Salt Lake City
Million Solar Roofs Partnership

Memorandum of Support

To: Division of Public Utilities
Heber M. Wells Building, 4th Floor
160 East 300 South
Salt Lake City UT 84111

Public Service Commission
Heber M. Wells Building, 4th Floor
160 East 300 South
Salt Lake City UT 84111

From: Salt Lake City Million Solar Roofs Partnership

Re: Rocky Mountain Power's proposed Pilot Solar Incentive Program
Tariff PSCU No. 47, Schedule 107 – Solar Incentive Program

Date: May 25, 2007

Dear Commissioners and Division Staff:

Please accept this memorandum outlining Salt Lake City Million Solar Roofs Partnership's support for Rocky Mountain Power's petition for approval of their proposed Solar Incentive Program. We strongly support the pilot program, with one minor change. In their Implementation Plan, Rocky Mountain Power is requesting a transfer of all of the Renewable Energy Credits (RECs) associated with the solar PV systems served by the incentive program. Given that the utility rebate is only covering a portion of the total system cost, the RECs transferred to Rocky Mountain Power should be proportionate to the percentage of cost covered by the utility (i.e. Rocky Mountain Power proposes a $2 per watt rebate, representing approximately 20% of the total system cost, they should receive 20% of the RECs associated with the system). With this change, the Partnership supports the approval of the proposed program.

In this memorandum, we briefly introduce our involvement in the program and then provide technical analysis that supports program approval, including empirical analyses of the cost-effectiveness of the program. Any questions regarding these comments can be directed to Sarah Wright, Utah Clean Energy, (801) 363-4046 or Rich Collins, Project Consultant, (801) 580-4596.

Background

The Salt Lake City Million Solar Roof Partnership is sponsored by the United State Department of Energy (DOE) and consists of the following partners: Salt Lake City Corporation, DOE, Utah Clean Energy and consultant, Richard Collins. The partnership receives technical support from National Renewable Energy Laboratory (NREL) and Sandia National Laboratory. The goal of the Partnership is to mitigate or lower financial barriers that inhibit the adoption of solar photovoltaic (PV) electricity. The Partnership has been working with Rocky Mountain Power (RMP) for the last four years to develop a program that will help lower these financial barriers.

Solar PV provides key benefits to the electrical system that have not been fully recognized, including: the reduction of peak demands, production of electric energy at the time of system peak, the delay or avoidance of upgrades in distribution facilities, grid stabilization benefits, avoided costs of emission credits, protection against fuel cost volatility and economic risks associated with future environmental regulations, energy security, and air, water and public health benefits.

Solar PV electricity represents the ultimate distributed resource. The fuel source is inexhaustible and abundant world wide, its peak production corresponds with system peak in Utah and the West, it produces no noise, pollution or greenhouse gases, it uses no water (with the exception of limited water use for periodic cleaning), and its modular nature allows incremental investments, rapid deployment and flexibility in location. Deployment of PV will benefit the entire electric system, the utility and ratepayers. Given its environmental characteristics, its modularity and impact on customer peak demand, solar PV is much like a demand-side resource.

Goal of the Pilot Solar Incentive Program

As stated in Rocky Mountain Power's Implementation Plan, the primary goal of this project is to provide market-based information on the costs and benefits of a solar photovoltaic buydown program in Utah. The proposed pilot program will quantify the electrical output, costs of installation, customer participation rates, and the avoided cost of energy and distribution expenses. This pilot will provide the necessary information to evaluate this resource's potential in Utah and provide the Company and utility regulators experience in all aspects of PV deployment. Additionally, the program will provide valuable practical experience, both technical and administrative, in acquiring distributive solar resources and working collaboratively with the solar community.

Given the conservative size of this pilot program, it should be viewed as a Research and Development program that will provide peak power and provide information that will allow the Company and regulators the opportunity to effectively evaluate solar PV as both a supply-side resource and, to a certain extent, demand–side resource.

Reasons to Approve the Pilot Solar Rebate Program

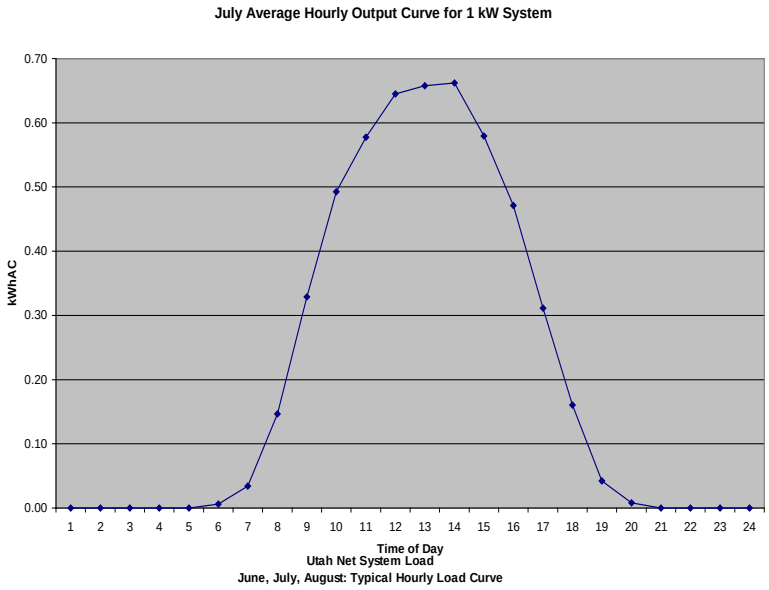
Utah has a tremendous solar resource and stands to benefit from the increased adoption of solar technologies. Solar photovoltaic electricity provides reliable, safe, and clean energy to help Utah meet its burgeoning peak demand. We feel this pilot program will provide valuable information to the utility, the Commission, and ratepayers on the nature and potential of solar electricity. What's more, representatives of Utah's emerging solar industry view this pilot program as an important step

to encourage further adoption of solar in Utah. The Partnership supports the proposed pilot solar incentive program for the reasons mentioned below, with the minor change in REC allocation described above.

