

**EXH. PKW-3C  
DOCKET UE-18\_\_\_\_  
PCA 16 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 2018 Power  
Cost Adjustment Mechanism Report**

**DOCKET UE-18\_\_\_\_**

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

**PAUL K. WETHERBEE**

**ON BEHALF OF PUGET SOUND ENERGY**

**REDACTED  
VERSION**

**APRIL 30, 2018**

**PUGET SOUND ENERGY**

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

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1 **PUGET SOUND ENERGY**

2 **ILLUSTRATION OF PSE'S PORTFOLIO AND**  
3 **RISK MANAGEMENT ACTIVITIES FOR PCA PERIOD 16 POWER**  
4 **SUPPLY FOR THE SINGLE MONTH JULY 2017**

5 **I. PUGET SOUND ENERGY'S HEDGING PLANS**

6 The purpose of this exhibit is to illustrate the manner in which Puget Sound Energy  
7 ("PSE") manages its electric portfolio, including risk management activities, by describing  
8 in more detail the hedge programs utilized to managed power supply and costs for a single  
9 month during Power Cost Adjustment Mechanism ("PCA") Period 16: July 2017.

10 In accordance with PSE's Energy Risk Policy, the Energy Management Committee  
11 ("EMC") is responsible for providing policy-level and strategic direction on energy supply  
12 portfolio risk issues and significant new long-term resources and contracts. Energy Supply  
13 Merchant department staff ("ESM") manage PSE's short-term energy supply hedging and  
14 portfolio risk activities with the Actively Managed Hedge and the Programmatically  
15 Managed Hedge. The Actively Managed Hedge program consists of the next full [REDACTED]  
16 calendar months and is managed in accordance with the EMC approved Energy Supply  
17 Transaction and Hedging Procedures Manual ("Procedures Manual").

18 As defined in the Procedures Manual under Schedule F - Spot Market Exposure for  
19 Gas and Power Portfolios, the Authorized Traders have an exposure authority limit up to \$ [REDACTED]  
20 [REDACTED] monthly and \$ [REDACTED] for a rolling [REDACTED] period. This rolling [REDACTED]  
21 [REDACTED] period is referred to as the Actively Managed Hedge. Spot market exposure above  
22 the Authorized Traders limit requires notification to the EMC. At the end of each business  
23 day, the Energy Risk Control ("ERC") department calculates exposure individually for on-

1 peak, off-peak, and gas for power positions with the authority limit calculated on the total  
2 net exposure of all three positions. Spot market exposure is measured by valuing the net  
3 open position, in megawatt hours, off the forward market price. It represents the net dollar  
4 amount that PSE has not hedged during a certain timeframe, given forecasted volumes and  
5 market prices. See Exh. PKW-7C for the Schedule F excerpt from the Procedures Manual.

6 The Programmatically Managed Hedge program is an EMC approved strategy that  
7 covers the [REDACTED] beyond the Actively Managed Hedge period. This strategy is  
8 designed to manage the power portfolio total net exposure so that as a month rolls into the  
9 Actively Managed Hedge period the exposure for that month will be within the monthly  
10 limit under Schedule F. For the Programmatically Managed Hedge strategy, the maximum  
11 monthly exposure reduction is calculated by dividing the total net exposure by the  
12 remaining number of months prior to the time when the position falls into the Actively  
13 Managed Hedge. The minimum monthly exposure reduction is calculated by dividing the  
14 total net exposure (plus or minus the EMC monthly limit authority) by the remaining  
15 number of months prior to the time when the position falls into the Actively Managed  
16 Hedge. If such a month's position already falls within the Schedule F monthly exposure  
17 limit authority, there is no monthly hedge requirement.

18 ESM uses various reports, analytics and data tools to manage positions, measure  
19 specific portfolio risks, and compare hedge choices. Examples include stochastic price  
20 simulations, portfolio cost simulation and scenario analysis. The stochastic model allows  
21 varying key inputs, such as volatility, to create price distributions, which can aid in making  
22 hedge decisions.

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1 The remainder of this exhibit will illustrate the hedging programs used by ESM for  
2 PCA Period 16. Sections II through IV provide a summary of [REDACTED]  
3 and discuss some of the analyses relied upon by ESM to make hedging decisions for July  
4 2017. Section V describes Exh. PKW-4C through Exh. PKW-9C, which collectively  
5 provide additional detail supporting this narrative.

