

**EXH. CKC-4
DOCKETS UE-170033/UG-170034
2017 PSE GENERAL RATE CASE
WITNESS: DR. CHUN K. CHANG**

**BEFORE THE
WASHINGTON UTILITIES AND TRANSPORTATION COMMISSION**

**WASHINGTON UTILITIES AND
TRANSPORTATION COMMISSION,**

Complainant,

v.

PUGET SOUND ENERGY,

Respondent.

**Docket UE-170033
Docket UG-170034**

**FIRST EXHIBIT (NONCONFIDENTIAL) TO THE
PREFILED REBUTTAL TESTIMONY OF**

DR. CHUN K. CHANG

ON BEHALF OF PUGET SOUND ENERGY

AUGUST 9, 2017

BEFORE THE WASHINGTON UTILITIES AND TRANSPORTATION COMMISSION

**Dockets UE-170033 and UG-170034
Puget Sound Energy
2017 General Rate Case**

WUTC STAFF DATA REQUEST NO. 006

WUTC STAFF DATA REQUEST NO. 006:

RE: Weather Normalization – Model Output

Please provide the output for all temperature sensitivity models, including electric system-level model, all electric rate class-level models, gas system-level model and all gas rate class-level models, separately. Please also include the model output for the rate classes whose usages are not weather sensitive. Please include all relevant statistics generated by the statistical software.

Response:

Please refer to Attachment A to Puget Sound Energy's ("PSE's") Response to WUTC Staff Data Request No. 006 for an Excel file containing the Eviews outputs for all temperature sensitivity models. The file presents model specifications and coefficient estimates, and all statistics generated by Eviews. As stated in PSE's Response to WUTC Staff Data Request No. 005, PSE did not develop temperature sensitivity models for non-weather-sensitive electric and gas rate schedules.

Some errors were discovered in the gas rate-schedule modeling database after PSE filed the direct testimony on January 13, 2017. The gas rate-schedule modeling results presented in Attachment A to PSE's Response to WUTC Staff Data Request No. 006 reflects the corrections made after the original filing. Since the revision of model coefficients is limited to the schedule-level equations, the total temperature adjustment at the system level did not change while rate-schedule allocations have changed slightly. The overall impact on revenue adjustment is about \$50,000. An electronic copy of the revised gas adjustment workpaper file is provided in Attachment B to PSE's Response to WUTC Staff Data Request No. 006.

BEFORE THE WASHINGTON UTILITIES AND TRANSPORTATION COMMISSION

**Dockets UE-170033 and UG-170034
Puget Sound Energy
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WUTC STAFF DATA REQUEST NO. 009

WUTC STAFF DATA REQUEST NO. 009:

RE: Weather Normalization – Unbilled Usage in Monthly Sales Data

Do rate class-level monthly sales data contain any estimates for unbilled usage? If so, please describe how the company estimates unbilled electric and gas usage separately.

Response:

None of the actual electric and gas sales histories analyzed in the schedule-level temperature normalization involves unbilled sales estimation. Electric schedule-level modeling is based on daily energy use and weather. Monthly actual and normalized electric sales by schedule are all shown on an as-billed basis. Monthly actual and normalized gas sales by schedule are calendar-month sales, which are estimated with the sales by billing cycle and the billing-cycle period data for the current month and a month after. Puget Sound Energy's billing system keeps track of the volume billed in each billing cycle by rate schedule. With the billing cycle data, calendar-month therm usage is estimated by prorating the billing-cycle sales on the basis of how many days in each billing cycle fall under the current month and summing the prorated volumes for all of the billing cycles.

BEFORE THE WASHINGTON UTILITIES AND TRANSPORTATION COMMISSION

**Dockets UE-170033 and UG-170034
Puget Sound Energy
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WUTC STAFF DATA REQUEST NO. 011

WUTC STAFF DATA REQUEST NO. 011:

RE: Weather Normalization – System-level Adjustment versus Rate Class-level Adjustment

Please provide the rationale for developing a system-level adjustment first and then allocating the total system adjustment to the rate classes based on a ratio developed by rate class-level adjustments. Why does the company use a two-step approach to reconcile system-level and rate class-level adjustments? Why are rate class-level adjustments not sufficient?

Response:

It is necessary to have a temperature adjustment at the rate schedule level because the adjustment to test year revenue is calculated by multiplying the kWh or therm adjustment by the rates, and the rates vary by rate schedule. Puget Sound Energy (“PSE”) develops a temperature adjustment at the system level first, because daily load data for the entire population is available only at the system level, and greater accuracy is expected from the coefficients of a temperature sensitivity model developed using the daily data for entire population than a model estimated with sampled data or monthly population data. Daily load data for the population is not readily available or easily accessible at the schedule level. For the electric system, daily schedule-level load data is accessible only for the customers randomly sampled for temperature sensitivity modeling. For the gas system, only monthly schedule-level data was available for class temperature sensitivity modeling.

The amount of adjustment at the system level was determined by using the temperature variable coefficients of the system model equation, and the amount of system-level adjustment was then allocated to the rate classes based on the relative magnitudes of the schedule-level adjustments calculated with the schedule temperature sensitivity model coefficients.

BEFORE THE WASHINGTON UTILITIES AND TRANSPORTATION COMMISSION

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WUTC STAFF DATA REQUEST NO. 046

WUTC STAFF DATA REQUEST NO. 046:

Please provide updates to temperature normalization adjustments for both Electric and Gas models as they become available. With each update:

- a. Please describe the nature of the revision.
- b. Please clearly state the impact of the revision on revenue adjustments, including all revenue adjustments affected by weather-normalized sales volumes.
- c. Please provide revised workpapers and associated supporting documents.

Response:

- a. As explained in Puget Sound Energy's (PSE's) Response to WUTC Staff Data Request No. 006, Puget Sound Energy ("PSE") discovered an error in the gas rate-schedule modeling process. PSE uses an econometric modeling software called "EViews" to estimate the weather sensitivity model coefficients. There was a problem with the way "Eviews" was reading the historical data. Instead of starting with the row of January of 2011, it started with the row of February of 2010. As a result, the original model equations were estimated with the historical data of February of 2010 through January of 2015, instead of the most recent five-year period of January of 2011 through December of 2015. Therefore, the model coefficients had to be re-estimated with the input data for the correct historical period. The temperature adjustment of sales by rate schedule was then re-calculated with the revised model coefficients.
- b. Although the input data was shifted by eleven months, the monthly interactive dummy and intercept terms were assigned correctly. Therefore, the extent of changes in estimated coefficients was small. Furthermore, the total amount of temperature adjustment at the system level did not change because the revision of model coefficients affected only the schedule-level model equations. This correction has resulted in a slight change in rate-schedule allocations within the service classes (i.e. Firm, Interruptible and Transportation service classes). This revision has lowered the weather-related revenue adjustment by \$50,044, from \$58,088,570 to \$58,038,526.

- c. The revised gas rate-schedule model coefficients with statistical analysis results and the revised workpaper have been provided in Attachments A and B to PSE's Response to WUTC Staff Data Request No. 006.