Kansas City Power & Light-Greater Missouri Operations

Renewable Energy System Performance Analysis

Cost Effectiveness Screening

Eighteen renewable energy technologies were evaluated for their cost effectiveness. The field modeling of these renewable technologies was completed by Mr. Bob Solger of "The Energy Savings Store" (TESS) based on his experience having sized and installed many of these technologies in the Kansas City area. His results, summarized in a report dated June 01, 2009, were used as inputs in the DSMore cost effectiveness modeling tool.

The technologies analyzed were:

- Solar Photovoltaic (PV) System 2.0 kW – Northeast Kansas City
- Solar PV System 3.2 kW – Northeast Kansas City
- Solar PV System 2.0 kW – Southwest Overland Park, KS
- Solar PV System 3.2 kW – Southwest Overland Park
- Solar Photovoltaic (PV) System 2.0 kW – St. Joseph, MO
- Solar PV System 3.2 kW – St. Joseph, MO
- Solar PV System 2.0 kW – Sedalia, MO
- Solar PV System 3.2 kW – Sedalia, MO

- Wind Turbine 2.4 kW System Northeast
- Wind Turbine 6 kW System Northeast
- Wind Turbine 2.4 kW System Southwest
- Wind Turbine 6 kW System Southwest
- Wind Turbine 2.4 kW System Sedalia
- Wind Turbine 6 kW System Sedalia
- Wind Turbine 2.4 kW System St. Joseph
- Wind Turbine 6 kW System St. Joseph

- Solar Hot Water System – All areas
- Solar Air Heating System – All areas

All renewable energy technologies were applied to a residential single family home. The PV and Wind technologies were modeled assuming that any excess power generated from the system and not needed by the home would be sold back to the utility by reversing the meter (net metering).

The value of renewable energy produced and consumed by the customer is equal to the value of the retail kWh rate. Four different residential tariff rates were used in the DSMore screening evaluations; 1) KCP&L-GMO L&P, 2) KCP&L-GMO MPS, 3) KCP&L KS and 4) KCP&L MO.

Utility avoided costs included avoided energy, generation capacity, and transmission and distribution (T&D) capacity. Avoided generation capacity was valued at $97 per kW-yr. KCP&L-GMO requested and received a waiver to use the levelized cost of a combustion turbine for avoided generation capacity. Avoided T&D was valued at $25 per kW-yr for KCP&L and $153 per kW-yr for KCP&L-GMO.

Load summaries by hour were generated for these technologies indicating when the power was generated, used or sold back to the utility. These load summaries were then averaged across the year by hour to create load curves for the DSMore model to use. Two examples are shown below.

