

Solar Energy as a Utility Service

Solar Hot Water in the Demand Rate Future

**2016 Hot Water Forum
Portland, Oregon**



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Lakeland Electric
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Lakeland Electric:
124,000 Total Customers
104,000 Res. Customers
(95% all-electric)
Winter Peaking



How important do you think it is for Lakeland Electric to encourage non-fossil fuel, carbon-free sources of energy?

Do you think it is very important, somewhat important, not too important, or not important at all?

- **VERY IMPORTANT** 45%
- **SW IMPORTANT** 36%
- **NOT TOO IMPORTANT** 7%
- **NOT IMPORTANT** 4%
- **NOT SURE** 8%

The Lakeland Electric SHW Service Model

What it is not:

- Incentive for purchase of solar equipment
- Direct sale (does not compete with local contractors)
- Leasing program
- Performance Contract
- Joint Venture Partnership

What it is: ...for those who favor solar energy but prefer not to purchase their own solar products.

- Solar Energy Service Company (ESCO)
- Utility Ownership of the Program
- Power Purchase Agreement (PPA)
- Fuel Switching Program

Lakeland's Query: Is Solar Water Heating Cost Effective?

- Accurate metering of thermal energy
- Profitable sale of solar energy
- Utilize SHW as “supply side” device
- Demonstrate SHW as a DG
- Determine market appeal
- Produce & sell SREC's
- Can a solar thermal KWh compete with a fossil fuel KWh ?

Having no RPS in FL, Lakeland chose SHW

- Popular with the customers
- Gives them a hands-on solar experience
- Cost effective for both parties.

