [REDACTED]
 6 MMBtu/day natural gas [REDACTED] position. See Exh. PKW-4C for the April 2016 exposures over
 7 the hedging period. At that time, market implied flat heat rates for April 2016 were
 8 averaging around [REDACTED], a level where two of PSE's gas-fired generators could
 9 be economically dispatched. See Exh. PKW-8C for the daily forward heat rate trends for
 10 April 2016. Given the relatively small [REDACTED] net exposure position, Employees chose, at that
 11 time, to [REDACTED]
 12 [REDACTED] and well within the monthly exposure limits under Schedule F of the Procedures
 13 Manual.
 14

15 From [REDACTED], Employees [REDACTED] hedges
 16 for April 2016. Implied on-peak market heat rates, for April 2016, increased from
 17 approximately [REDACTED] MMBtu/MWh. This was due mostly to a steady decline in gas
 18 prices during the four month period. As a result, the probabilistic on- and off-peak power
 19 positions [REDACTED] while the gas position got [REDACTED]. In July 2015 PSE updated its
 20 customer load forecast which resulted in [REDACTED] customer demand for April 2016.
 21 The lower gas prices, increased market heat rates and the change in the load forecast
 22 resulted in net exposure reduction from [REDACTED] million to [REDACTED] from [REDACTED]
 23 [REDACTED].

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1 In [REDACTED], provided with an updated wind forecast and market implied heat
 2 rates, Employees [REDACTED] MW [REDACTED]. These hedges, in addition to changes in
 3 commodity prices and heat rates kept the net exposure at [REDACTED].

4 With the start of a new hydro year in October 2015, the Northwest River Forecast
 5 Center (NWRFC) forecasts for January through July 2016 outflows at Grand Coulee ranged
 6 from ninety-five to eighty-nine percent of normal. See Exh. PKW-6 for NWRFC Grand
 7 Coulee forecasts. In [REDACTED], Employees [REDACTED] a total of [REDACTED] MMBtu/day of
 8 [REDACTED] and [REDACTED] MMBtu/day of [REDACTED] to manage physical index supply at
 9 PSE's transport receipt points.

10 In [REDACTED], the NWRFC January through July forecasts for Grand Coulee
 11 outflows increased, ranging from ninety-five to one hundred and three percent of normal.
 12 Looking at the April 2016 position under various scenarios, Employees elected to [REDACTED]
 13 MW of [REDACTED] for the entire second quarter. These hedges combined with lower
 14 market heat rates resulted in an [REDACTED] in exposure to [REDACTED]

15 In [REDACTED], forward gas and power prices continued their decline due in part to
 16 above normal temperature forecasts. Employees [REDACTED] MW on-peak power and [REDACTED]
 17 MW off-peak power while [REDACTED] a total of [REDACTED] MMBtu/day of gas to [REDACTED]
 18 commodities. Employees also [REDACTED] MW [REDACTED] power and [REDACTED] MW [REDACTED]
 19 power to optimize assets. These hedges combined with higher heat rates reduced net
 20 exposure by [REDACTED]

21 In [REDACTED], the Bonneville Power Administration (BPA) elected to perform
 22 drum gate maintenance at Grand Coulee in spring of 2016 which could support power prices
 23 in April and May 2016. Given the [REDACTED] power position, Employees [REDACTED] MW of

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1 [REDACTED] power for April 2016 delivery. At the end of [REDACTED], the updated hydro forecast
 2 shifted hydro generation from May and June 2016 to April 2016 so Employees [REDACTED] MW
 3 of [REDACTED] power for April 2016 and [REDACTED] power for [REDACTED]
 4 These hedges combined with changes in commodity prices brought the net exposure to
 5 [REDACTED] million.

6 In March 2016 the NWRFC hydro forecasts for January through July Grand Coulee
 7 output increased to slightly above normal. There was also a change in [REDACTED] planned
 8 maintenance resulting in higher generation. As a result of these adjustments, Employees
 9 [REDACTED] MW of on- and off-peak power. To manage physical index supply at PSE's
 10 transport receipt points, Employees [REDACTED] MMBtu/day of [REDACTED] gas and [REDACTED]
 11 the equivalent volume of [REDACTED] gas and purchased 10,000 MMBtu/day of Station 2 gas and
 12 sold the equivalent volume of Hunt gas.. The combination of these hedges and changes in
 13 gas and power prices resulted in a total net exposure of [REDACTED] at the end of March
 14 2016.