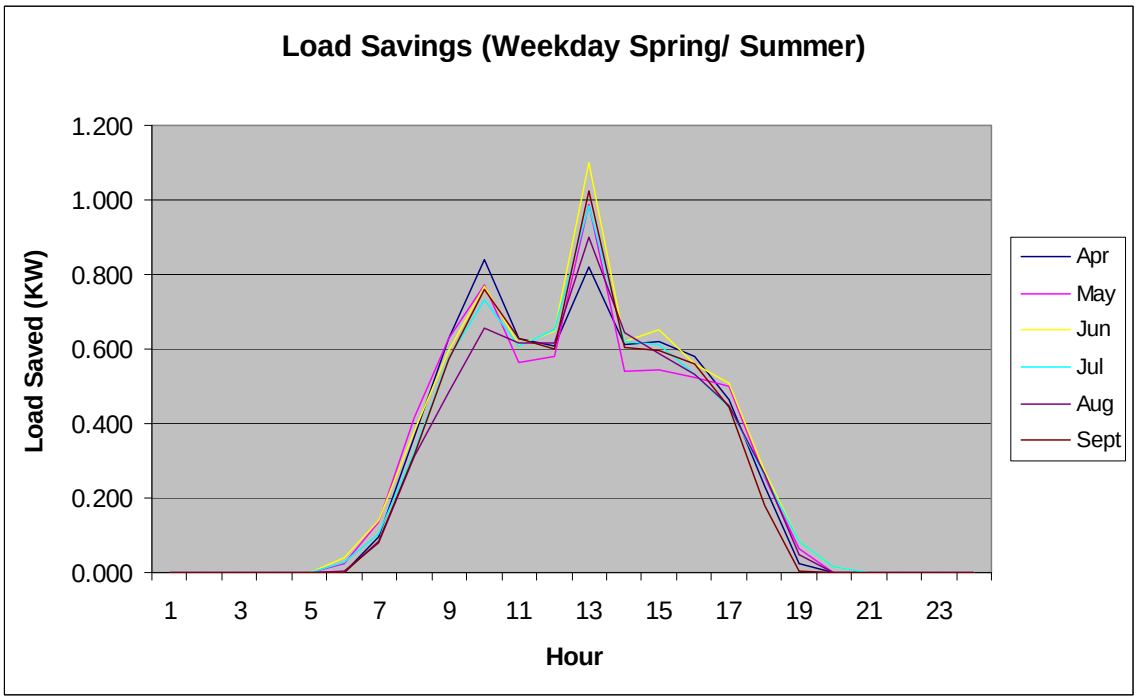

Figure 1: PV 2.0 South – Savings

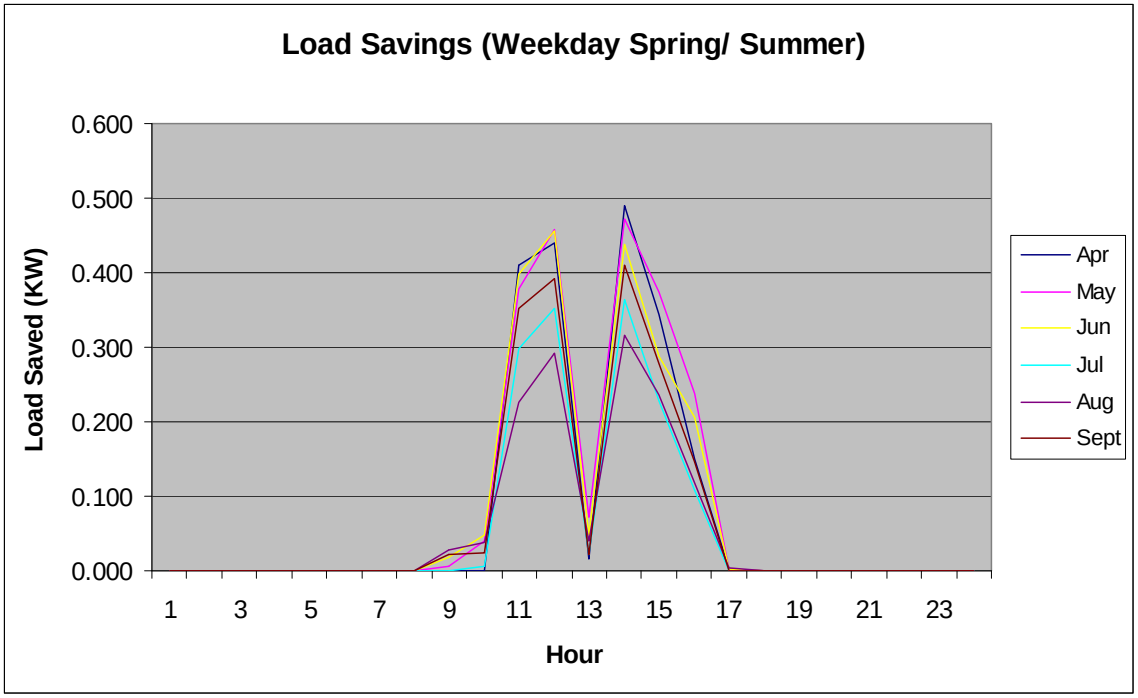

Figure 2: PV 2.0 South – Buy Back

To run the DSMore model for the PV and Wind technologies and reflect the value from both the saved energy at the home by using the generated power (avoiding purchasing kWh from the utility) and the utility "buy back" portion of the energy generated (kWh fed back through the meter), DSMore was run twice.

For the first run, the "buy back" mode, DSMore uses the generated load curve for the kWh fed back into the grid (see Figure 2 above). This modeling generated the retail value to the customer for that reversal of the meter and the utility avoided cost for the amount of energy fed back into the meter. The customer value of this net metering or "buy back" sale is $0.023 per kWh for KCP&L customers and $0.035 per kWh for KCP&L-GMO customers.

The second run of the model uses the load curve depicting the energy "saved" by the customer (see Figure 1 above) or the amount of kWh that customer did not have to buy from the utility to fulfill his internal needs. This represents the value to the customer of the avoided retail energy not purchased.

The Probable Environmental Benefits Test (PEBT) as defined in MO 4 CSR 240-22.050 (3), "Cost-Effectiveness Screening of End-Use Measures", was used to evaluate each of the renewable energy technologies. The DSMore model evaluates load, cost and benefits on an hourly basis. Inputs into this model include residential customer hourly load profiles, hourly net metering sales to the utility by the customer, and the net hourly energy production of the renewable energy technology. Outputs from the DSMore model include annual energy and capacity savings in kWh and kW, annual customer

costs, annual utility avoided costs, annual utility lost revenue and environmental cost savings.

KCP&L-GMO requested and was granted a waiver to use the DSMore model for screening purposes. No program administrative or delivery costs were included in the PEBT screening.

For the Solar Domestic Hot Water systems (SDHW) and the Space Heat systems (SH) DSMore was again used to analyze the technologies for cost effectiveness. For these technologies there is no "buy-back" to the utility grid system. These are thermal technologies so they only affect the thermal loads. Consequently DSMore only needed to be run once to get the results and these results were applied against the standard load curve of the home to get the "savings" from these technologies.

Table 1 below is a summary of the screening results for each renewable energy technology. None of the technologies evaluated passed the PEBT screening test. Detailed screening results for each technology are in shown in Appendix A.