Lakeland Solar Heater / Thermal Energy Meter*

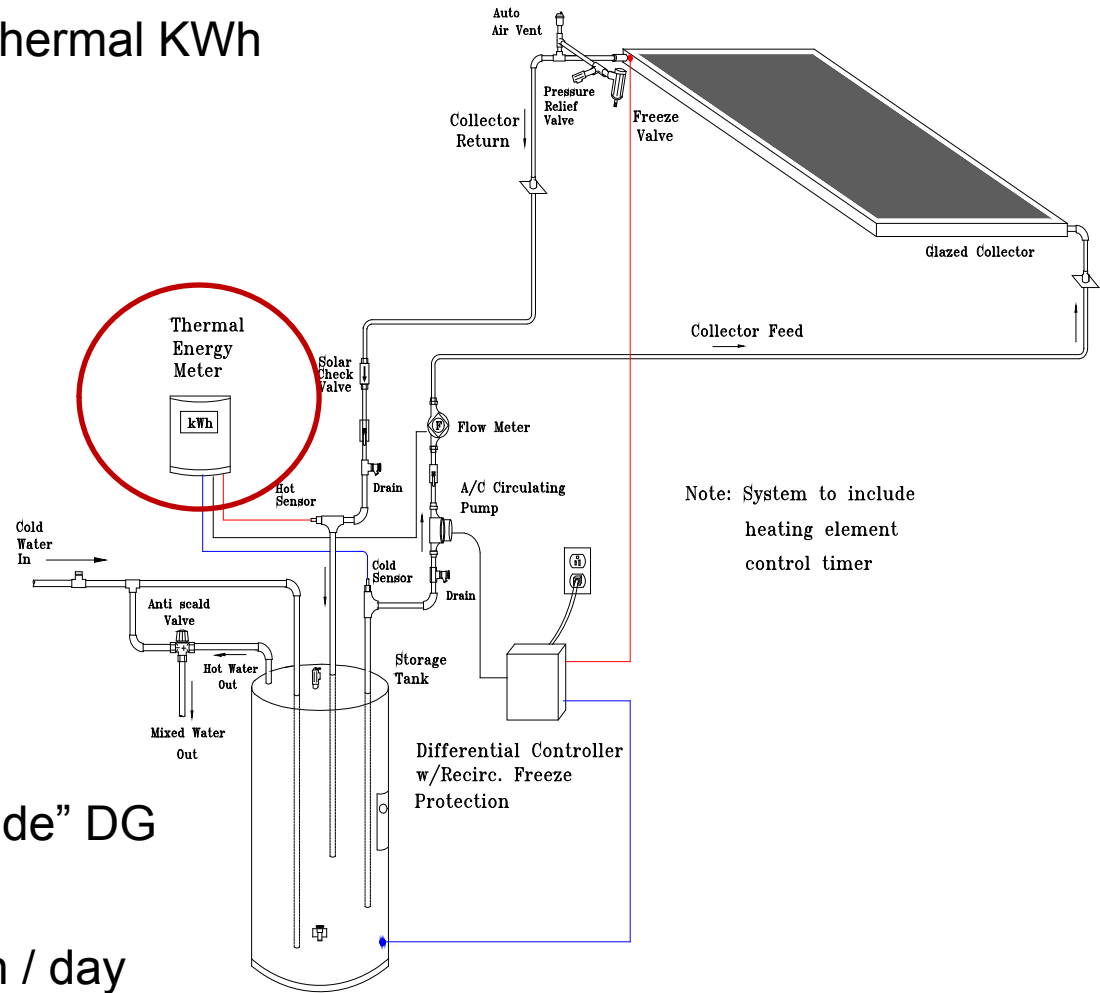
❖ Displays thermal KWh

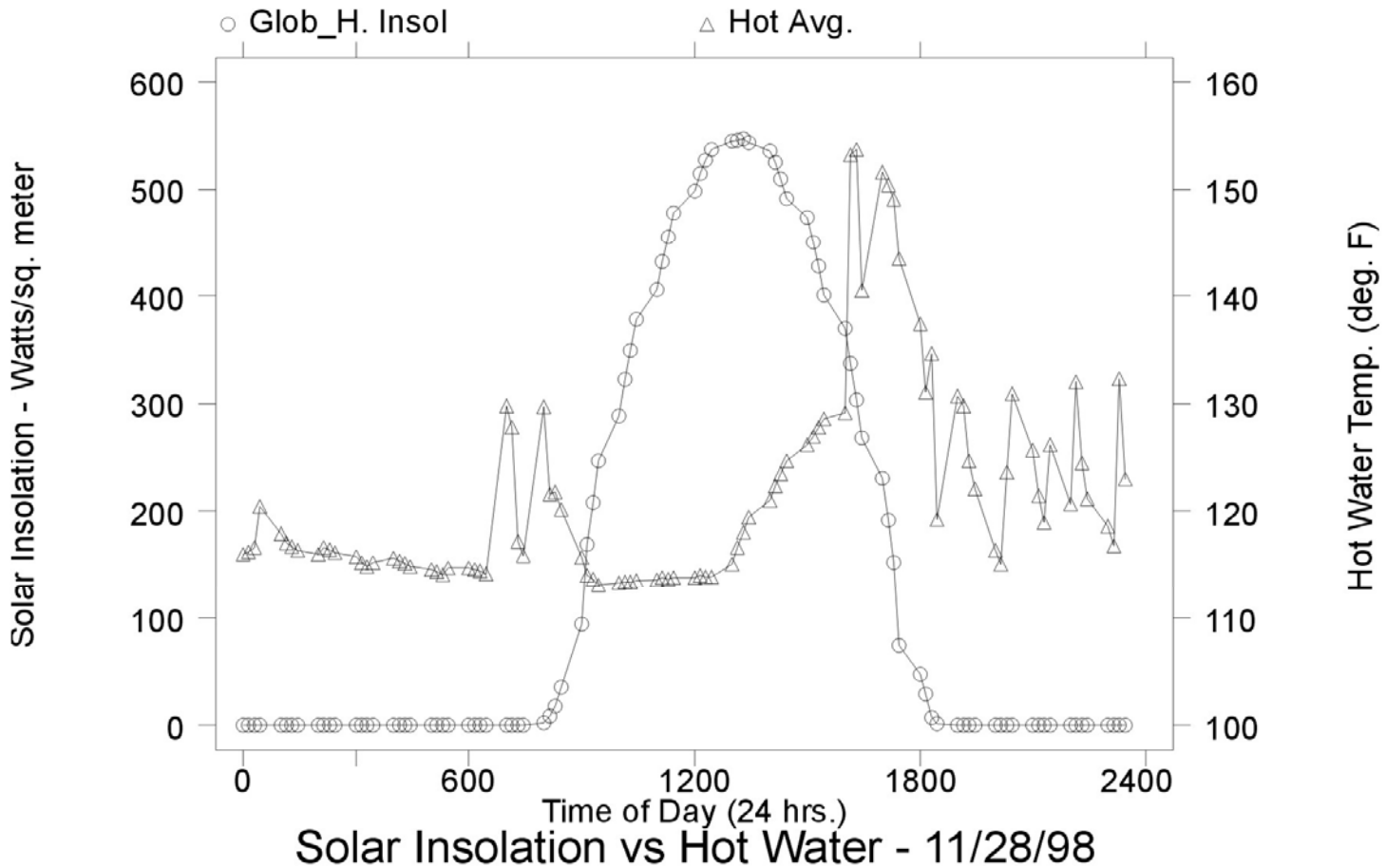
Added benefits:

- Performance verification
- Dashboard value
- Acts as “multi-meter”
- Diagnostic tool
- Remote interrogation
- Pulse flow indicator
- Customer Service tool


Elevates a traditional conservation measure to a generation “supply side” DG

40/80 DHW produces 6 – 8 KWh / day





Solar Energy Monthly Bill

City Of Lakeland • Department Of Electric Utilities			
 <p>Retain This Portion For Your Records</p>	Service Location: 2642 HIGHLANDS VUE PY LAKELAND, FL 33813	Billing Date: 06/08/06 Page: 1 Account No. 3247313	
	Payment History	Previous Balance\$ 133.22 Payments\$ 134.00- Credits\$ 0.00 BALANCE REMAINING IS A CREDIT\$ 0.78-	
Current Charge Summary	Electric Service\$ 259.38 (Includes Fuel Charge of \$123.32) Solar Hot Water Service\$ 34.95 Water Service\$ 58.96 TOTAL CURRENT CHARGES\$ 359.35		
	TOTAL AMOUNT SUBJECT TO PENALTY AFTER 07/03/06\$ 358.57		
	All charges above include all taxes.		

Water Heating and Demand

What is Demand?

Residential Demand Schedule / Typical		Demand	
Device Loads		KW	
Oven		5.5	
Water Heater		4.5	
Clothes Dryer		5.5	
Central HVAC (3.0 ton/13 seer)		2.8	
Aux Heat		5	
Refrigerator		0.3	
Pool Pump		1.2	
Lighting		1	
Other		1	
Total		26.8	

Residential Service (RES) Rate Plan

<u>Tier</u>	<u>KWh Rate</u>
1 st	\$ 0.11
2 nd	\$ 0.115
3 rd	\$ 0.12

Residential Service Demand (RSD) Rate Plan

<u>Demand Charge</u>	<u>Energy Charge</u>
\$ 5.60 / KW*	\$ 0.07 / KWh

- * Summer Demand 2:00 – 8:00 PM Weekdays
- Winter Demand 6:00 – 10:00 AM Weekdays

