

September 30, 2010

***VIA ELECTRONIC FILING
AND HAND DELIVERY***

Public Service Commission of Utah
Heber M. Wells Building, 4th Floor
160 East 300 South
Salt Lake City, UT 84114

Attention: Julie P. Orchard
Commission Secretary

Re: Docket No. 07-035-T14 – Three year assessment of the Solar Incentive Program

In its August 3, 2007 order in the above referenced docket, the Commission directed Rocky Mountain Power to provide a report within three years of the implementation of the Solar Incentive Program (administered through Schedule 107) assessing whether program changes are warranted. Rocky Mountain Power herewith provides the attached report in compliance with the Commission's direction.

An original and five (5) copies of this report are provided with this filing.


It is respectfully requested that all formal correspondence and staff requests regarding this matter be addressed to:

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aaron.lively@pacificorp.com
daniel.solander@pacificorp.com

By regular mail: Data Request Response Center
PacifiCorp
825 NE Multnomah Blvd., Suite 2000
Portland, OR 97232

Informal inquiries regarding this filing may be directed to Aaron Lively, regulatory manager, at 801-220-4501.

Sincerely,



Jeffrey K. Larsen
Vice President, Regulation

cc: Division of Public Utilities
Office of Consumer Services

Utah Solar Incentive Pilot Program

Findings and Recommendations

September 30, 2010

Background

On April 4, 2007, Rocky Mountain Power (“RMP” or the “Company”) filed Tariff Advice No. 07-14 with the Public Service Commission of Utah (“Commission”) requesting approval to implement a 5-year Solar Incentive Pilot Program (“Program”). The Program was approved by the Commission on August 3, 2007 to operate for the requested five years. The pilot program was designed to gather information on the viability of photovoltaic solar technology. Goals of the Program were laid out by the Commission¹ to provide information regarding the following:

- Customer willingness to participate and invest in solar technology;
- The ability of solar power to meet peak demand;
- The integration of distributed photovoltaic resources into the electric system; and
- Cost effectiveness.

In the order approving the Program, the Company was directed to provide a report within three years assessing whether changes are warranted in any element of the Program. In compliance with the Commission order, this report provides the Company assessment of the Program and its recommendation on Program changes. Additionally, this report includes responses requested by the Commission in its recent order in this docket.²

Customer willingness to participate and invest in solar technology

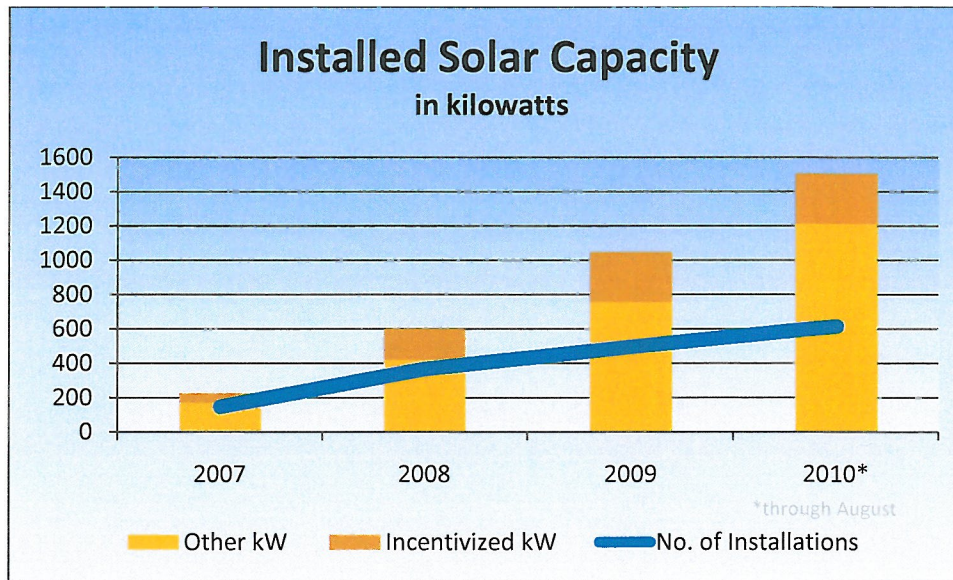
Pilot Program participation caps were oversubscribed each year. Of the total solar capacity installed by Utah net metering customers from 2007 to 2010, 26% of that solar capacity was incentivized by the Program. The remaining capacity was installed without Program incentives.

