Rocky Mountain Power - Utah

Workgroups I and II

Load Research and Peak-Hour Forecasting

Presented by
UTAH INDUSTRIAL ENERGY CONSUMERS

Salt Lake City, Utah
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How the Rocky Mountain Power Residential Sample Size is Calculated

- RMP states that its goal is to provide precision of +/- 5% with 90% confidence for an estimate of the average of the twelve monthly system peak hours--using monthly kWs at time of system peak. The recorders were stratified by average annual kWh usage as follows: 0-750, 751-1500, and over 1500 monthly kWh.

			Recorded Data for kW												Variable of Interest	Stratification Variable	
Rec ID	Location	Date Installed	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Average kW	Average kWh	Stratum
00022004	SALT LAKE CITY	11/18/2004	0.186	0.058	0.058	0.107	0.102	0.486	0.01	0.563	0.074	0.164	0.059	0.181	0.171	113.5	1
00026015	SALT LAKE CITY	1/11/2000	0.107	0.076	0.428	0.138	0.097	0.104	0.106	0.142	0.113	0.095	0.271	0.487	0.180	129.8	1
00022040	SALT LAKE CITY	8/5/2004	0.728	0.094	2.196	0.122	2.322	0.114	3.822	4.112	4.476	0.198	0.064	0.144	1.533	659.8	1
00022035	CENTERVILLE	8/29/2002	0.851	0.773	2.221	0.404	1.26	0.508	0.52	0.712	1.195	0.946	1.999	0.872	1.022	694.1	1
00022018	SALT LAKE CITY	8/23/2005	0.862	1.068	1.188	1.208	0.9	1.298	1.196	0.924	0.944	0.876	2.116	1.986	1.214	699.2	1
00022050	SALT LAKE CITY	8/15/2005	0.482	0.694	1.5	0.394	0.616	0.544	0.976	1.096	0.384	0.44	4.308	2.478	1.159	718.1	1
00026493	RIVERTON	3/17/2005	0.884	0.868	3.478	0.642	0.918	0.67	0.958	1.45	1.408	0.53	0.512	1.898	1.185	762.6	2
00022064	SALT LAKE CITY	12/5/2001	0.714	1.039	0.626	0.776	0.685	0.626	2.615	2.406	1.558	0.512	0.634	0.532	1.060	776.9	2
00022045	SALT LAKE CITY	11/18/2004	0.884	1.248	1.512	0.596	0.858	1.09	3.448	3.76	4.06	0.744	1.858	3.14	1.933	779.8	2
00026529	WEST VALLEY CITY	11/9/2005	4.144	3.956	4.64	4.552	1.3	2.514	0.35	0.526	0.552	0.204	5.956	7.736	3.036	1,319.7	2
00022094	SANDY	8/19/2005	2.232	1.332	2.262	1.008	1.066	5.19	3.444	1.932	0.584	2.508	0.998	2.206	2.064	1,365.0	2
00022103	DRAPER	1/28/2000	2.72	2.062	1	0.821	0.553	7.826	8.449	8.15	6.828	1.06	1.362	0.688	3.460	1,401.9	2
00032028	OGDEN	3/29/2001	4.806	3.907	6.161	0.58	0.294	0.422	0.485	2.141	0.613	3.564	2.164	3.61	2.396	1,491.1	2
00042018	OREM	8/1/2007	2.094	1.304	1.801	4.817	0.61	4.766	5.286	6.607	3.652	1.645	6.487	2.998	3.506	1,529.8	3
00022096	MAGNA	1/3/2000	4.566	0.882	4.889	1.236	1.924	3.344	2.502	3.51	2.825	0.73	1.836	2.542	2.566	1,573.4	3
00026040	SALT LAKE CITY	1/14/2000	2.08	1.918	2.64	2.479	1.512	3.142	2.97	3.106	1.54	1.355	2.206	2.363	2.276	1,607.9	3
00022078	SANDY	8/18/2005	1.6	3.648	1.808	7.198	1.778	1.426	3.05	1.472	1.57	2.482	6.748	11.074	3.655	1,657.7	3
00026041	SALT LAKE CITY	1/17/2000	7.645	3.883	7.747	3.274	2.963	1.543	6.37	3.868	4.61	1.703	7.513	4.91	4.669	3,063.2	3
00022105	SALT LAKE CITY	8/5/2004	4.538	3.704	4.412	7.326	9.282	9.038	7.318	8.312	6.83	3.624	3.634	6.4	6.202	3,242.3	3
00026039	SALT LAKE CITY	1/14/2000	5.575	3.07	3.288	6.06	6.589	9.124	8.592	7.585	4.89	2.831	4.81	4.246	5.555	3,575.7	3

