

BEFORE THE WASHINGTON UTILITIES AND TRANSPORTATION COMMISSION

**Docket Nos. UE-111048 and UG-111049
Puget Sound Energy, Inc.'s
2011 General Rate Case**

PUBLIC COUNSEL DATA REQUEST NO. 308

PUBLIC COUNSEL DATA REQUEST NO. 308:

Re: Testimony of David Mills, Exhibit No. DEM-1T, p. 50.

- a. At p. 50, ll. 4-8, Mr. Mills describes the load forecast PSE used to run its AURORA hourly dispatch model. Please describe the analysis and adjustments made by PSE to derive a “delivered electric load forecast, net of demand-side resources (conservation).”
- b. Please also provide all workpapers, with formulae intact, for the calculations performed by PSE to develop a load forecast “net of demand-side resources.”

Response:

- a. Puget Sound Energy, Inc.’s current electric load forecast (“F2011”) is an estimate of energy demand and customer growth based on econometric models that use historical data to describe changes in customer counts and usage per customer. This monthly forecast, net of demand-side resources, is used as an input into the AURORA hourly dispatch model. Attached as Attachment A to PSE’s Response to Public Counsel Data Request No. 308, please find a copy of PSE’s F2011 electric sales forecast.

PSE subscribes to Moody’s Analytics Economy and Consumer Credit Analytics (formerly Economy.com) for U.S. level historical and forecast data for major macroeconomic variables. These data series are the underlying assumptions in developing the service area level macroeconomic forecasts. Attached as Attachment B to PSE’s Response to Public Counsel Data Request No. 308, please find a copy of the U.S. macroeconomic inputs used in the F2011 economic-demographic forecasting models.

PSE staff forecasts the service area economic-demographic conditions using a set of econometric forecast equation models relating regional economic variables to U.S. economic variables. These service area forecasts of macroeconomic variables are used as inputs in the econometric models that forecast usage per

customer and customer counts. Attached as Attachment C to PSE's Response to Public Counsel Data Request No. 308, please find a copy of the electric service territory economic-demographic inputs (with description of variables) used in the F2011 electric load forecasting models.

Delivered sales and loads by customer class are derived from this process, and forecasts for demand-side resources or conservation are applied to get the "delivered electric load forecast, net of demand-side resources". Conservation targets are received from the Energy Efficiency Services ("EES") group for the current year and the Integrated Resource Planning ("IRP") group for the balance of the forecast period. For the purpose of load forecasting, these raw conservation targets from the EES and IRP groups must be converted into "load impacts"; that is, the actual impact of new incremental conservation on future load. These annual targets are then adjusted to be applied on a monthly basis that accounts for the fact that all conservation applied during a given year is not available at the beginning of the year. New conservation is phased in over the course of each year. The conservation is further adjusted to account for the fact that conservation has different value based on the type of conservation and the season; i.e., some conservation is more effective in the winter months. This is handled through monthly shaping derived from the sum of all subtypes of conservation. Lastly, conservation is reduced slightly over time as conservation depletes over time. This is handled using the average measure life for the sum of all conservation by class.

Please see Attachment A to PSE's Response to Public Counsel Data Request No. 308 for a copy of the conservation estimates used in the F2011 load forecasting models.

In addition, adjustments are made to sales forecasts based on information from Major Accounts on large known and measurable load changes of major customers. Attached as Attachment D to PSE's Response to Public Counsel Data Request No. 308, please find a copy of the known large load changes of major customers used in the F2011 load forecasting models.

- b. Due to the large volume of PSE's workpapers used to build the F2011 load forecast, Public Counsel and its consultants are invited to review the load forecasting work papers at PSE's Bellevue offices at a mutually-agreeable time.