- In 2007, RMP had 82 solar customers in Utah participating in net metering. Since the Program began 102 customers have received incentive payments. By August 2010, RMP had 615 solar customers in Utah participating in net metering. Most of these customers did not receive incentive payments.
- Solar capacity enrolled in net metering increased from 107 kW in 2007 to 1,484 kW in August 2010. Of the August 2010 total, 354 kilowatts received Program incentives.
- The average size of each solar installation was 1.3 kW in 2007. In August of 2010, the average size was 2.41 kW.

¹ Docket No. 07-035-T14, Order dated August 3, 2007, page 2.

² Docket No. 07-035-T14, September 15, 2010.

- From 2007 to August of 2010, enrolled net metering solar customers, including Program participants and other net metering customers, increased 750%.



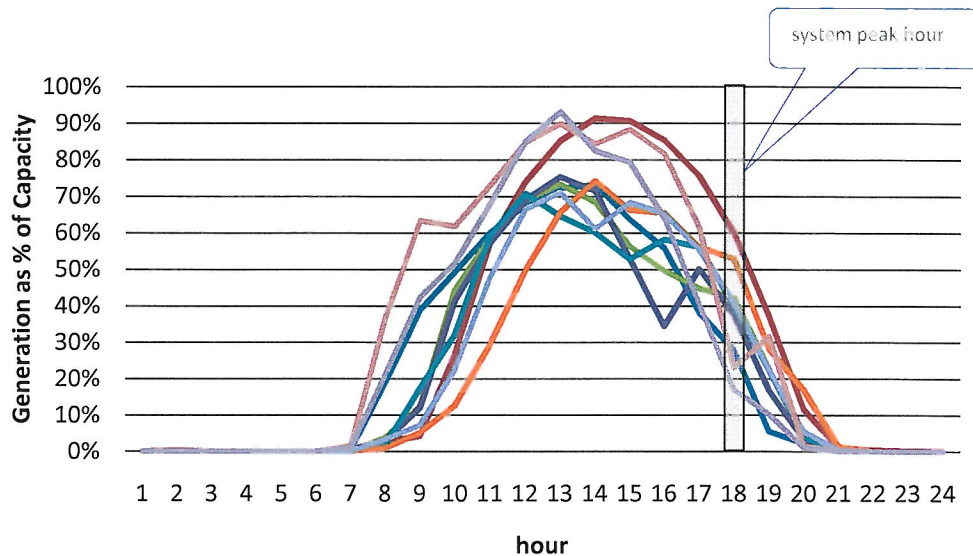
The Company's Program administrator has 43 approved solar vendors listed on their website. Equipment availability and vendor availability has been able to support the increase in solar installations.

Ability of solar power to meet peak demand

Initially, Program customers were asked to provide information about their power generation. This approach was adopted to minimize Program costs. Yet, customers did not respond. At the end of 2009 and in early 2010, the Company installed interval meters at certain customer sites to gather revenue grade output data. To control costs interval meters were not installed on the systems of all Program participants.

Most customers orient panels facing south to maximize energy production. South facing panels tend to produce more kilowatt-hours than panels oriented in other directions. Yet, south facing panels produce less energy during the typical evening system peak hour. In comparison a southwest facing panel is more likely to generate more energy during the evening system peak hour. The graph below shows the level of solar generation of nine Program participants with interval meters on August 3, 2010, the Wasatch Front peak day for the year. These nine installations, located in communities such as Salt Lake City, Park City, and Moab, are primarily oriented to the south or south-southwest. Differing production levels often reflect specific orientation, pitch of the panel, tracking capability, shading from nearby buildings or trees, and passing clouds.