IV. APRIL 2016 – WITHIN MONTH OVERVIEW

16 At the end of March 2016, the net exposure for April 2016 was [REDACTED], which
 17 represented a [REDACTED] position for gas of [REDACTED] MMBtu/day [REDACTED] and a
 18 [REDACTED] position for both on- and off-peak power of [REDACTED]
 19 [REDACTED], respectively. Positioning the portfolio with [REDACTED] allows for
 20 participation in lower [REDACTED]. If heat rates decrease within the month of April 2016,
 21 Employees can [REDACTED].

22 Above average temperatures enveloped the Pacific Northwest region during April
 23 2016. Seattle averaged six degrees above normal. The higher temperatures produced lower

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1 loads and above average hydro generation for the month. Runoff measured at Grand Coulee
 2 was 75% higher than normal for April 2016. See Exh. PKW-6 for Grand Coulee runoff
 3 volumes. Daily market flat heat rates for April 2016 ranged from zero to 12.3
 4 MMBtu/MWh. The average daily flat heat rate for the month was 7.3 MMBtu/MWh, with
 5 on-peak Mid-C power prices averaging \$12.14/MWh, off-peak Mid-C power prices
 6 averaging \$6.08/MWh and Sumas gas price averaging \$1.31/MMBtu.

7 In the first half of the month, Employees [REDACTED] MW of [REDACTED] power, for
 8 the remainder of April 2016, to hedge load given lower prices. Employees also [REDACTED]
 9 commodities within the month by [REDACTED] and [REDACTED]
 10 [REDACTED] for the remainder of April 2016 (a heat rate [REDACTED]
 11 [REDACTED]), participating in lower power prices. In addition, Employees [REDACTED]
 12 [REDACTED] within the month due to lower loads and an
 13 increase in expected wind generation for the remainder of the month.

14 From May 2013 through March 2016, Employees [REDACTED] MW of
 15 on-peak power, [REDACTED] MW of off-peak power and [REDACTED] MMBtu/day of natural gas.
 16 Employees also [REDACTED] a total of [REDACTED] of on-peak power, [REDACTED] of off-peak power and
 17 [REDACTED] MMBtu/day of gas. See Exh. PKW-5C for further detail of PSE's hedges for April
 18 2016.

V. SUPPORTING EXHIBITS

19
 20 The monthly exposure for April 2016 is included in Exh. PKW-4C. April 2016
 21 hedges were executed in accordance with both the Programmatically Managed Hedge and
 22 Actively Managed Hedge programs, and the hedge details are shown for both power and gas
 23 in Exh. PKW-5C.

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1 A graph of the NWRFC forecasts for the January through July 2016 period is
2 provided in Exh. PKW-6. The 30 year average (1981-2010), referred to as "normal," for the
3 January through July period at Grand Coulee is 59,599 thousand acre-feet ("KAF"). The
4 actual January through July 2016 runoff was nearly 100 percent of normal at Grand Coulee,
5 or 59,577 KAF. The actual monthly runoff volumes at Grand Coulee for water years 2014
6 through 2016 are also shown in Ex. PKW-6.

7 A copy of Schedule F from the Procedures Manual, "Spot Market Exposure for Gas
8 and Power Portfolios," which provides the monthly exposure limits, is provided in Exh.
9 PKW-7C.

10 Daily heat rate trends for April 2016 can be found in Exh. PKW-8C, as well as the
11 dispatch heat rate of PSE's gas fired turbines. Implied market heat rates fluctuate daily
12 depending on the power and gas prices, and are part of the dispatch logic used in the risk
13 model to determine which gas fired turbines are "in the money" and may dispatch
14 economically.

15 Commodity prices for April 2016 are provided in Exh. PKW-9C. The first chart
16 illustrates on-peak power, off-peak power, and gas forward market prices as they evolved
17 over the [REDACTED] hedging period. The second chart displays the daily settlement prices for
18 Mid-C power and Sumas gas prices for the month of April 2016. The final chart
19 demonstrates the forward market prices for calendar year strips 2015 and 2016.