- The average of the average kW is calculated for each stratum, yielding 3 averages. These averages are weighted by number of customers in each stratum to obtain one overall average. The average and the standard deviations from the strata are then used to arrive at the total sample size.
- But, the 5% precision with 90% confidence criteria apply to only one number: the overall average kW across all months and customers. It does not to apply to any monthly figures.

Actual Precision and Confidence Attained for Monthly Estimate Using RMP Sample Are Lower than Criteria

- To achieve the 5% precision and 90% confidence criteria at the monthly level, RMP would need larger sample sizes than that it has calculated using the 12-month average kW at system peak.
- This means, with the sample size as calculated by RMP, lower precision is attained than the 5% claimed.
- The table below indicates the precisions actually attained each month using the current sample of 144 customers.

	Overall	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Averages													
Stratum 1	0.740	0.595	0.524	0.799	0.511	0.568	0.813	1.192	1.078	0.781	0.403	0.814	0.795
Stratum 2	1.964	1.774	1.590	2.303	1.421	1.200	2.469	2.516	2.876	1.942	1.163	1.933	2.342
Stratum 3	4.150	5.896	4.491	3.760	3.063	3.189	4.428	5.411	5.210	3.734	2.275	3.893	4.361
St. Deviations													
Stratum 1	0.426	0.724	0.416	0.637	0.686	0.721	0.873	1.310	1.226	0.900	0.395	0.806	0.663
Stratum 2	0.585	1.105	1.000	1.281	1.139	0.715	1.752	1.698	1.846	1.388	0.844	1.440	1.533
Stratum 3	1.096	5.219	3.776	1.544	2.117	2.349	2.284	2.080	2.062	2.296	1.760	1.687	2.394
Average	1.491	1.483	1.259	1.621	1.070	1.026	1.747	2.047	2.109	1.470	0.849	1.497	1.683
Precision	**5.00%**	**11.48%**	**10.00%**	**8.13%**	**12.55%**	**11.40%**	**10.44%**	**10.20%**	**9.97%**	**11.22%**	**11.00%**	**10.30%**	**9.30%**
Sample Size	**144**	**144**	**144**	**144**	**144**	**144**	**144**	**144**	**144**	**144**	**144**	**144**	**144**
Adj. Sample Size	**170**	**170**	**170**	**170**	**170**	**170**	**170**	**170**	**170**	**170**	**170**	**170**	**170**

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The division also questions the accuracy of RMP's Load Research Data

" **Q. What is your opinion of the company's load research program?**

A. The Company purports to be designing its load samples for the non-demand metered classes to meet a PURPA standard, discussed in Mr. Thornton's testimony, which mandates that samples be designed so that 90 percent of population load estimates are within 10 percent of actual loads. While the company may be designing samples in an appropriate way to meet this standard, the resulting estimates from their samples of over the last several rate cases and this case do not appear to be meeting the standard. "

Direct Testimony of Jonathan Nunes
Docket No. 09-035-23
DPU Exhibit 9.0, Page 13
October 8, 2009