Table 1: Renewable Energy System Performance

Measure Description	Measure Cost	KCP&L, KCP&L GMO Incentive Payment	Measure Life (Years)	Probable Environmental Benefits Test	Annual Energy Savings, kWh	Net Metering Sales, kWh	Total Energy Production, kWh	Summer Co-Incident demand reduction, kW	NPV Total Utility Avoided Cost	NPV Environmental Benefits
Solar PV System Analysis 2.0 KW - Northeast Kansas City	$ 15,000	$ 4,000	20	0.29	2,147	624	2,770	0.59	$ 2,700	$ 324
Solar PV System Analysis 2.0 KW - Southwest Kansas City	$ 15,000	$ 4,000	20	0.29	2,114	598	2,712	0.56	$ 2,630	$ 319
Solar PV System Analysis 2.0 KW - St. Joseph	$ 15,000	$ 4,000	20	0.37	2,119	609	2,728	0.56	$ 3,455	$ 319
Solar PV System Analysis 2.0 KW - Sedalia	$ 15,000	$ 4,000	20	0.37	2,121	598	2,719	0.57	$ 3,464	$ 320
Solar PV System Analysis 3.2 KW - Northeast Kansas City	$ 21,000	$ 6,400	20	0.30	2,793	1,675	4,469	0.70	$ 3,781	$ 420
Solar PV System Analysis 3.2 KW - Southwest Kansas City	$ 21,000	$ 6,400	20	0.29	2,747	1,615	4,362	0.68	$ 3,696	$ 414
Solar PV System Analysis 3.2 KW - St. Joseph	$ 21,000	$ 6,400	20	0.36	2,751	1,630	4,381	0.68	$ 4,562	$ 415
Solar PV System Analysis 3.2 KW - Sedalia	$ 21,000	$ 6,400	20	0.36	2,758	1,613	4,371	0.69	$ 4,580	$ 416
Wind Turbine Analysis 2.4 kW System Northeast of K.C.	$ 15,000	$ 4,000	20	0.29	2,503	376	2,879	0.37	$ 2,628	$ 376
Wind Turbine Analysis 2.4 kW System Southwest of K.C.	$ 15,000	$ 4,000	20	0.29	2,573	458	3,031	0.28	$ 2,618	$ 386
Wind Turbine Analysis 2.4 kW System Sedalia	$ 15,000	$ 4,000	20	0.27	2,289	321	2,609	0.24	$ 2,489	$ 343
Wind Turbine Analysis 2.4 kW System St. Joseph	$ 15,000	$ 4,000	20	0.31	2,599	439	3,039	0.27	$ 2,816	$ 390
Wind Turbine Analysis 6 kW System Northeast of K.C.	$ 45,000	$ 11,250	20	0.26	6,027	4,197	10,225	0.64	$ 7,085	$ 906
Wind Turbine Analysis 6 kW System Southwest of K.C.	$ 45,000	$ 11,250	20	0.27	6,190	4,503	10,693	0.66	$ 7,306	$ 930
Wind Turbine Analysis 6 kW System Sedalia	$ 45,000	$ 11,250	20	0.26	5,736	3,650	9,387	0.61	$ 6,993	$ 862
Wind Turbine Analysis 6 kW System St. Joseph	$ 45,000	$ 11,250	20	0.29	6,188	4,523	10,711	0.64	$ 7,604	$ 930
Solar Hot Water System Analysis, KCP&L MO	$ 9,500	$ 4,750	15	0.70	4,635	-	4,635	0.61	$ 4,096	$ 579
Solar Hot Water System Analysis, KCP&L KS	$ 9,500	$ 4,750	15	0.70	4,635	-	4,635	0.61	$ 4,096	$ 579
Solar Hot Water System Analysis, St. Joseph	$ 9,500	$ 4,750	15	0.91	4,635	-	4,635	0.61	$ 5,503	$ 579
Solar Hot Water System Analysis, Sedalia	$ 9,500	$ 4,750	15	0.91	4,635	-	4,635	0.61	$ 5,503	$ 579
Solar Air Heating System Analysis, KCP&L MO	$ 4,900	$ 2,450	15	0.43	2,807	-	2,807	-	$ 1,713	$ 370
Solar Air Heating System Analysis, KCP&L KS	$ 4,900	$ 2,450	15	0.42	2,807	-	2,807	-	$ 1,710	$ 370
Solar Air Heating System Analysis, St. Joseph	$ 4,900	$ 2,450	15	0.43	2,807	-	2,807	-	$ 1,713	$ 370
Solar Air Heating System Analysis, Sedalia	$ 4,900	$ 2,450	15	0.42	2,807	-	2,807	-	$ 1,710	$ 370

APPENDIX A

Detailed screening results

**** Highly Confidential ****

Solar PV KCPL 2.0KW Northeast

Utility Avoided Cost			
Avoided Capacity	$	712.00	
Avoided T&D	$	183.50	
Avoided Energy @ market	$	1,542.55	
Avoided energy on net metering purchase		262.28	
Total Avoided Cost	**$**	**2,700.33**	(1)
Environmental Benefits		**323.60**	(2)
Utility Program Cost			
Administration Costs		-	
Implementation / Participation Costs		-	
Incentives		4,000.00	
Total		**4,000.00**	(3)
Customer Expense	$	15,000.00	(4)
Rebate	$	(4,000.00)	(5)
Grid sales Benefit	$	(179.01)	(6)
Renewable Energy Tax Credit	$	(4,500.00)	(7)
Net Customer Cost	**$**	**6,320.99**	(8)
Probable Environmental Benefits Test		**0.29**	
(1 + 2) / (3 + 8)			

$ / kWh	
0.00175	SOx
0.00187	NOx
0.01000	CO2

Total annual solar PV production, kWh		2,770	kW-hr
Annual grid sales, kWh		624	kW-hr
Annual Energy Savings		2,147	kW-hr
Net Metering Buyback rate	$	0.0230	per kW-hr

**** Highly Confidential ****

Solar PV KCPL 2.0KW Southwest

Utility Avoided Cost			
Avoided Capacity	$	682.22	
Avoided T&D	$	181.02	
Avoided Energy @ market	$	1,516.43	
Avoided energy on net metering purchase		250.61	
Total Avoided Cost	**$**	**2,630.28**	(1)
Environmental Benefits		**318.69**	(2)
Utility Program Cost			
Administration Costs		-	
Implementation / Participation Costs		-	
Incentives		4,000.00	(3)
Total		**4,000.00**	
Customer Expense	$	15,000.00	(4)
Rebate	$	(4,000.00)	(5)
Grid sales Benefit	$	(188.73)	(6)
Renewable Energy Tax Credit	$	(4,500.00)	(7)
Net Customer Cost	**$**	**6,311.27**	(8)
Probable Environmental Benefits Test		**0.29**	
(1 + 2) / (3 + 8)			

$ / kWh	
$ 0.00175	SOx
$ 0.00187	NOx
$ 0.01000	CO2

Total annual solar PV production, kWh		2,712	kW-hr
Annual grid sales, kWh		598	kW-hr
Annual Energy Savings		2,114	kW-hr
Net Metering Buyback rate	$	0.0230	per kW-hr

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Solar PV KCPL-GMO 2.0KW Sedalia, MO

Utility Avoided Cost			
Avoided Capacity	$	688.12	
Avoided T&D	$	1,090.26	
Avoided Energy @ market	$	1,523.97	
Avoided energy on net metering purchase		161.61	
Total Avoided Cost	**$**	**3,463.96**	(1)
Environmental Benefits		**319.82**	(2)
Utility Program Cost			
Administration Costs		-	
Implementation / Participation Costs		-	
Incentives		4,000.00	(3)
Total		**4,000.00**	
Customer Expense	$	15,000.00	(4)
Rebate	$	(4,000.00)	(5)
Grid sales Benefit	$	(275.04)	(6)
Renewable Energy Tax Credit	$	(4,500.00)	(7)
Net Customer Cost	**$**	**6,224.96**	(8)
Probable Environmental Benefits Test		**0.37**	
(1 + 2) / (3 + 8)			