**ATTACHMENT A ONLY
TO PSE'S RESPONSE TO PUBLIC COUNSEL DATA NO. 308**

Year	Month	Total Firm Sales (MWh) (net of 6.9% losses)		
		Gross of Conservation	Conservation	Net of Conservation
2011	3	1,984,698	873	1,983,825
2011	4	1,759,327	2,613	1,756,714
2011	5	1,670,275	4,424	1,665,851
2011	6	1,602,851	6,390	1,596,462
2011	7	1,553,764	8,582	1,545,182
2011	8	1,571,776	11,066	1,560,710
2011	9	1,575,331	13,721	1,561,610
2011	10	1,575,536	16,538	1,558,998
2011	11	1,788,561	19,753	1,768,808
2011	12	2,134,787	23,584	2,111,202
2012	1	2,256,137	28,971	2,227,166
2012	2	2,161,569	30,928	2,130,641
2012	3	2,096,093	30,338	2,065,755
2012	4	1,796,504	30,732	1,765,772
2012	5	1,707,200	31,621	1,675,580
2012	6	1,639,564	33,807	1,605,756
2012	7	1,589,245	37,431	1,551,814
2012	8	1,607,455	41,790	1,565,665
2012	9	1,610,682	43,847	1,566,835
2012	10	1,610,123	46,876	1,563,247
2012	11	1,826,006	54,553	1,771,453
2012	12	2,178,334	63,970	2,114,363
2013	1	2,304,981	70,396	2,234,586
2013	2	2,208,555	66,844	2,141,711
2013	3	2,069,943	62,607	2,007,336
2013	4	1,836,125	62,455	1,773,670
2013	5	1,745,015	62,082	1,682,933
2013	6	1,676,159	63,530	1,612,630
2013	7	1,625,364	68,778	1,556,586
2013	8	1,644,547	75,049	1,569,497
2013	9	1,648,511	75,991	1,572,520
2013	10	1,648,106	79,490	1,568,616
2013	11	1,869,600	91,818	1,777,782
2013	12	2,231,231	106,675	2,124,556
2014	1	2,367,434	114,852	2,252,582
2014	2	2,269,184	107,137	2,162,048
2014	3	2,127,333	99,325	2,028,008
2014	4	1,887,574	97,630	1,789,944
2014	5	1,794,437	95,044	1,699,392
2014	6	1,724,090	95,928	1,628,162
2014	7	1,672,246	102,585	1,569,661
2014	8	1,692,226	109,851	1,582,375
2014	9	1,696,659	109,916	1,586,743
2014	10	1,696,412	113,936	1,582,476
2014	11	1,924,424	130,324	1,794,100
2014	12	2,296,889	151,052	2,145,837
2015	1	2,428,782	160,641	2,268,140
2015	2	2,327,523	147,939	2,179,584

2015	3	2,181,938	136,881	2,045,057
2015	4	1,935,777	133,611	1,802,166
2015	5	1,840,080	128,040	1,712,040
2015	6	1,767,804	128,598	1,639,206
2015	7	1,714,493	136,697	1,577,797
2015	8	1,734,668	144,629	1,590,039
2015	9	1,739,035	143,253	1,595,783
2015	10	1,738,337	146,659	1,591,678
2015	11	1,971,468	167,502	1,803,966
2015	12	2,352,806	193,844	2,158,962
2016	1	2,481,493	203,363	2,278,130
2016	2	2,378,517	189,158	2,189,360
2016	3	2,307,237	176,251	2,130,986
2016	4	1,977,956	168,129	1,809,827
2016	5	1,880,389	159,976	1,720,412
2016	6	1,806,808	160,078	1,646,729
2016	7	1,752,408	167,770	1,584,638
2016	8	1,773,000	178,144	1,594,857
2016	9	1,777,497	176,752	1,600,745
2016	10	1,776,415	177,995	1,598,420
2016	11	2,014,138	202,831	1,811,307
2016	12	2,403,623	235,390	2,168,233
2017	1	2,530,575	246,884	2,283,691
2017	2	2,425,144	225,408	2,199,736
2017	3	2,273,239	209,015	2,064,224
2017	4	2,016,570	201,642	1,814,928
2017	5	1,916,969	192,119	1,724,850
2017	6	1,841,954	192,404	1,649,550
2017	7	1,786,627	200,234	1,586,393
2017	8	1,807,424	211,797	1,595,627
2017	9	1,811,930	208,681	1,603,249
2017	10	1,810,300	209,685	1,600,616
2017	11	2,052,600	238,700	1,813,900
2017	12	2,449,233	275,675	2,173,558
2018	1	2,578,838	289,416	2,289,422
2018	2	2,471,512	263,816	2,207,696
2018	3	2,316,274	242,621	2,073,653
2018	4	2,054,469	233,960	1,820,510
2018	5	1,952,825	222,952	1,729,874
2018	6	1,876,496	222,086	1,654,410
2018	7	1,819,949	231,378	1,588,572
2018	8	1,841,069	244,475	1,596,594
2018	9	1,845,746	238,646	1,607,100
2018	10	1,843,612	240,635	1,602,977
2018	11	2,090,353	275,049	1,815,304
2018	12	2,494,766	315,986	2,178,780
2019	1	2,631,041	331,507	2,299,534
2019	2	2,521,770	301,938	2,219,832
2019	3	2,363,524	275,904	2,087,620
2019	4	2,096,503	266,898	1,829,605
2019	5	1,993,000	255,244	1,737,756
2019	6	1,915,377	251,770	1,663,607

