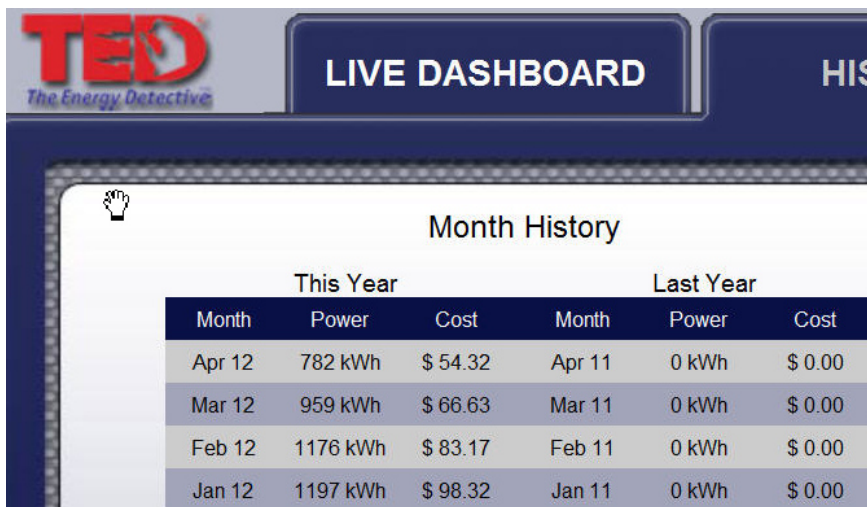


Hot Tub Energy Consumption Measurements and Estimates

Data was collected on a Large (6ft 2in OD) tub, equipped with the Elite Electric heating system having 16 jets, a circulation pump and two jet pumps. This tub is built into a high deck and is insulated using 2 layers of foil bubble insulation wrap, insulated piping also using foil bubble insulation, an insulated floor and an R21 cover. Circulation pump was running continuously. Tub was used at least once a day, during which time cover is off and heat loss is greatest.



Data on energy consumption was collected using the TED 5000 system which developed a data collection fault after 4 month, but 4 month's worth of data was nevertheless collected covering all of January to April 2012.



This Year		Last Year			
Month	Power	Cost	Month	Power	Cost
Apr 12	782 kWh	\$ 54.32	Apr 11	0 kWh	\$ 0.00
Mar 12	959 kWh	\$ 66.63	Mar 11	0 kWh	\$ 0.00
Feb 12	1176 kWh	\$ 83.17	Feb 11	0 kWh	\$ 0.00
Jan 12	1197 kWh	\$ 98.32	Jan 11	0 kWh	\$ 0.00

This data and mean monthly temperature data for Pinawa Manitoba is used to obtain the daily kw-hrs consumed per degree F of differential temperature between the water temperature and the mean outdoor temperature. The data which refers to a large 6ft 2in

OD tub has then been extrapolated to other tub sizes. The results are shown in the next table.

Month	No of Days	Avg Monthly Temp (F)	Hot Tub Water Temp (F)	Avg Heating Degrees (Δ°F)	Monthly Energy Usage (kW-hrs)	Avg Daily Energy Usage (kW-hrs)	Avg Daily Energy Usage/heating Degree	Daily Kw-hrs per Δ°F			
								Extrapolated to Extra Large	Measured for Large Tub	Extrapolated to Med Tub	Extrapolated to Small Tub
Jan-12	31	10.4	101	90.6	1197	38.6	0.43	0.49	0.43	0.38	0.33
Feb-12	28	14	101	87	1176	42.0	0.48	0.55	0.48	0.43	0.37
Mar-12	31	35.9	101	65.1	959	30.9	0.48	0.54	0.48	0.42	0.37
Apr-12	30	41.5	101	59.5	782	26.1	0.44	0.50	0.44	0.39	0.34
						Avg	0.46	0.52	0.46	0.40	0.35

So for example a customer wanted to know, how much energy would an extra large tub utilize. He further indicated hottest month has a mean temperature of 90°F and the coldest 41°F.

The monthly energy use for the coldest month, keeping the hot tub at 101°F would then be: $(101 - 41) \times 0.52 = 31 \text{ kW-hr/day}$.

The monthly energy use for the hottest month, keeping the hot tub at 101°F would then be: $(101 - 90) \times 0.52 = 5.7 \text{ kW-hr/day}$.

As mentioned, if the tub is not insulated as described previously, energy consumption will likely be double.

Dieter Jung
Northern Lights Cedar Tubs Inc.