EXH. CDP-1T
DOCKETS UE-22___/UG-22___
2022 PSE GENERAL RATE CASE
WITNESS: CURT D. PUCKETT

BEFORE THE
WASHINGTON UTILITIES AND TRANSPORTATION COMMISSION

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

PREFILED DIRECT TESTIMONY (NONCONFIDENTIAL) OF

CURT D. PUCKETT

ON BEHALF OF PUGET SOUND ENERGY

JANUARY 31, 2022

PUGET SOUND ENERGY

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PUGET SOUND ENERGY

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I. INTRODUCTION

Q. Please state your name, business address, and position with Puget Sound Energy.

A. My name is Curt D. Puckett, and my business address is 179 Pinehill Lake Dr, Horton, MI 49246. I am employed by Det Norske Veritas ("DNV") as Vice President, Energy Systems, North America, Energy Insights, U.S.A., Analytics & Digitalization. DNV was hired by Puget Sound Energy ("PSE") to support the gas load research analysis filed as Exh. CDP-3.

Q. Have you prepared an exhibit describing your education, relevant employment experience, and other professional qualifications?

A. Yes. My professional qualifications are provided as Exh. CDP-2.

Q. What are your duties as Vice President, DNV for PSE?

A. On this project I was the Project Sponsor, responsible for overseeing and approving the analytics conducted in support of the Gas Load Research Analysis project.

Q. What topics are you covering in your testimony?

A. The purpose of my testimony is to present the results of the gas load study conducted for the 12-months test year ending on June 30, 2021, in support of PSE's 2022 general rate case. This analysis was conducted to comply with the Electric and Natural Gas Cost of Service Rules recently codified in Chapter 480-85 of the Washington Administration Code. These rules were developed through an Electric and Natural Gas rulemaking process in WUTC Dockets UE-170002 and UG-170003 (consolidated). The gas load study is submitted herewith as Exh. CDP-3.

II. GAS LOAD RESEARCH

A. Definition of Gas Load Research

Q. Generally speaking, what is gas load research and how does PSE perform its gas load research?

A. Gas load research provides information and insight on how the demand for gas varies across different classes of customers. PSE conducts its gas load research to develop daily gas usage profiles by rate class and to provide estimates of coincident and non-coincident peaks, average gas usage for a test year period to support its gas cost of service and rate design. To conduct this analysis, DNV used daily gas consumption data provided by PSE. The analysis includes validating data quality, adjusting for gaps when the full population data are not

available or cannot be used, developing load profiles and calculating summary statistics.

Q. Did PSE use the same load research methodology in this case as in its last general rate case?

A. This is the first year PSE is preparing a gas load research analysis. The analysis was conducted in accordance with WAC 480-85. The analysis follows standard load research practices as outlined in the Third Edition of the AEIC Load Research Manual.[1]

B. Load Research Methodology

Q. What statistical methodology did DNV use in this analysis?

A. DNV used standard load research practices in its review and analysis of the gas load data as documented in the Association of Edison Illuminating Companies ("AEIC") Load Research Manual. The analysis takes advantage of as much data as possible and, in cases when full population data are not available, it uses standard statistical techniques such as stratified ratio estimation to expand the available daily data to the full populations of interest. Under stratified ratio estimation, the analysis leverages data available for the various rate schedule

[1] The Association of Edison Illuminating Companies ("AEIC") is the oldest organization in the electric energy industry, sharing research and technical information and best practices via conferences, workshops, and published reports in the ever-changing energy industry.

samples (e.g., daily gas usage data), with information known for the full population of customers, such as annual billed energy.

In DNV's analysis, the population of customers was stratified based on rate schedule, class, and annual use. Next, the available sample data are mapped back into the populations of interest. This allows us to create "case weights," which are used to weight the available sample data to the populations of interest. A case weight is simply the number of customers in the population of interest represented by each available sample point. A final reconciliation adjusts the daily load over the study period to the known population billing totals for that same period by rate schedule and class.

Q. Please describe the historical daily load data, gas sales and customer data used for PSE's Daily Gas Load Research analysis

A. Although PSE attempts to collect gas usage data for all gas customers via AMR/AMI metering technology or any other data communication technology, there are omissions. Data for all gas customers were not available for the entire test period due to an absence of proper metering technology, equipment failures, etc. Because of these reasons, certain rate schedules and classes may not include daily data for all customers for the entire test period.