6 **II. PROGRAMMATICALLY MANAGED HEDGE PERIOD**  
7 [REDACTED] **THROUGH** [REDACTED]

8 In [REDACTED], [REDACTED] was first included in the Programmatically Managed  
9 Hedge period. At the time, the [REDACTED] on- and off-peak power exposure was [REDACTED]  
10 [REDACTED] and [REDACTED], respectively, and the natural gas exposure was [REDACTED] for  
11 a total net exposure of [REDACTED]. With [REDACTED] remaining until July 2017 would  
12 roll into the Actively Managed Hedge, the maximum monthly exposure reduction was  
13 [REDACTED] [REDACTED]). Given the then market implied flat heat rate of 9.4  
14 MMBtu/MWh, commodity prices and the value of PSE's gas-fired generation resources,  
15 the net exposure for July 2017 was below the Procedures Manual Schedule F authority  
16 limit of [REDACTED]. See Exh. PKW-4C for the July 2017 exposure over the entire [REDACTED]  
17 hedging period.

18 Although there was not a minimum requirement to remove exposure for July 2017  
19 over the course of the Programmatically Managed Hedge period there were minimum  
20 requirements for August and/or September. During the first half of 2015, ESM [REDACTED]  
21 power for the entire third quarter (July, August and September) of 2017 to meet minimum  
22 hedge requirements for August and September, and then later rebalanced the portfolio. By

1 the end of June 2015 the total net exposure had decreased by [REDACTED]. The fixed price  
2 position can be rebalanced in a variety of ways including monthly rolls ([REDACTED] July and  
3 [REDACTED] September), on/off transactions ([REDACTED] on-peak power and [REDACTED] off-peak  
4 power) and commodity choice (natural gas versus power). A power hedge transaction can  
5 span a full quarter or full calendar year due to the fact that quarterly and calendar strips are  
6 more liquid than single month markets and the pricing and volume reflect the availability at  
7 that time.

8 In July 2015 PSE updated its customer demand forecast, which caused a [REDACTED]  
9 [REDACTED] in July 2017. Over the next several months, as natural gas prices  
10 decreased, market heat rates for July 2017 increased. The higher heat rates, combined with  
11 the [REDACTED] load forecast resulted in a position with [REDACTED] exposure. ESM determined to  
12 rebalance commodities during this time by [REDACTED] power and [REDACTED] natural gas. See  
13 Exh. PKW-4C and Exh. PKW-8 for monthly exposures and heat rates.

14 During the [REDACTED] months ([REDACTED]) of the Programmatically  
15 Managed Hedge period, exposure for July 2017 was [REDACTED] by \$ [REDACTED]. In addition  
16 to hedges, exposure fluctuated as a result of customer load forecast updates and changes in  
17 commodity prices and heat rates. PSE [REDACTED] a total of [REDACTED] MW on-peak power, [REDACTED]  
18 MW off-peak power and [REDACTED] MMBtu/day of natural gas and [REDACTED] a total of [REDACTED] MW on-  
19 peak power, [REDACTED] MW off-peak power and [REDACTED] MMBtu/day of natural gas, remaining  
20 within the parameters of the strategy. See Exh. PKW-5C for the hedging transaction detail.

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1 **III. ACTIVELY MANAGED HEDGE PERIOD**

2 In [REDACTED] July 2017 rolled into the Actively Managed Hedge period. This  
3 hedge program allows ESM to more actively manage the July 2017 position for a full  
4 [REDACTED] prior to delivery. At the beginning of [REDACTED], the July 2017 net exposure  
5 was [REDACTED] with a [REDACTED] million on-peak power position, a [REDACTED] million off-peak  
6 power position and a [REDACTED] million natural gas position. See Exh. PKW-4C for the July  
7 2017 exposures over the hedging period. At that time, market implied flat heat rates for  
8 July 2017 were averaging around 10.0 MMBtu/MWh, a level where PSE's gas-fired  
9 generating resources could be economically dispatched. See Exh. PKW-8C for the daily  
10 forward heat rate trends for July 2017.

11 From [REDACTED] through early [REDACTED], ESM [REDACTED] a combination of  
12 natural gas and power to reduce spot market exposure. The [REDACTED] of natural gas,  
13 combined with natural gas generating resources creates a flexible power hedge with the  
14 option to re-balance with [REDACTED] in the future.

15 In [REDACTED] through early [REDACTED], ESM began to analyze hydro  
16 conditions for the 2017 water year. Given the current heat rate levels and a bias toward  
17 higher regional hydro, ESM began to [REDACTED] heat rate by [REDACTED] natural gas and [REDACTED]  
18 power to lock in natural gas generation value for the portfolio.