$ / kWh	
0.00175	SOx
0.00187	NOx
0.01000	CO2

Total annual solar PV production, kWh		2,719	kW-hr
Annual grid sales, kWh		598	kW-hr
Annual Energy Savings		2,121	kW-hr
Net Metering Buyback rate	$	0.0350	per kW-hr

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Solar PV KCPL-GMO 2.0KW St. Joseph, MO

Utility Avoided Cost			
Avoided Capacity	$	684.17	
Avoided T&D	$	1,084.63	
Avoided Energy @ market	$	1,521.55	
Avoided energy on net metering purchase		164.31	
Total Avoided Cost	**$**	**3,454.66**	(1)
Environmental Benefits		**319.44**	(2)
Utility Program Cost			
Administration Costs		-	
Implementation / Participation Costs		-	
Incentives		4,000.00	(3)
Total		**4,000.00**	
Customer Expense	$	15,000.00	(4)
Rebate	$	(4,000.00)	(5)
Grid sales Benefit	$	(280.37)	(6)
Renewable Energy Tax Credit	$	(4,500.00)	(7)
Net Customer Cost	**$**	**6,219.63**	(8)
Probable Environmental Benefits Test		**0.37**	
(1 + 2) / (3 + 8)			

$ / kWh	
0.00175	SOx
0.00187	NOx
0.01000	CO2

Total annual solar PV production, kWh		2,728	kW-hr
Annual grid sales, kWh		609	kW-hr
Annual Energy Savings		2,119	kW-hr
Net Metering Buyback rate	$	0.0350	per kW-hr

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Solar PV KCPL 3.2 KW Northeast

Utility Avoided Cost			
Avoided Capacity	$	846.77	
Avoided T&D	$	226.19	
Avoided Energy @ market	$	2,001.35	
Avoided energy on net metering purchase		706.92	
Total Avoided Cost	**$**	**3,781.23**	(1)
Environmental Benefits		**419.76**	(2)
Utility Program Cost			
Administration Costs		-	
Implementation / Participation Costs		-	
Incentives		6,400.00	
Total		**6,400.00**	(3)
Customer Expense	$	21,000.00	(4)
Rebate	$	(6,400.00)	(5)
Grid sales Benefit	$	(479.74)	(6)
Renewable Energy Tax Credit	$	(6,300.00)	(7)
Net Customer Cost	**$**	**7,820.26**	(8)
Probable Environmental Benefits Test		**0.30**	
(1 + 2) / (3 + 8)			

$ / kWh	
0.00175	SOx
0.00187	NOx
0.01000	CO2

Total annual solar PV production, kWh		4,469	kW-hr
Annual grid sales, kWh		1,675	kW-hr
Annual Energy Savings		2,793	kW-hr
Net Metering Buyback rate	$	0.0230	per kW-hr

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Solar PV KCPL 3.2KW Southwest

Utility Avoided Cost			
Avoided Capacity	$	828.69	
Avoided T&D	$	213.58	
Avoided Energy @ market	$	1,972.46	
Avoided energy on net metering purchase		681.75	
Total Avoided Cost	**$**	**3,696.47**	(1)
Environmental Benefits		**414.27**	(2)
Utility Program Cost			
Administration Costs		-	
Implementation / Participation Costs		-	
Incentives		6,400.00	
Total		**6,400.00**	(3)
Customer Expense	$	21,000.00	(4)
Rebate	$	(6,400.00)	(5)
Grid sales Benefit	$	(510.05)	(6)
Renewable Energy Tax Credit	$	(6,300.00)	(7)
Net Customer Cost	**$**	**7,789.95**	(8)
Probable Environmental Benefits Test		**0.29**	
(1 + 2) / (3 + 8)			

$ / kWh	
0.00175	SOx
0.00187	NOx
0.01000	CO2

Total annual solar PV production, kWh		4,362	kW-hr
Annual grid sales, kWh		1,615	kW-hr
Annual Energy Savings		2,747	kW-hr
Net Metering Buyback rate	$	0.0230	per kW-hr

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Solar PV KCPL-GMO 3.2 KW Sedalia, MO

Utility Avoided Cost			
Avoided Capacity	$	834.42	
Avoided T&D	$	1,323.33	
Avoided Energy @ market	$	1,982.25	
Avoided energy on net metering purchase		440.24	
Total Avoided Cost	**$**	**4,580.23**	(1)
Environmental Benefits		**415.85**	(2)
Utility Program Cost			
Administration Costs		-	
Implementation / Participation Costs		-	
Incentives		6,400.00	
Total		**6,400.00**	(3)
Customer Expense	$	21,000.00	(4)
Rebate	$	(6,400.00)	(5)
Grid sales Benefit	$	(775.35)	(6)
Renewable Energy Tax Credit	$	(6,300.00)	(7)
Net Customer Cost	**$**	**7,524.65**	(8)
Probable Environmental Benefits Test		**0.36**	
(1 + 2) / (3 + 8)			

$ / kWh	
0.00175	SOx
0.00187	NOx
0.01000	CO2

Total annual solar PV production, kWh		4,371	kW-hr
Annual grid sales, kWh		1,613	kW-hr
Annual Energy Savings		2,758	kW-hr
Net Metering Buyback rate	$	0.0350	per kW-hr

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Solar PV KCPL-GMO 3.2 KW St. Joseph, MO