Table 1 below presents a summary of the daily data available for each rate schedule and class. The table presents the rate schedule, customer class, number of accounts in the population, number of accounts with available daily data,

percentage of accounts with daily data, and the resultant case weight. As illustrated by the table, daily data were available for nearly 99 percent of the population.

Table 1 – Summary of Available Daily Data

Schedule/Domain	Number of Accounts (N)	Available Daily Data (n)	Percentage of Data Available	Case Weight (N/n)
23-Residential	796,281	787,104		1.01
Schedule 23 Total	796,281	787,104	98.8%	
31-Commercial	55,164	52,111		1.06
31-Industrial	2,216	2,105		1.05
31T-Commercial	2	2		1.00
Schedule 31 Total	57,382	54,218	94.5%	
41-Commercial	1,181	1,170		1.01
41-Industrial	70	68		1.03
41T-Commercial	81	81		1.00
41T-Industrial	19	18		1.04
Schedule 41 Total	1,350	1,337	99.0%	
85-Commercial	24	24		1.00
85-Industrial	5	4		1.21
85T-Commercial	28	27		1.03
85T-Industrial	65	63		1.03
Schedule 85 Total	122	118	97.1%	
86-Commercial	114	114		1.00
86-Industrial	4	2		2.00
86T-Commercial	3	3		1.00
86T-Industrial	5	5		1.00
Schedule 86 Total	125	123	98.4%	
87-Commercial	5	1		5.00
87T-Commercial	3	3		1.00
87T-Industrial	7	7		1.00
Schedule 87 Total	15	11	73.3%	
99-Special Contracts	10	10		1.00
Schedule 99 Total	10	10	100.0%	
Schedule Totals	855,285	842,922	98.6%	

Q. Please describe the historical gas sales and customer data used for PSE's Daily Gas Load Research analysis.

A. For this analysis DNV was provided energy usage data for the full population of PSE Sales and Transportation customers. The data were provided by schedule and customer class. Table 2 below summarizes the energy usage data.

Table 2 – Summary of Population Billing Data Used in Analysis

Schedule/Domain	Number of Accounts	Annual Use (Therms)	Average Annual Use (Therms)
Sales Customers			
23-Residential	796,281	595,407,721	748
31-Commercial	55,164	204,135,954	3,701
31-Industrial	2,216	12,661,336	5,714
41-Commercial	1,181	51,209,746	43,361
41-Industrial	70	9,735,512	139,079
85-Commercial	24	15,734,156	655,590
85-Industrial	5	3,992,016	798,403
86-Commercial	114	5,467,047	47,957
86-Industrial	4	172,847	43,212
87-Commercial	5	21,408,354	4,281,671
Sales Totals	855,064	919,924,691	1,076
Transportation Customers			
31T-Commercial	2	36,959	18,479
41T-Commercial	81	13,721,241	169,398
41T-Industrial	19	5,684,815	299,201
85T-Commercial	28	19,143,764	683,706
85T-Industrial	65	49,630,061	763,539
86T-Commercial	3	506,748	168,916
86T-Industrial	5	1,211,736	242,347
87T-Ccommercial	3	16,561,726	5,520,575
87T-Industrial	7	80,674,059	11,524,866
Special Contracts	10	31,302,307	3,130,231
Trasportation Totals	223	218,473,415	979,701
Sales & Transport Totals	855,287	1,138,398,105	1,331

The residential class accounts for 93 percent of the total accounts and 52 percent of the total annual gas sales. Schedule 31 Sales accounts for 6.7 percent of the total number of accounts and an additional 19 percent of total annual gas sales.

Q. Please summarize the results of PSE's 2022 load research results.

A.

Figure **1** below presents vertical EnergyPrints that display the total daily use of each Sales schedule. The EnergyPrint displays day of year on the y-axis and the daily use as a color gradient with low levels of load in the black to blue spectrum and high levels of load in the yellow to white spectrum. The EnergyPrints present a "helicopter" view of the data providing a perspective on the average weekday, average weekend, and seasonality of the load. The EnergyPrints start on July 1, 2020 and present the daily use throughout the study period ending on June 30, 2021.

Figure 1 presents the average daily temperature, followed by the PSE system load, and each of the rate Sales class schedule loads, beginning with Schedule 23 Residential. Schedules 23- Residential and 31- General Service loads mimic the system load characteristics. The remaining classes are slightly different, with Schedule 85 being the most different from the system load. Schedule 85 shows much higher, more consistent use during the summer months. In addition, the dark lines throughout demonstrate lower loads experienced by this class on weekends.