19 Starting in [REDACTED] through early [REDACTED] the regional hydro runoff  
20 forecasts for water year 2017 increased, which caused July 2017 market heat rates to  
21 decrease. See pages one and two of Exh. PKW-6 for Northwest River Forecast Center

1 (“NWRFC”) Grand Coulee runoff forecasts. As a result, ESM [REDACTED] power and [REDACTED]  
2 natural gas to re-balance at a more optimal, [REDACTED] heat rate level.

3 From late [REDACTED] through [REDACTED], regional temperatures and hydro  
4 forecasts were above normal. In addition, drum gate maintenance was being performed at  
5 the Bonneville Power Administration’s (“BPA”) Grand Coulee dam. Drum gate  
6 maintenance requires the BPA to draft the Grand Coulee reservoir down to 1255 feet of  
7 elevation and maintain at or below that level for a 45 day period. This reduces the amount  
8 of hydro storage in the market adding volatility to regional power prices. As such, market  
9 heat rates for July 2017 increased and PSE [REDACTED] heat rate by [REDACTED] power hedges and re-  
10 balancing them with [REDACTED] to create portfolio optionality and  
11 lock in natural gas generating resource value.

12 In late [REDACTED], due to an extension of outages on natural gas generating  
13 resources into [REDACTED] PSE re-balanced the portfolio by [REDACTED] power and [REDACTED] natural  
14 gas.

15 From [REDACTED], ESM [REDACTED] MW on-peak  
16 power, [REDACTED] of off-peak power and [REDACTED] MMBtu/day of natural gas. ESM also [REDACTED]  
17 a total of [REDACTED] of on-peak power, [REDACTED] of off-peak power and [REDACTED] MMBtu/day  
18 of natural gas. See Exh. PKW-5C for a complete list of PSE’s hedges for July 2017.

19 **IV. JULY 2017 – WITHIN MONTH OVERVIEW**

20 At the beginning of July 2017, the net exposure for July 2017 was [REDACTED]  
21 with natural gas exposure of [REDACTED], on-peak power exposure of [REDACTED] and



1 off-peak power exposure of [REDACTED]. Daily power spot prices were driven mostly by  
2 fluctuations in wind production forecasts. ESM [REDACTED] balance-of-the-month off-peak power  
3 to hedge forecasted [REDACTED] wind production. Later, ESM [REDACTED] balance of month  
4 off-peak power and [REDACTED] on-peak power to reduce price risk associated with lower hydro  
5 output.

6 Hydro runoff measured at Grand Coulee was 11% lower than normal for July 2017.  
7 See page three of Exh. PKW-6 for Grand Coulee runoff volumes. Daily market flat heat  
8 rates for July 2017 ranged from 7.5 to 21.0 MMBtu/MWh, averaging 11.5 MMBtu/MWh  
9 for the month. On-peak Mid-C power prices averaged \$29.91/MWh, off-peak Mid-C  
10 power prices averaged \$21.24/MWh and Sumas gas price averaged \$2.29/MMBtu. See  
11 Exh. PKW-9C for July 2017 forward market and daily settlement prices.

## 12 V. SUPPORTING EXHIBITS

13 The monthly exposure for July 2017 is included in Exh. PKW-4C. July 2017  
14 hedges were executed in accordance with both the Programmatically Managed Hedge and  
15 Actively Managed Hedge programs, and the hedge details are shown for both power and  
16 gas in Exh. PKW-5C.

17 Graphs of the NWRFC forecasts for the January through July 2017 period and the  
18 April through September 2017 period are provided in Exh. PKW-6, as is a graph of the  
19 actual monthly runoff volumes at Grand Coulee for water years 2015 through 2017. The  
20 30 year average (1981-2010), referred to as “normal,” for the January through July period  
21 at Grand Coulee is 59,599 thousand acre-feet (“KAF”). The actual January through July  
22 2017 runoff was nearly 126 percent of normal at Grand Coulee, or 74,905 KAF.

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

4 Daily heat rate trends for July 2017 can be found in Exh. PKW-8C, as well as the  
5 dispatch heat rate of PSE's gas fired turbines. Implied market heat rates fluctuate daily  
6 depending on the power and gas prices, and are part of the dispatch logic used in the risk  
7 model to determine which gas fired turbines may dispatch economically.

8 Commodity prices for July 2017 are provided in Exh. PKW-9C. The first chart illustrates  
9 on-peak power, off-peak power, and gas forward market prices as they evolved over the  
10 [REDACTED] hedging period. The second chart displays the daily settlement prices for Mid-C  
11 power and Sumas gas for the month of July 2017.

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