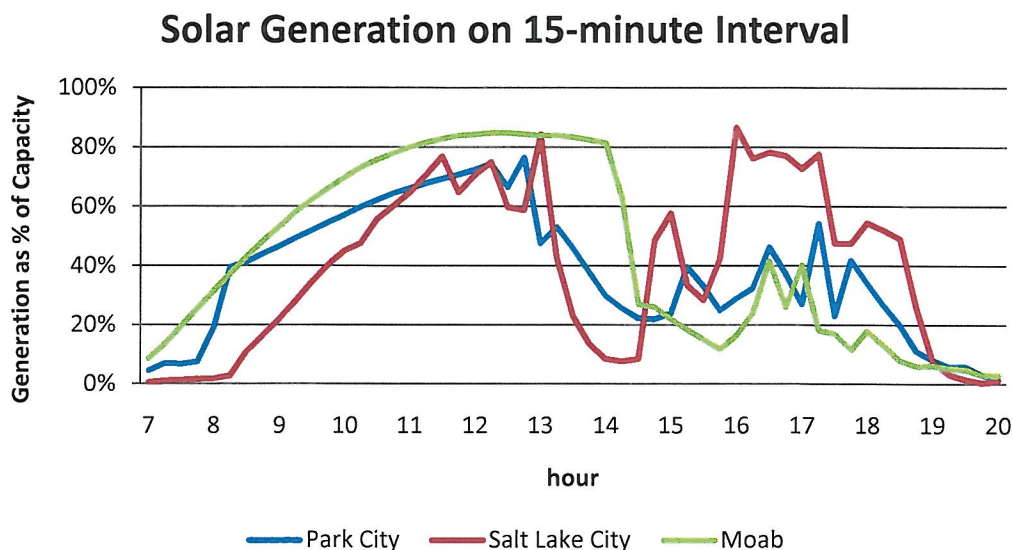
Solar Generation on 1-hour Interval



The graph illustrates that solar generation typically operates at modest levels during the hour of system peak. Maximum solar generation typically occurs midday. In contrast, the system peak typically occurs in the evening when customers return home from work. On the day of the system peak, none of the metered customer systems operated at 100% capacity for a full hour. During the hour of system peak, the average panel operated at 36% of capacity. Individual customer systems operated between 17% and 60% of capacity during peak hour. This data is based on 1-hour interval data.

Integration of distributed photovoltaic resources into the electrical system

Intermittent generation can impose challenges to power systems. Short interval data shown on the following chart illustrates that generation intermittency is more volatile than hourly data reveals. Generation recorded on 15-minute intervals is graphed for three different customers on July 9, 2010. It appears that clouds can contribute to intermittent solar generation and the shorter the interval that is measured, the greater the potential intermittency.



At current levels of net metering participation the Company has not experienced negative impacts on distribution system integration.

Cost effectiveness

The unsubsidized cost of solar installed by Program participants dropped 23% since 2007. Since Program inception the average installed cost of unsubsidized small-scale photovoltaic solar panels dropped from \$10.37 per watt to \$8.02 per watt by mid-year 2010. As the price of solar declined, the Program subsidy became a larger percentage of the incentives, reducing project cost. Market price declines since the Program began are now larger than the pilot subsidy of \$2.00 per watt.

Today Program incentives appear generous relative to the cost of equipment. Government and Program subsidies lower the average cost of solar power to residential participants by more than 50%.

Average cost for a 3,000 watt solar system	\$24,000
Less: Pilot Program incentive of \$2 per watt	(6,000)
Less: Federal tax incentive equal to 30% of installed cost	(5,400)
Less: State personal tax incentive, UCA §59-10-1014	<u>(2,000)</u>
Average net cost	\$10,600
Average cost per watt after incentives	\$3.18

In Docket No. 09-035-27 five cost-benefit measures were adopted to assess energy efficiency programs. In its order in Docket No. 09-035-27, the Commission directed the Company to evaluate small scale renewables on a similar basis until other economic tests are shown to be more informative. Based on these cost-benefit measures, solar remains expensive even though market prices have declined.