Kathleen

Residential Comparison ~ Outside City Limits							
Account # 3133277							02/17/2016
Bill Month	kWh	kWd	Load Factor	RS Bill	RSD Bill	RSD Difference	
Jan-16	1,817	14.54	15.7%	\$216.86	\$245.61	\$28.75	
Dec-15	1,536	9.01	24.1%	\$182.47	\$186.72	\$4.25	
Nov-15	1,859	10.57	25.7%	\$222.01	\$221.17	(\$0.84)	
Oct-15	2,321	10.56	28.6%	\$278.58	\$254.91	(\$23.67)	
Sep-15	2,470	10.16	33.8%	\$296.83	\$263.07	(\$33.76)	
Aug-15	2,447	11.14	31.6%	\$294.01	\$268.15	(\$25.86)	
Jul-15	2,839	10.23	35.0%	\$341.99	\$290.55	(\$51.44)	
Jun-15	2,517	10.79	33.0%	\$302.59	\$270.86	(\$31.73)	
May-15	2,405	10.77	29.5%	\$288.87	\$262.52	(\$26.35)	
Apr-15	1,905	8.88	29.8%	\$227.66	\$212.86	(\$14.80)	
Mar-15	1,681	9.51	24.5%	\$200.22	\$200.82	\$0.60	
Feb-15	1,074	9.78	16.3%	\$128.85	\$158.23	\$29.38	
Annual Total				\$2,980.94	\$2,835.47	(\$145.47)	
Avg Month				\$248.41	\$236.29	(\$12.12)	
Percent of Difference						-4.9%	

(2100 sq ft)

Scott Lake

Residential Comparison ~ Outside City Limits						
Account # 3282247		11/30/2015				
Bill Month	kWh	kWd	Load Factor	RS Bill	RSD Bill	RSD Difference
Nov-15	1,564	10.95	19.2%	\$196.24	\$212.59	\$16.35
Oct-15	1,316	7.42	24.6%	\$165.54	\$168.32	\$2.78
Sep-15	1,466	9.61	21.2%	\$183.86	\$195.43	\$11.57
Aug-15	1,653	8.73	24.7%	\$207.75	\$204.27	(\$3.48)
Jul-15	1,515	8.67	24.3%	\$189.93	\$192.85	\$2.92
Jun-15	1,475	8.70	22.1%	\$184.96	\$189.88	\$4.92
May-15	1,219	8.52	20.5%	\$153.70	\$168.21	\$14.51
Apr-15	1,069	8.65	17.2%	\$135.38	\$157.09	\$21.71
Mar-15	983	7.91	17.9%	\$124.97	\$145.09	\$20.12
Feb-15	1,127	7.17	20.5%	\$142.45	\$151.46	\$9.01
Jan-15	1,108	8.97	16.6%	\$140.12	\$162.46	\$22.34
Dec-14	1,046	8.80	16.0%	\$132.56	\$156.33	\$23.77
Annual Total				\$1,957.46	\$2,103.98	\$146.52
Avg Month				\$163.12	\$175.33	\$12.21
Percent of Difference						7.5%

(2400 sq ft w/PV)

Grasslands

Residential Comparison ~ Inside City Limits						
Account # 3203151		02/17/2016				
Bill Month	kWh	kWd	Load Factor	RS Bill	RSD Bill	RSD Difference
Feb-16	2,483	12.83	24.4%	\$279.68	\$265.24	(\$14.44)
Jan-16	2,125	12.23	22.7%	\$238.61	\$236.44	(\$2.17)
Dec-15	1,894	9.48	29.7%	\$212.13	\$202.94	(\$9.19)
Nov-15	2,410	11.44	28.3%	\$271.30	\$251.36	(\$19.94)
Oct-15	2,423	9.72	34.6%	\$272.79	\$241.45	(\$31.34)
Sep-15	2,804	11.75	32.9%	\$316.49	\$280.90	(\$35.59)
Aug-15	2,724	12.26	29.1%	\$307.32	\$278.53	(\$28.79)
Jul-15	3,002	12.17	34.2%	\$339.20	\$297.38	(\$41.82)
Jun-15	3,063	11.00	36.0%	\$346.20	\$294.29	(\$51.91)
May-15	2,446	11.18	31.7%	\$275.45	\$252.27	(\$23.18)
Apr-15	2,231	11.54	26.8%	\$250.79	\$239.50	(\$11.29)
Mar-15	2,175	10.46	29.9%	\$244.36	\$228.74	(\$15.62)
Annual Total				\$3,354.32	\$3,069.04	(\$285.28)
Avg Month				\$279.53	\$255.75	(\$23.77)
Percent of Difference						-8.5%