Figure 1 – Sales Schedule Loads

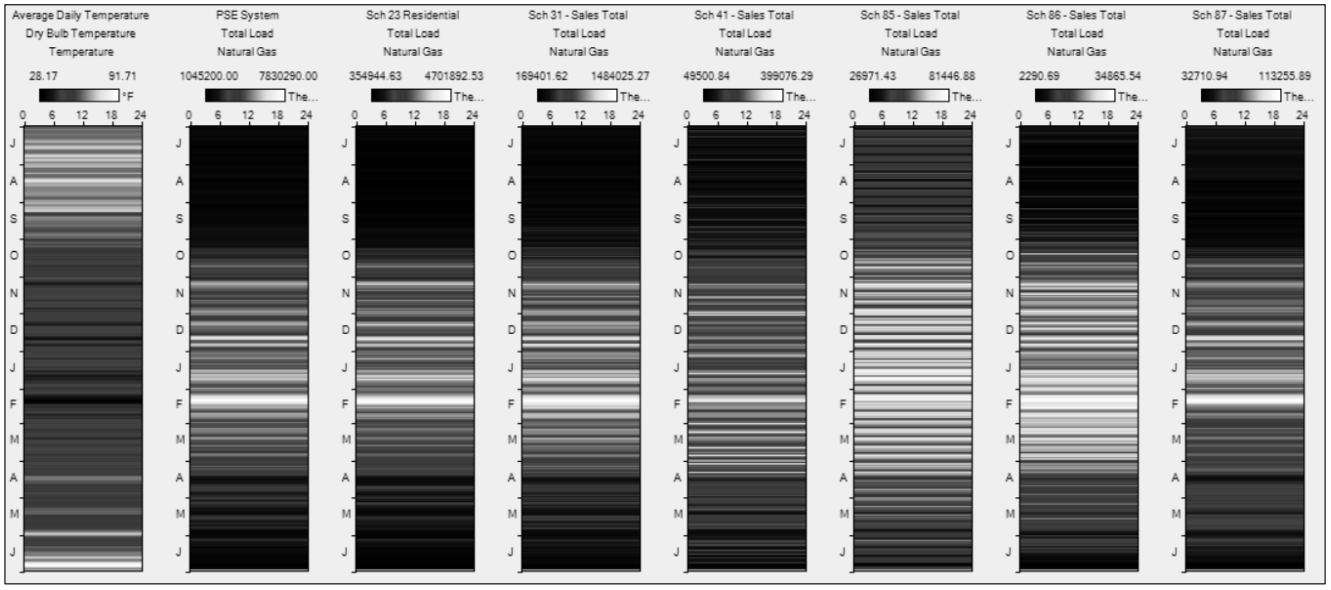

Figure **2** below presents the vertical EnergyPrints for the Transportation schedules. Once again, one can see the average daily temperature and the PSE system load, followed by the various transportation schedules. Here, most of the schedules show a substantial difference when compared to the System load. Schedules 41 Transportation, 85 Transportation, and 87 Transportation show consistently higher weekday load throughout the year when compared to the system load. In general, the transportation loads have higher and more consistent load when compared to their Sales counterparts.