Program costs, levelized costs and cost effectiveness results information for the program through 2009 are presented in Tables 1 and 2.³

Table 1 - Levelized cost of Energy⁴

Customer Cost (for capacity receiving incentives)	\$1,038,086
Incentives	\$222,034
Program Delivery and Administration	\$94,390
Meters (Net meters, gen meters and phone costs)	\$15,948
Total Resource Cost (Customer Cost + Program Delivery + Meters)	\$1,148,424
Total Annual Generation (MWh)	206,849
Levelized Total Cost (\$/MWh)	\$493.71
Levelized Utility Cost (\$/MWh)	\$142.89
2008 IRP 49% Load Factor Decrement Levelized Cost (\$/MWh)	\$101.86

Cost data was provided by customers. Output data was calculated. In order to determine the energy output from the pilot systems each system was individually analyzed using a solar analysis program called PVWattsTM, which was developed by the National Renewable Energy Laboratory. The PVWattsTM calculator creates hour-by-hour performance simulations that provide estimated monthly and annual energy production in kilowatts and energy value. Cadmus, a consultant employed by the Company, input individual system parameters for size, electric cost, array type, tilt angle, and azimuth angle⁵.

The PVWattsTM calculator was used to test the cost effectiveness. Cadmus calculated the value of the output on an hour by hour basis over the 25 year expected life of the system. The hourly value was determined using the 2008 Integrated Resource Plan ("IRP") 49% load factor decrement at \$48/ton of CO₂. The hourly value of the systems outputs was discounted at the 2008 IRP discount value of 7.4% and compared with the participant and utility costs of the program.

³ Tables are reproduced from the 2009 Solar Incentive Program Annual Report.

⁴ Levelized Total Cost and Utility Cost are calculated over the 25 estimated life of the PV systems at a 7.4% discount rate. Levelized cost for the 2008 IRP 49% load factor decrement is calculated over the 17 year IRP decrement planning period.

⁵ For a full description of PVWattsTM see <http://www.nrel.gov/rredc/pvwatts/>.

Table 2 - Program Results

All Systems				AC: IRP 49% LF Decrement	
	Levelized \$/kWh	Costs	Benefits	Net Benefits	Benefit/Cost Ratio
Total Resource Cost Test (PTRC) + Conservation Adder	0.4937	\$1,148,425	\$309,334	(\$839,091)	0.269
Total Resource Cost Test (TRC) No Adder	0.4937	\$1,148,425	\$281,212	(\$867,212)	0.245
Utility Cost Test (UCT)	0.1429	\$332,372	\$281,212	(\$51,160)	0.846
Rate Impact Test (RIM)		\$591,585	\$281,212	(\$310,372)	0.475
Participant Cost Test (PCT)		\$816,052	\$259,212	(\$556,840)	0.318
Lifecycle Revenue Impacts (\$/kWh)				\$0.0000004046	

None of the five economic tests shown in Table 2 indicate favorable outcomes. Whether or not cost-benefit measures for energy efficiency are directly applicable to small scale renewables remains an unresolved question. Even the state of California, which has devoted considerable resources to evaluating appropriate measures of solar cost-effectiveness, has not resolved the issue.

In addition to these cost-benefit calculations the value of distributed solar generation can be viewed from three other perspectives. Federal and state tax policy already obligate taxpayers to provide solar incentives that amount to roughly 38% of the total cost of solar. Additionally, net metering customers are compensated more than market value for energy they generate, as they are effectively paid the retail price of electricity, which includes delivery and customer service. Yet, energy from net metering customers has a value comparable to the wholesale market price. Lastly, the current \$2.00 per watt Program incentive obligates non-participating customers to pay an even larger subsidy.

The bottom line is that the program as currently structured is not cost effective.

Additional responses requested by Commission

In an order dated September 15, 2010⁶, the Commission directed the Company to respond to seven issues raised by various parties. Below are the issues and the Company's response:

1. The Commission should open an investigative docket, or other formal proceeding, to initiate a comprehensive review of the effectiveness of the Program and evaluate it for possible changes and expansion.