Utility Avoided Cost			
Avoided Capacity	$	827.74	
Avoided T&D	$	1,313.73	
Avoided Energy @ market	$	1,976.78	
Avoided energy on net metering purchase		443.92	
Total Avoided Cost	**$**	**4,562.17**	(1)
Environmental Benefits		**414.81**	(2)
Utility Program Cost			
Administration Costs		-	
Implementation / Participation Costs		-	
Incentives		6,400.00	
Total		**6,400.00**	(3)
Customer Expense	$	21,000.00	(4)
Rebate	$	(6,400.00)	(5)
Grid sales Benefit	$	(750.81)	(6)
Renewable Energy Tax Credit	$	(6,300.00)	(7)
Net Customer Cost	**$**	**7,549.19**	(8)
Probable Environmental Benefits Test		**0.36**	
(1 + 2) / (3 + 8)			

$ / kWh	
0.00175	SOx
0.00187	NOx
0.01000	CO2

Total annual solar PV production, kWh		4,381	kW-hr
Annual grid sales, kWh		1,630	kW-hr
Annual Energy Savings		2,751	kW-hr
Net Metering Buyback rate	$	0.0350	per kW-hr

**** Highly Confidential ****

Wind Turbine KCPL 2.4KW Northeast

Utility Avoided Cost			
Avoided Capacity	$	442.89	
Avoided T&D	$	294.51	
Avoided Energy @ market	$	1,743.21	
Avoided energy on net metering purchase		147.55	
Total Avoided Cost	**$**	**2,628.16**	(1)
Environmental Benefits		**375.77**	(2)
Utility Program Cost			
Administration Costs		-	
Implementation / Participation Costs		-	
Incentives		4,000.00	
Total		**4,000.00**	(3)
Customer Expense	$	15,000.00	(4)
Rebate	$	(4,000.00)	(5)
Grid sales Benefit	$	(107.36)	(6)
Renewable Energy Tax Credit	$	(4,500.00)	(7)
Net Customer Cost	**$**	**6,392.64**	(8)
Probable Environmental Benefits Test		**0.29**	
(1 + 2) / (3 + 8)			

$ / kWh	
0.00175	SOx
0.00187	NOx
0.01000	CO2

Total annual Wind production, kWh		2,879	kW-hr
Annual grid sales, kWh		376	kW-hr
Annual Energy Savings		2,503	kW-hr
Net Metering Buyback rate	$	0.0230	per kW-hr

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Wind Turbine KCPL 2.4KW Southwest

Utility Avoided Cost			
Avoided Capacity	$	342.73	
Avoided T&D	$	313.68	
Avoided Energy @ market	$	1,781.41	
Avoided energy on net metering purchase		180.64	
Total Avoided Cost	**$**	**2,618.45**	(1)
Environmental Benefits		**386.05**	(2)
Utility Program Cost			
Administration Costs		-	
Implementation / Participation Costs		-	
Incentives		4,000.00	(3)
Total		**4,000.00**	
Customer Expense	$	15,000.00	(4)
Rebate	$	(4,000.00)	(5)
Grid sales Benefit	$	(144.40)	(6)
Renewable Energy Tax Credit	$	(4,500.00)	(7)
Net Customer Cost	**$**	**6,355.60**	(8)
Probable Environmental Benefits Test		**0.29**	
(1 + 2) / (3 +8)			

$ / kWh	
$ 0.00175	SOx
$ 0.00187	NOx
$ 0.01000	CO2

Total annual Wind production, kWh		3,031	kW-hr
Annual grid sales, kWh		458	kW-hr
Annual Energy Savings		2,573	kW-hr
Net Metering Buyback rate	$	0.0230	per kW-hr

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Wind Turbine KCPL-GMO 2.4KW Sedalia, MO

Utility Avoided Cost			
Avoided Capacity	$	294.59	
Avoided T&D	$	538.33	
Avoided Energy @ market	$	1,577.96	
Avoided energy on net metering purchase		78.01	
Total Avoided Cost	**$**	**2,488.90**	(1)
Environmental Benefits		**343.14**	(2)
Utility Program Cost			
Administration Costs		-	
Implementation / Participation Costs		-	
Incentives		4,000.00	(3)
Total		**4,000.00**	
Customer Expense	$	15,000.00	(4)
Rebate	$	(4,000.00)	(5)
Grid sales Benefit	$	(152.71)	(6)
Renewable Energy Tax Credit	$	(4,500.00)	(7)
Net Customer Cost	**$**	**6,347.29**	(8)
Probable Environmental Benefits Test		**0.27**	
(1 + 2) / (3 + 8)			

$ / kWh	
0.00175	SOx
0.00187	NOx
0.01000	CO2

Total annual Wind production, kWh		2,609	kW-hr
Annual grid sales, kWh		321	kW-hr
Annual Energy Savings		2,289	kW-hr
Net Metering Buyback rate	$	0.0350	per kW-hr

**** Highly Confidential ****

Wind Turbine KCPL-GMO 2.4KW St. Joseph, MO

Utility Avoided Cost			
Avoided Capacity	$	324.97	
Avoided T&D	$	596.52	
Avoided Energy @ market	$	1,788.47	
Avoided energy on net metering purchase		106.04	
Total Avoided Cost	**$**	**2,816.00**	(1)
Environmental Benefits		**389.81**	(2)
Utility Program Cost			
Administration Costs		-	
Implementation / Participation Costs		-	
Incentives		4,000.00	(3)
Total		**4,000.00**	
Customer Expense	$	15,000.00	(4)
Rebate	$	(4,000.00)	(5)
Grid sales Benefit	$	(209.23)	(6)
Renewable Energy Tax Credit	$	(4,500.00)	(7)
Net Customer Cost	**$**	**6,290.77**	(8)
Probable Environmental Benefits Test		**0.31**	
(1 + 2) / (3 + 8)			

$ / kWh	
0.00175	SOx
0.00187	NOx
0.01000	CO2

Total annual Wind production, kWh		3,039	kW-hr
Annual grid sales, kWh		439	kW-hr
Annual Energy Savings		2,599	kW-hr
Net Metering Buyback rate	$	0.0350	per kW-hr