2019	7	1,857,831	263,665	1,594,166
2019	8	1,879,482	278,916	1,600,566
2019	9	1,884,440	270,678	1,613,761
2019	10	1,882,139	273,269	1,608,870
2019	11	2,133,911	311,770	1,822,141
2019	12	2,546,930	357,325	2,189,605
2020	1	2,686,003	374,342	2,311,661
2020	2	2,574,510	346,757	2,227,753
2020	3	2,497,272	318,356	2,178,916
2020	4	2,140,371	302,860	1,837,511
2020	5	2,034,807	287,072	1,747,735
2020	6	1,955,734	285,444	1,670,291
2020	7	1,897,067	301,118	1,595,949
2020	8	1,919,191	315,950	1,603,242
2020	9	1,924,356	308,890	1,615,466
2020	10	1,921,795	312,637	1,609,158
2020	11	2,178,610	355,870	1,822,739
2020	12	2,600,272	410,468	2,189,804
2021	1	2,742,012	427,407	2,314,606
2021	2	2,628,256	388,421	2,239,835
2021	3	2,463,349	359,788	2,103,561
2021	4	2,185,062	348,098	1,836,964
2021	5	2,077,409	328,127	1,749,282
2021	6	1,996,865	325,483	1,671,383
2021	7	1,937,050	341,269	1,595,781
2021	8	1,959,647	358,227	1,601,420
2021	9	1,965,003	350,176	1,614,827
2021	10	1,962,150	350,646	1,611,504
2021	11	2,224,049	398,485	1,825,563
2021	12	2,654,467	460,139	2,194,328
2022	1	2,798,018	474,905	2,323,114
2022	2	2,682,087	428,351	2,253,736
2022	3	2,513,866	396,662	2,117,204
2022	4	2,229,923	382,871	1,847,052
2022	5	2,120,265	361,121	1,759,144
2022	6	2,038,327	357,308	1,681,019
2022	7	1,977,398	369,970	1,607,427
2022	8	2,000,496	387,982	1,612,514
2022	9	2,006,046	378,138	1,627,908
2022	10	2,002,852	373,728	1,629,124
2022	11	2,269,745	420,264	1,849,481
2022	12	2,708,855	482,264	2,226,590
2023	1	2,854,163	497,364	2,356,800
2023	2	2,736,096	448,859	2,287,237
2023	3	2,564,562	416,203	2,148,359
2023	4	2,274,956	401,381	1,873,576
2023	5	2,163,346	381,201	1,782,144
2023	6	2,080,061	378,824	1,701,236
2023	7	2,018,035	390,261	1,627,775
2023	8	2,041,649	408,340	1,633,309
2023	9	2,047,384	396,953	1,650,431
2023	10	2,043,807	393,082	1,650,725