Company reply - A new investigation is not necessary if the Program concludes as recommended. If the Program continues or expands, then effectiveness of future program incentives should be considered.

⁶ Docket No. 07-035-T14, order dated September 15, 2010, page 5.

2. The Commission should use caution in using the findings in the Company's 2009 Annual Report to determine the effectiveness of the program without considering economies of scale, more reasonable administrative costs, programs used in other utilities, and more transparent data analysis.

Company reply – The Program has been informative. However, the pilot Program was not designed to answer all possible questions. The Program has collected actual cost data from participating customers that has documented a substantial decline in the market cost of installing solar. It has also shown there is a group of customers willing to invest in subsidized solar. The size of that group appears to be in the hundreds. As indicated above, the bottom line is that solar is expanding without Program incentives.

3. The Program budget, and design, is too small to fairly conduct an economic analysis and to encourage adequate solar penetration into the Utah market.

Company reply – The Program budget and design are adequate to provide meaningful perspective and information. The Company does not view the purpose of the Program to “encourage adequate solar penetration.” The program was explicitly limited to control costs borne by non-participating customers. If higher levels of solar penetration are part of government energy policy, then legislators should adopt measures to achieve that objective. The pilot Program is primarily informational. Plus, the solar market is growing without the pilot Program.

4. The Parties support a more open and thorough review process and request a more detailed explanation of the methodology, assumptions, calculations, formulas, and models used in the report and request an open forum to explore these issues.

Company reply – The Company can explain the methodology, assumptions, calculations, formulas and models used to report cost effectiveness in previous solar reports. If the Program terminates as scheduled, there is no need to initiate a forum to explore these issues. If the Program continues, this could be an issue for discussion as part of the ongoing objectives.

5. The average installation costs shown in the report appear to be too high and do not accurately reflect current market prices.

Company reply – Installation cost information in the 2009 report was provided by customers. The Company has no reason to doubt the accuracy. The most recent data indicate the average installation cost is \$8.02 per watt. This average figure also means that many customers acquired solar for less.

6. The administrative costs shown in the report are extremely high compared to total program costs due to the small scale of the program. The costs associated with the Company's metering requirement for these installations also contribute to the high administrative costs and likely negative impact of the cost effectiveness of the pilot program. The metering

costs are a one-time expenditure and should not be used to evaluate the total cost of the program for the purposes of determining program effectiveness.

Company reply – Metering is a cost of operating the program. How a cost is categorized as administrative or some other category can be adjusted. However, cost effectiveness calculations should incorporate all costs, even non-recurring costs.

7. Three additional cost effectiveness analyses should be performed including:
 - Levelized Utility Costs without the generation meters included
 - Levelized Utility Costs with a 5 percent administration cost cap
 - Levelized Utility Costs with a 10 percent administration cost cap

Company reply – The requested information is provided below. In addition to the 2009 total program analysis, three additional scenarios were analyzed. They are presented in Tables 3 through 5. Table 3 presents the cost effectiveness results excluding meter costs. Tables 4 and 5 present the cost effectiveness results with program delivery costs limited to 5% and 10% of the utility program cost respectively. Assuming administration costs of 5% to 10%, as directed by the Commission, the solar Program is shown to be expensive.

Table 3 - Results Excluding Meter Cost

All Systems				AC: IRP 49% LF Decrement	
	Levelized \$/kWh	Costs	Benefits	Net Benefits	Benefit/Cost Ratio
Total Resource Cost Test (PTRC) + Conservation Adder	0.4869	\$1,132,477	\$309,334	(\$823,143)	0.273
Total Resource Cost Test (TRC) No Adder	0.4869	\$1,132,477	\$281,212	(\$851,264)	0.248
Utility Cost Test (UCT)	0.1360	\$316,424	\$281,212	(\$35,212)	0.889
Rate Impact Test (RIM)		\$575,637	\$281,212	(\$294,424)	0.489
Participant Cost Test (PCT)		\$816,052	\$259,212	(\$556,840)	0.318
Lifecycle Revenue Impacts (\$/kWh)				\$0.0000003838	