**** Highly Confidential ****

Wind Turbine KCPL 6KW Northeast

Utility Avoided Cost			
Avoided Capacity	$	782.11	
Avoided T&D	$	385.01	
Avoided Energy @ market	$	4,236.03	
Avoided energy on net metering purchase		1,681.45	
Total Avoided Cost	**$**	**7,084.60**	(1)
Environmental Benefits		**905.81**	(2)
Utility Program Cost			
Administration Costs		-	
Implementation / Participation Costs		-	
Incentives		11,250.00	
Total		**11,250.00**	(3)
Customer Expense	$	45,000.00	(4)
Rebate	$	(11,250.00)	(5)
Grid sales Benefit	$	(1,199.88)	(6)
Renewable Energy Tax Credit	$	(13,500.00)	(7)
Net Customer Cost	**$**	**19,050.12**	(8)
Probable Environmental Benefits Test		**0.26**	
(1 + 2) / (3 + 8)			

$ / kWh	
0.00175	SOx
0.00187	NOx
0.01000	CO2

Total annual wind production, kWh		10,225	kW-hr
Annual grid sales, kWh		4,197	kW-hr
Annual Energy Savings		6,027	kW-hr
Net Metering Buyback rate	$	0.0230	per kW-hr

**** Highly Confidential ****

Wind Turbine KCPL 6KW Southwest

Utility Avoided Cost			
Avoided Capacity	$	796.86	
Avoided T&D	$	388.93	
Avoided Energy @ market	$	4,327.97	
Avoided energy on net metering purchase		1,792.18	
Total Avoided Cost	**$**	**7,305.95**	(1)
Environmental Benefits		**930.42**	(2)
Utility Program Cost			
Administration Costs		-	
Implementation / Participation Costs		-	
Incentives		11,250.00	(3)
Total		**11,250.00**	
Customer Expense	$	45,000.00	(4)
Rebate	$	(11,250.00)	(5)
Grid sales Benefit	$	(1,413.02)	(6)
Renewable Energy Tax Credit	$	(13,500.00)	(7)
Net Customer Cost	**$**	**18,836.98**	(8)
Probable Environmental Benefits Test		**0.27**	
(1 + 2) / (3 + 8)			

$ / kWh	
$ 0.00175	SOx
$ 0.00187	NOx
$ 0.01000	CO2

Total annual wind production, kWh		10,693	kW-hr
Annual grid sales, kWh		4,503	kW-hr
Annual Energy Savings		6,190	kW-hr
Net Metering Buyback rate	$	0.0230	per kW-hr

**** Highly Confidential ****

Wind Turbine KCPL-GMO 6KW Sedalia, MO

Utility Avoided Cost			
Avoided Capacity	$	742.93	
Avoided T&D	$	1,346.65	
Avoided Energy @ market	$	4,002.90	
Avoided energy on net metering purchase		900.40	
Total Avoided Cost	**$**	**6,992.89**	(1)
Environmental Benefits		**861.95**	(2)
Utility Program Cost			
Administration Costs		-	
Implementation / Participation Costs		-	
Incentives		11,250.00	(3)
Total		**11,250.00**	
Customer Expense	$	45,000.00	(4)
Rebate	$	(11,250.00)	(5)
Grid sales Benefit	$	(1,741.45)	(6)
Renewable Energy Tax Credit	$	(13,500.00)	(7)
Net Customer Cost	**$**	**18,508.55**	(8)
Probable Environmental Benefits Test		**0.26**	
(1 + 2) / (3 + 8)			

$ / kWh	
0.00175	SOx
0.00187	NOx
0.01000	CO2

Total annual wind production, kWh		9,387	kW-hr
Annual grid sales, kWh		3,650	kW-hr
Annual Energy Savings		5,736	kW-hr
Net Metering Buyback rate	$	0.0350	per kW-hr

**** Highly Confidential ****

Wind Turbine KCPL-GMO 6KW St. Joseph, MO

Utility Avoided Cost			
Avoided Capacity	$	777.32	
Avoided T&D	$	1,408.03	
Avoided Energy @ market	$	4,312.39	
Avoided energy on net metering purchase		1,106.53	
Total Avoided Cost	**$**	**7,604.28**	(1)
Environmental Benefits		**929.94**	(2)
Utility Program Cost			
Administration Costs		-	
Implementation / Participation Costs		-	
Incentives		11,250.00	
Total		**11,250.00**	(3)
Customer Expense	$	45,000.00	(4)
Rebate	$	(11,250.00)	(5)
Grid sales Benefit	$	(2,158.39)	(6)
Renewable Energy Tax Credit	$	(13,500.00)	(7)
Net Customer Cost	**$**	**18,091.61**	(8)
Probable Environmental Benefits Test		**0.29**	
(1 + 2) / (3 + 8)			

$ / kWh	
0.00175	SOx
0.00187	NOx
0.01000	CO2

Total annual wind production, kWh		10,711	kW-hr
Annual grid sales, kWh		4,523	kW-hr
Annual Energy Savings		6,188	kW-hr
Net Metering Buyback rate	$	0.0350	per kW-hr

**** Highly Confidential ****

Solar Domestic Hot Water KCPL Northeast

Utility Avoided Cost			
Avoided Capacity	$	1,066.52	
Avoided T&D	$	412.24	
Avoided Energy @ market	$	2,616.97	
Total Avoided Cost	**$**	**4,095.73**	(1)
Environmental Benefits		**579.44**	(2)
Utility Program Cost			
Administration Costs		-	
Implementation / Participation Costs		-	
Incentives		4,750.00	
Total		**4,750.00**	(3)
Customer Expense	$	9,500.00	(4)
Rebate	$	(4,750.00)	(5)
Renewable Energy Tax Credit	$	(2,850.00)	(6)
Net Customer Cost	**$**	**1,900.00**	(7)
Probable Environmental Benefits Test		**0.70**	
(1 + 2) / (3 +7)			