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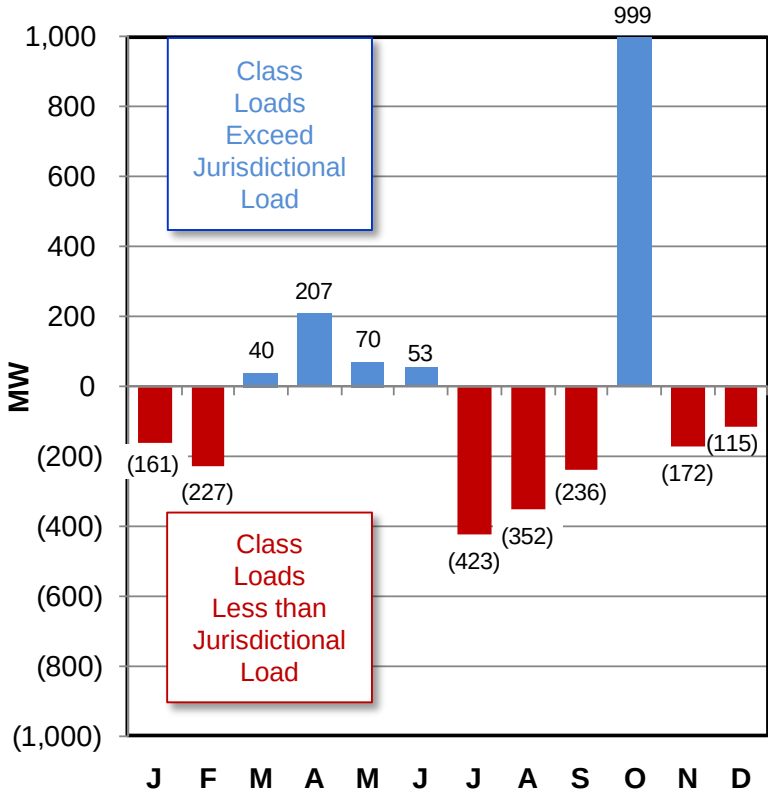
Large differences between class and jurisdictional loads have not been explained



Sources:
Exhibit RMP_(CCP-3R)
McDougal Exhibit RMP _ (SRM-2), Page 10.13

RMP REBUTTAL FILING

Month	Total Utah Jurisdictional used in Inter-Jurisdictional Allocation (1)	Sum of Utah Retail Classes from Class COS Study (2)	Class Total Exceeds (is less than) Total Jurisdictional (3)	Difference as a Percent of Column (1) (4)
Jan	3,079	2,918	(161)	-5%
Feb	3,123	2,896	(227)	-7%
Mar	2,860	2,900	40	1%
Apr	2,794	3,001	207	7%
May	3,591	3,661	70	2%
Jun	3,952	4,005	53	1%
Jul	4,169	3,746	(423) *	-10%
Aug	4,113	3,761	(352) *	-9%
Sep	3,799	3,563	(236) *	-6%
Oct	2,656	3,655	999	38%
Nov	3,390	3,218	(172)	-5%
Dec	3,442	3,327	(115)	-3%
Total	40,968	40,650	(318)	-1%
Summation of Absolute Values of Differences			3,054	7%

** Loads that are intentionally excluded from the class data account for no more than 40 MW of the difference (RMP Response to UIEC Data Request 10.22)*

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Another issue with the load data is that it is not adjusted to reflect typical "peak-making" weather

" **Q. Is all of the load data for each rate schedule that is used to calculate demand related cost allocation factors in the class cost of service study in this case weather normalized? If not, please explain why not.**

A. Customer class load data used in the cost of service study in this docket is based on the same methodology employed in Docket 08-035-38. In that case, the Company's response to UIEC Data Request 1 1.6 provided the following explanation regarding rate schedule load data:

> 'Customer class load data used to calculate demand-related cost allocation factors employed in the class costs of service study **is not weather normalized**. However, this same customer class load data is calculated from forecasted energy data which is weather normalized according to the new methodology. A description of the differences between the new and previous methodologies is provided in the Company's response to UIEC Data Request 10.2. ' **"** *(Emphasis added)*

09-035-23/Rocky Mountain Power
July 29, 2009
UIEC Data Request 2.15

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Another problem with the class load data is that loads are adjusted using annual average loss factors

This causes loads at peak times to be understated because the losses are higher when the temperature is hot and the loads are larger.

Because of the physics of electrical systems the difference between peak losses and average losses is greater for low voltage customers than for transmission customers.

As a result the low voltage customer's loads are understated relative to transmission customer loads, causing too much cost to be allocated to transmission customers.

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Conclusion Concerning Loads

The sum of class loads must be reconciled to the separately determined jurisdictional loads and adjustments (calibration) should be made if differences are large.

Expected sources of difference for sample classes:

1. Sample Accuracy
2. Lack of reflection of “Peak-Making” Weather
3. Unrecognized difference in peak losses that results in understatement of loads of low voltage customers