Figure 2 – Transportation Schedule Loads

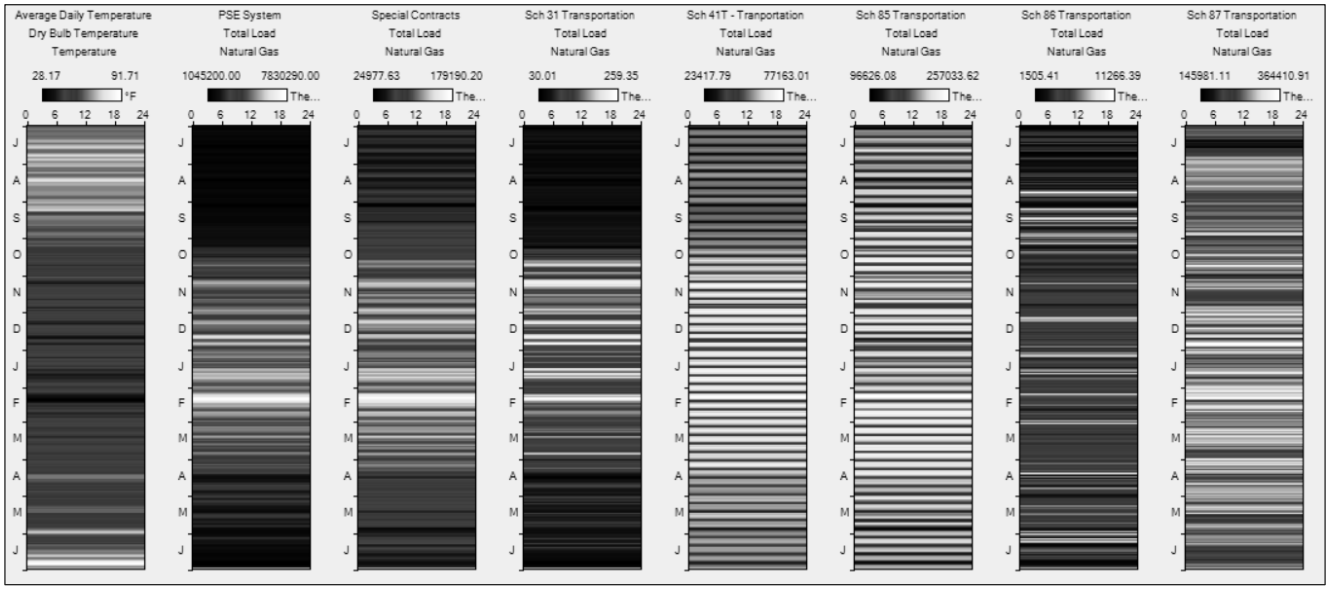

Table below summarizes the annual use, average daily use, annual class peak date, annual class peak demand, load factor, class demand at the time of the system peak, system peak load factor and coincidence factor. Schedule 23-Residential dominates, accounting for 65 percent of the total annual therm use and an even higher portion (78 percent) of the system peak demand. Schedules 31, 31T, and 87 are coincident with the system peak. Schedules 23, 85, 86, and special contracts have a coincidence factor above 90 percent. Schedule 86T has the lowest coincidence with the system load, calculated at 49 percent.

Table 3 – Summary of Results

Schedule	Annual Use (Therms)	Average Daily Use (Therms)	Non-Coincident (Class Peak) Date	Non-Coincident (Class Peak) Demand (Therms)	Non-Coincident Load Factor	Coincident (System Peak), Friday February 12, 2021		Coincidence Factor
						Class Demand (Therms)	Load Factor (%)	
Sales								
23	595,407,721	1,631,254	Saturday, February 13, 2021	4,701,893	34.7%	4,554,816	35.8%	96.9%
31	216,797,290	593,965	Friday, February 12, 2021	1,484,025	40.0%	1,484,025	40.0%	100.0%
41	60,945,259	166,973	Monday, April 5, 2021	399,076	41.8%	325,801	51.3%	81.6%
85	19,726,173	54,044	Monday, January 25, 2021	81,447	66.4%	74,777	72.3%	91.8%
86	5,639,894	15,452	Thursday, February 18, 2021	34,866	44.3%	34,341	45.0%	98.5%
87	21,408,354	58,653	Friday, February 12, 2021	113,256	51.8%	113,256	51.8%	100.0%
Sales Totals	919,924,691	2,520,342	Saturday, February 13, 2021	6,664,543	37.8%	6,587,016	38.3%	98.8%
Transportation								
31T	36,959	101	Friday, February 12, 2021	259	39.0%	259	39.0%	100.0%
41T	19,406,055	53,167	Wednesday, February 10, 2021	77,163	68.9%	63,221	84.1%	81.9%
85T	68,773,825	188,421	Wednesday, February 10, 2021	257,034	73.3%	208,613	90.3%	81.2%
86T	1,718,484	4,708	Wednesday, September 9, 2020	11,266	41.8%	5,536	85.0%	49.1%
87T	97,235,785	266,399	Thursday, February 11, 2021	364,411	73.1%	319,744	83.3%	87.7%
Special Contracts	31,302,307	85,760	Thursday, February 11, 2021	179,190	47.9%	166,407	51.5%	92.9%
Transportation Totals	218,473,415	598,557	Thursday, February 11, 2021	859,548	69.6%	763,781	78.4%	88.9%

More detail is provided using a series of figures and tables and presented in Exh. CDP-3.

III. CONCLUSION

Q. Does that conclude your prefiled direct testimony?

A. Yes, it does.