$ / kWh	
0.00175	SOx
0.00187	NOx
0.01000	CO2

Total annual energy savings, kWh	4,393	kW-hr
Co-Incident demand reduction, kW	0.64	kW

**** Highly Confidential ****

Solar Domestic Hot Water KCPL Southwest

Utility Avoided Cost			
Avoided Capacity	$	1,066.52	
Avoided T&D	$	412.24	
Avoided Energy @ market	$	2,616.97	
Total Avoided Cost	**$**	**4,095.73**	(1)
Environmental Benefits		**579.44**	(2)
Utility Program Cost			
Administration Costs		-	
Implementation / Participation Costs		-	
Incentives		4,750.00	
Total		**4,750.00**	(3)
Customer Expense	$	9,500.00	(4)
Rebate	$	(4,750.00)	(5)
Renewable Energy Tax Credit	$	(2,850.00)	(7)
Net Customer Cost	**$**	**1,900.00**	(8)
Probable Environmental Benefits Test		**0.70**	
(1 + 2) / (3 + 8)			

$ / kWh	
$ 0.00175	SOx
$ 0.00187	NOx
$ 0.01000	CO2

Total annual energy savings, kWh	4,393	kW-hr
Co-Incident demand reduction, kW	0.64	kW

**** Highly Confidential ****

Solar Domestic Hot Water KCPL-GMO Sedalia, MO

Utility Avoided Cost			
Avoided Capacity	$	1,066.52	
Avoided T&D	$	1,819.60	
Avoided Energy @ market	$	2,616.97	
Total Avoided Cost	**$**	**5,503.09**	(1)
Environmental Benefits		**579.44**	(2)
Utility Program Cost			
Administration Costs		-	
Implementation / Participation Costs		-	
Incentives		4,750.00	
Total		**4,750.00**	(3)
Customer Expense	$	9,500.00	(4)
Rebate	$	(4,750.00)	(5)
Renewable Energy Tax Credit	$	(2,850.00)	(6)
Net Customer Cost	**$**	**1,900.00**	(7)
Probable Environmental Benefits Test		**0.91**	
(1 + 2) / (3 +7)			

$ / kWh	
0.00175	SOx
0.00187	NOx
0.01000	CO2

Total annual energy savings, kWh	4,393	kW-hr
Co-Incident demand reduction, kW	0.64	kW

**** Highly Confidential ****

Solar Domestic Hot Water KCPL-GMO St. Joseph, MO

Utility Avoided Cost			
Avoided Capacity	$	1,066.52	
Avoided T&D	$	1,819.60	
Avoided Energy @ market	$	2,616.97	
Total Avoided Cost	**$**	**5,503.09**	(1)
Environmental Benefits		**579.44**	(2)
Utility Program Cost			
Administration Costs		-	
Implementation / Participation Costs		-	
Incentives		4,750.00	
Total		**4,750.00**	(3)
Customer Expense	$	9,500.00	(4)
Rebate	$	(4,750.00)	(5)
Renewable Energy Tax Credit	$	(2,850.00)	(6)
Net Customer Cost	**$**	**1,900.00**	(7)
Probable Environmental Benefits Test		**0.91**	
(1 + 2) / (3 +7)			

$ / kWh	
0.00175	SOx
0.00187	NOx
0.01000	CO2

Total annual energy savings, kWh	4,393	kW-hr
Co-Incident demand reduction, kW	0.64	kW

**** Highly Confidential ****

Solar Space Heat KCPL Northeast

Utility Avoided Cost			
Avoided Capacity	$	-	
Avoided T&D w OATT	$	85.47	
Avoided Energy @ market	$	1,624.37	
Total Avoided Cost	**$**	**1,709.85**	(1)
Environmental Benefits		**370.24**	(2)
Utility Program Cost			
Administration Costs		-	
Implementation / Participation Costs		-	
Incentives		2,450.00	
Total		**2,450.00**	(3)
Customer Expense	$	4,900.00	(4)
Rebate	$	(2,450.00)	(5)
Net Customer Cost	**$**	**2,450.00**	(7)
Probable Environmental Benefits Test		**0.42**	

(1 + 2) / (3 +7)

$ / kWh	
0.00175	SOx
0.00187	NOx
0.01000	CO2

Annual Energy Savings	2,807	kW-hr
Summer Co-Incident demand reduction	-	kW-hr

**** Highly Confidential ****

Solar Space Heat KCPL Southwest

Utility Avoided Cost			
Avoided Capacity	$	-	
Avoided T&D w OATT	$	85.47	
Avoided Energy @ market	$	1,624.37	
Total Avoided Cost	**$**	**1,709.85**	(1)
Environmental Benefits		**370.24**	(2)
Utility Program Cost			
Administration Costs		-	
Implementation / Participation Costs		-	
Incentives		2,450.00	(3)
Total		**2,450.00**	
Customer Expense	$	4,900.00	(4)
Rebate	$	(2,450.00)	(5)
Grid sales Benefit	$	-	(6)
Net Customer Cost	**$**	**2,450.00**	(8)
Probable Environmental Benefits Test		**0.42**	
(1 + 2) / (3 + 4 + 5 +6 + 7)			

$ / kWh	
$ 0.00175	SOx
$ 0.00187	NOx
$ 0.01000	CO2

Annual Energy Savings	2,807	kW-hr
Summer Co-Incident demand reduction	-	kW-hr

**** Highly Confidential ****

Solar Space Heat KCPL-GMO Sedalia, MO

Utility Avoided Cost			
Avoided Capacity	$	-	
Avoided T&D w OATT	$	85.47	
Avoided Energy @ market	$	1,624.37	
Total Avoided Cost	**$**	**1,709.85**	(1)
Environmental Benefits		**370.24**	(2)
Utility Program Cost			
Administration Costs		-	
Implementation / Participation Costs		-	
Incentives		2,450.00	
Total		**2,450.00**	(3)
Customer Expense	$	4,900.00	(4)
Rebate	$	(2,450.00)	(5)
Net Customer Cost	**$**	**2,450.00**	(7)
Probable Environmental Benefits Test		**0.42**	