3400 sq ft w/SHW

Peeke

Residential Comparison ~ Outside City Limits						
Account # 3272176		12/01/2015				
Bill Month	kWh	kWd	Load Factor	RS Bill	RSD Bill	RSD Difference
Nov-15	1,690	9.92	25.4%	\$212.51	\$215.47	\$2.96
Oct-15	1,721	7.63	31.3%	\$216.53	\$202.10	(\$14.43)
Sep-15	2,280	8.37	35.5%	\$288.67	\$251.87	(\$36.80)
Aug-15	2,137	8.44	36.4%	\$270.21	\$240.88	(\$29.33)
Jul-15	2,359	8.55	34.8%	\$298.87	\$259.39	(\$39.48)
Jun-15	1,559	8.11	26.7%	\$195.62	\$192.52	(\$3.10)
May-15	1,734	7.56	33.0%	\$218.20	\$202.62	(\$15.58)
Apr-15	1,689	8.31	26.5%	\$212.39	\$204.21	(\$8.18)
Mar-15	1,553	7.42	29.1%	\$194.85	\$187.25	(\$7.60)
Feb-15	1,484	11.00	20.0%	\$186.05	\$206.57	\$20.52
Jan-15	1,499	8.68	24.0%	\$187.88	\$191.64	\$3.76
Dec-14	1,965	10.80	22.3%	\$248.02	\$243.53	(\$4.49)
Annual Total				\$2,729.80	\$2,598.05	(\$131.75)
Avg Month				\$227.48	\$216.50	(\$10.98)
Percent of Difference						-4.8%

(2000 sq ft w/PV & SHW)

McMansion

Residential Comparison ~ Outside City Limits

Account # 3360261 10/21/2015

Bill Month	kWh	kWd	Load Factor	RS Bill	RSD Bill	RSD Difference
Sep-15	3,335	17.09	25.4%	\$424.84	\$379.64	(\$45.20)
Aug-15	2,953	16.89	25.1%	\$375.50	\$347.89	(\$27.61)
Jul-15	3,191	18.41	21.9%	\$406.26	\$375.99	(\$30.27)
Jun-15	3,643	22.73	22.3%	\$464.60	\$437.73	(\$26.87)
May-15	2,965	16.18	26.3%	\$377.08	\$344.67	(\$32.41)
Apr-15	2,629	20.15	17.0%	\$333.72	\$341.43	\$7.71
Mar-15	1,851	15.25	16.9%	\$233.29	\$250.23	\$16.94
Feb-15	4,719	17.01	41.3%	\$603.45	\$489.63	(\$113.82)
Jan-15	3,649	16.72	30.3%	\$465.37	\$402.54	(\$62.83)
Dec-14	3,766	16.98	27.2%	\$480.46	\$413.39	(\$67.07)
Nov-14	2,225	15.88	20.1%	\$281.57	\$283.80	\$2.23
Oct-14	2,647	16.97	21.0%	\$336.03	\$323.98	(\$12.05)
Annual Total				\$4,782.17	\$4,390.92	(\$391.25)
Avg Month	3,131	17.52	24.5%	\$398.51	\$365.91	(\$32.60)
				Percent of Difference		-8.2%

(4200 sq ft w/PV & SHW)

Lessons Learned

In all-electric homes:

- PV will not likely offset peak
- Basic SHW saves energy but does not lower demand
- High usage & high demand do not coincide
- SHW is an excellent energy storage device
- 4500w element is Demand Enemy #1