Table 4 - Results at 5% Program Delivery and Administration Cost

All Systems				AC: IRP 49% LF Decrement	
	Levelized \$/kWh	Costs	Benefits	Net Benefits	Benefit/Cost Ratio
Total Resource Cost Test (PTRC) + Conservation Adder	0.4585	\$1,066,560	\$309,334	(\$757,226)	0.290
Total Resource Cost Test (TRC) No Adder	0.4585	\$1,066,560	\$281,212	(\$785,347)	0.264
Utility Cost Test (UCT)	0.1077	\$250,507	\$281,212	\$30,705	1.123
Rate Impact Test (RIM)		\$509,720	\$281,212	(\$228,507)	0.552
Participant Cost Test (PCT)		\$816,052	\$259,212	(\$556,840)	0.318
Lifecycle Revenue Impacts (\$/kWh)				\$0.0000002979	

Table 5 - Results at 10% Program Delivery and Administration Cost

All Systems				AC: IRP 49% LF Decrement	
	Levelized \$/kWh	Costs	Benefits	Net Benefits	Benefit/Cost Ratio
Total Resource Cost Test (PTRC) + Conservation Adder	0.4645	\$1,080,477	\$309,334	(\$771,143)	0.286
Total Resource Cost Test (TRC) No Adder	0.4645	\$1,080,477	\$281,212	(\$799,265)	0.260
Utility Cost Test (UCT)	0.1137	\$264,424	\$281,212	\$16,788	1.063
Rate Impact Test (RIM)		\$523,637	\$281,212	(\$242,425)	0.537
Participant Cost Test (PCT)		\$816,052	\$259,212	(\$556,840)	0.318
Lifecycle Revenue Impacts (\$/kWh)				\$0.0000003160	

Summary and Recommendation

In summary, the pilot Program goals to gain experience with the technology and market delivery infrastructure, along with cost and benefit information have been accomplished. The data indicates that both solar vendors and willing consumers exist in the marketplace for the installation of solar power without additional incentives. Market price declines for solar equipment since the Program began are now larger than the incentive of \$2.00 per watt and roughly three quarters of customers with solar systems installed them even though they did not receive the Program incentive. The pilot Program also demonstrated that the limited ability of solar to generate during the typical evening peak hour restricts the contribution to system peak demand. And, volatility of intermittent solar energy production can create integration challenges with the distribution system. However, at current levels of net metering participation the Company has not experienced negative impacts on distribution system integration.

Solar is still not a cost effective resource, but may become cost effective in the future as technology advances, energy storage capabilities expand, the production efficiencies add value to this renewable energy source or drive its costs down. The Company believes that it is important to continue to monitor and participate in the development of renewable energy technologies that will enhance the value of this energy and provide the experience necessary to understand the impacts on the electrical system as new technologies make solar a viable energy solution. Advances in energy storage technologies could enhance the value of solar by firming up the resource or extending its use to peak periods while reducing the intermittent nature of the resource.

Based on the results of the pilot Program the Company recommends the following course of action:

- Continue solar incentives through calendar year 2010 then terminate.
- Continue the funding levels currently in rates through 2012 to fund an energy storage demonstration project.

The demonstration energy storage project would involve an electro-mechanical battery (flywheel) storage technology. This demonstration project is anticipated to provide information on battery storage technology and the impact of the interface of these types of technologies on the network. The purpose would be to demonstrate the feasibility of such a technology to store energy, including renewable energy, and deliver it to the grid when needed. It is anticipated that this demonstration project could enhance the value of intermittent renewable generation to serve peak demand and reduce intermittency, as well as identify opportunities for distributed generation on the distribution network.

The Company would like the opportunity to explain the demonstration storage project to the Commission and interested parties, and outline the concept of the electro-mechanical battery demonstration project and the potential benefits to customers as a result of the project.