(1 + 2) / (3 +7)

$ / kWh	
0.00175	SOx
0.00187	NOx
0.01000	CO2

Annual Energy Savings	2,807	kW-hr
Summer Co-Incident demand reduction	-	kW-hr

**** Highly Confidential ****

Solar Space Heat KCPL-GMO St. Joseph, MO

Utility Avoided Cost			
Avoided Capacity	$	-	
Avoided T&D w OATT	$	85.35	
Avoided Energy @ market	$	1,627.99	
Total Avoided Cost	**$**	**1,713.34**	(1)
Environmental Benefits		**370.24**	(2)
Utility Program Cost			
Administration Costs		-	
Implementation / Participation Costs		-	
Incentives		2,450.00	(3)
Total		**2,450.00**	
Customer Expense	$	4,900.00	(4)
Rebate	$	(2,450.00)	(5)
Net Customer Cost	**$**	**2,450.00**	(7)
Probable Environmental Benefits Test		**0.43**	
(1 + 2) / (3 +7)			

$ / kWh	
0.00175	SOx
0.00187	NOx
0.01000	CO2

Annual Energy Savings	2,807	kW-hr
Summer Co-Incident demand reduction	-	kW-hr

Renewable Energy System Performance

Measure Description	Measure Cost	KCP&L, KCP&L GMO Incentive Payment	Measure Life (Years)	Probable Environmental Benefits Test	Annual Energy Savings, kWh	Net Metering Sales, kWh	Total Energy Production, kWh	Summer Co-Incident demand reduction, kW	NPV Total Utility Avoided Cost	NPV Environmental Benefits
Solar PV System Analysis 2.0 KW - Northeast Kansas City	$ 15,000	$ 4,000	20	0.29	2,147	624	2,770	0.59	$ 2,700	$ 324
Solar PV System Analysis 2.0 KW - Southwest Kansas City	$ 15,000	$ 4,000	20	0.29	2,114	598	2,712	0.56	$ 2,630	$ 319
Solar PV System Analysis 2.0 KW - St. Joseph	$ 15,000	$ 4,000	20	0.37	2,119	609	2,728	0.56	$ 3,455	$ 319
Solar PV System Analysis 2.0 KW - Sedalia	$ 15,000	$ 4,000	20	0.37	2,121	598	2,719	0.57	$ 3,464	$ 320
Solar PV System Analysis 3.2 KW - Northeast Kansas City	$ 21,000	$ 6,400	20	0.30	2,793	1,675	4,469	0.70	$ 3,781	$ 420
Solar PV System Analysis 3.2 KW - Southwest Kansas City	$ 21,000	$ 6,400	20	0.29	2,747	1,615	4,362	0.68	$ 3,696	$ 414
Solar PV System Analysis 3.2 KW - St. Joseph	$ 21,000	$ 6,400	20	0.36	2,751	1,630	4,381	0.68	$ 4,562	$ 415
Solar PV System Analysis 3.2 KW - Sedalia	$ 21,000	$ 6,400	20	0.36	2,758	1,613	4,371	0.69	$ 4,580	$ 416
Wind Turbine Analysis 2.4 kW System Northeast of K.C.	$ 15,000	$ 4,000	20	0.29	2,503	376	2,879	0.37	$ 2,628	$ 376
Wind Turbine Analysis 2.4 kW System Southwest of K.C.	$ 15,000	$ 4,000	20	0.29	2,573	458	3,031	0.28	$ 2,618	$ 386
Wind Turbine Analysis 2.4 kW System Sedalia	$ 15,000	$ 4,000	20	0.27	2,289	321	2,609	0.24	$ 2,489	$ 343
Wind Turbine Analysis 2.4 kW System St. Joseph	$ 15,000	$ 4,000	20	0.31	2,599	439	3,039	0.27	$ 2,816	$ 390
Wind Turbine Analysis 6 kW System Northeast of K.C.	$ 45,000	$ 11,250	20	0.26	6,027	4,197	10,225	0.64	$ 7,085	$ 906
Wind Turbine Analysis 6 kW System Southwest of K.C.	$ 45,000	$ 11,250	20	0.27	6,190	4,503	10,693	0.66	$ 7,306	$ 930
Wind Turbine Analysis 6 kW System Sedalia	$ 45,000	$ 11,250	20	0.26	5,736	3,650	9,387	0.61	$ 6,993	$ 862
Wind Turbine Analysis 6 kW System St. Joseph	$ 45,000	$ 11,250	20	0.29	6,188	4,523	10,711	0.64	$ 7,604	$ 930
Solar Hot Water System Analysis, KCP&L MO	$ 9,500	$ 4,750	15	0.70	4,635	-	4,635	0.61	$ 4,096	$ 579
Solar Hot Water System Analysis, KCP&L KS	$ 9,500	$ 4,750	15	0.70	4,635	-	4,635	0.61	$ 4,096	$ 579
Solar Hot Water System Analysis, St. Joseph	$ 9,500	$ 4,750	15	0.91	4,635	-	4,635	0.61	$ 5,503	$ 579
Solar Hot Water System Analysis, Sedalia	$ 9,500	$ 4,750	15	0.91	4,635	-	4,635	0.61	$ 5,503	$ 579
Solar Air Heating System Analysis, KCP&L MO	$ 4,900	$ 2,450	15	0.43	2,807	-	2,807	-	$ 1,713	$ 370
Solar Air Heating System Analysis, KCP&L KS	$ 4,900	$ 2,450	15	0.42	2,807	-	2,807	-	$ 1,710	$ 370
Solar Air Heating System Analysis, St. Joseph	$ 4,900	$ 2,450	15	0.43	2,807	-	2,807	-	$ 1,713	$ 370
Solar Air Heating System Analysis, Sedalia	$ 4,900	$ 2,450	15	0.42	2,807	-	2,807	-	$ 1,710	$ 370