2023	11	2,315,619	439,980	1,875,640
2023	12	2,763,377	500,434	2,262,944
2024	1	2,911,256	517,491	2,393,765
2024	2	2,791,064	476,071	2,314,993
2024	3	2,707,614	439,097	2,268,517
2024	4	2,320,852	418,488	1,902,364
2024	5	2,207,296	400,101	1,807,195
2024	6	2,122,675	393,420	1,729,255
2024	7	2,059,550	408,192	1,651,358
2024	8	2,083,702	427,751	1,655,952
2024	9	2,089,628	411,916	1,677,712
2024	10	2,085,639	411,470	1,674,169
2024	11	2,362,423	460,895	1,901,528
2024	12	2,818,955	519,228	2,299,726
2025	1	2,969,352	538,022	2,431,330
2025	2	2,847,015	489,549	2,357,465
2025	3	2,668,753	450,979	2,217,774
2025	4	2,367,571	437,939	1,929,631
2025	5	2,252,054	417,859	1,834,196
2025	6	2,166,092	411,463	1,754,628
2025	7	2,101,853	427,095	1,674,758
2025	8	2,126,553	444,682	1,681,871
2025	9	2,132,664	429,192	1,703,472
2025	10	2,128,233	429,043	1,699,191
2025	11	2,410,027	475,997	1,934,030
2025	12	2,875,446	535,945	2,339,502
2026	1	3,028,479	554,654	2,473,825
2026	2	2,903,997	503,561	2,400,436
2026	3	2,722,305	465,984	2,256,321
2026	4	2,415,195	453,241	1,961,954
2026	5	2,297,723	430,758	1,866,965
2026	6	2,210,431	426,063	1,784,367
2026	7	2,145,075	443,237	1,701,838
2026	8	2,170,346	459,994	1,710,353
2026	9	2,176,647	444,349	1,732,298
2026	10	2,171,746	442,596	1,729,150
2026	11	2,458,603	490,985	1,967,618
2026	12	2,933,046	552,833	2,380,213
2027	1	3,088,707	569,013	2,519,694
2027	2	2,962,076	516,688	2,445,389
2027	3	2,776,907	482,084	2,294,823
2027	4	2,463,767	469,387	1,994,380
2027	5	2,344,337	444,768	1,899,569
2027	6	2,255,718	439,929	1,815,789
2027	7	2,189,232	456,470	1,732,762
2027	8	2,215,088	474,835	1,740,253
2027	9	2,221,569	459,681	1,761,888
2027	10	2,216,156	454,684	1,761,472
2027	11	2,508,105	504,237	2,003,868
2027	12	2,991,675	568,991	2,422,684
2028	1	3,149,857	583,725	2,566,132
2028	2	3,021,066	537,829	2,483,238

2028	3	2,931,353	502,933	2,428,419
2028	4	2,513,114	479,781	2,033,332
2028	5	2,391,728	457,857	1,933,871
2028	6	2,301,791	455,163	1,846,627
2028	7	2,234,169	468,100	1,766,069
2028	8	2,260,629	488,329	1,772,300
2028	9	2,267,294	473,715	1,793,578
2028	10	2,261,339	467,577	1,793,762
2028	11	2,558,410	516,492	2,041,918
2028	12	3,051,215	580,119	2,471,097
2029	1	3,212,089	600,549	2,611,540
2029	2	3,081,162	547,227	2,533,935
2029	3	2,888,919	508,331	2,380,588
2029	4	2,563,462	493,902	2,069,559
2029	5	2,440,146	471,889	1,968,256
2029	6	2,348,920	467,744	1,881,176
2029	7	2,280,172	481,781	1,798,390
2029	8	2,307,272	502,289	1,804,983
2029	9	2,314,132	484,283	1,829,849
2029	10	2,307,607	480,070	1,827,537
2029	11	2,609,865	531,657	2,078,208
2029	12	3,112,071	594,594	2,517,478
2030	1	3,275,614	615,046	2,660,568
2030	2	3,142,546	559,596	2,582,951
2030	3	2,946,695	517,464	2,429,231
2030	4	2,614,912	504,705	2,110,206
2030	5	2,489,654	484,150	2,005,504
2030	6	2,397,136	476,312	1,920,824
2030	7	2,327,240	493,507	1,833,733
2030	8	2,354,990	515,654	1,839,337
2030	9	2,362,031	495,395	1,866,637
2030	10	2,354,882	492,427	1,862,455
2030	11	2,662,356	544,412	2,117,944
2030	12	3,174,081	606,389	2,567,692