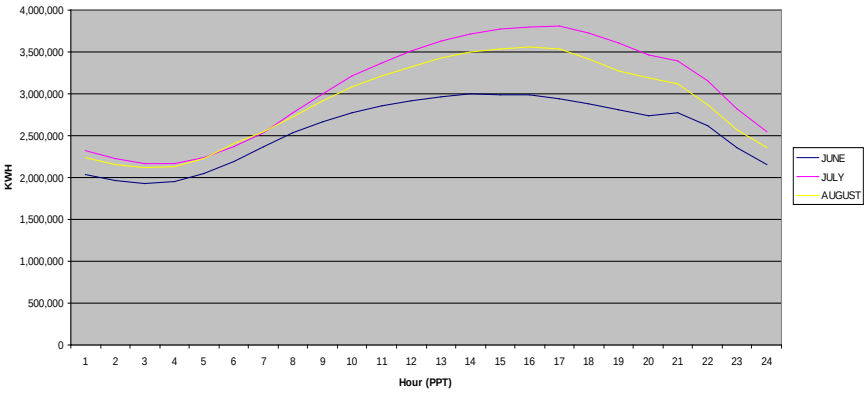
1. **PV Provides Summer Peak Power.** One of the most pressing issues confronting RMP today is the growing demand for power, particularly at peak times. In addition, there is growing concern about the environmental consequences of traditional thermal-based generation. These concerns create substantial risks for the Company and its ratepayers if future environmental regulations are legislated. The system peak of the Utah system occurs in the summer during the afternoon. IRP findings and conclusions indicate that sources of power during these periods of time are extremely valuable to the system; PacifiCorp's IRP indicates that both supply-side and demand-side resources are needed. Power generated by photovoltaic solar energy systems located in RMP service territory provide both a reduction in demand for power and the potential to produce power for other customers. The output of solar photovoltaic energy nearly matches the load profile at the time of system peak (See Figure 1).

Figure 1. Characteristics of Utah Solar Resource and Benefits to Utah System

Solar Output
Mountain Time



Utah's load shape
Pacific Time



2. **A Pilot Research Project.** Given this is a very small pilot program, the proposed solar incentive should be regarded as a research and development project and therefore should not be held to an explicit cost-effectiveness test. The program will provide valuable information on the output of solar PV systems and how the output corresponds to the peak demands of the Utah system. It will also provide important information about Utah RMP customers' willingness to provide the bulk of the capital necessary to fund this resource. This information can only be accurately obtained through the implementation of an actual program. Surveys, questionnaires and marketing studies will not provide the requisite information. For example, the Company's prior marketing analysis of the Blue Sky program indicated that Utah customers were not interested in renewable resources. When an actual program was initiated, data and results prove otherwise; nearly 21,000 Utahn's are currently participating in the program.

3. **Minimal cost.** Every attempt has been made to keep the cost of this pilot program to a minimum while obtaining a scale that will provide sufficient information on which to determine the long-run viability of the program. The pilot program size of 535 kW is quite small compared to other solar incentive programs across the nation. The yearly cost of the program is $313,000, and it is scheduled to run for five years for a total cost of $1,565,000; the present value of these expenditures is $1,277,036 when discounted at the Company's current cost of capital. As part of the settlement, the Company agreed to fund this program until the next rate case; thus, realistically there is no new cost of this program until the next rate case. At that point the Company is expected to request cost recover for the program. If these funds are approved for cost recovery rates will reflect the costs of the program starting in August of 2008.

4. **Cost-effectiveness.** We have prepared a cost-effectiveness analysis of the program under a number of different assumptions and present the findings in the Cost-Effectiveness Analysis section below. It should be noted that similar analyses has been performed by the Partnership in the past and presented to Utah's utility regulators. The current analysis reflects data consistent with the proposed program. We use current Schedule 37 rates for small QFs under 1 MW for our estimate of avoided costs. Schedule 37 provides rates for a generic QF that produces at an assumed 85% capacity factor. The solar PV systems have an assumed capacity factor of approximately 19%. Given that the production of solar power coincides with the Utah peak load shape makes this resource more valuable. We have adjusted the capacity payments in Schedule 37 to reflect this reality.

Cost-Effectiveness Analysis

In the attached spreadsheet "Calculations for avoided costs pilot solar," please find an analyses of the cost-effectiveness of the proposed solar incentive program. In the last three worksheets ("Tariff Page"; "Benefit Cost Shed 37 rates"; and "Benefit Cost no 1st year costs") we perform a number of different scenarios or sensitivities. We find the program to be cost-effective. The benefit-cost ratio is .96 using the Company's cost of capital and is 1.44 when using the social discount rate of 4% to account for the external benefits associated with the solar generation. These beneficial externalities include: reductions in the need for SO2 and NOX emission permits, reduction of risk associated with a potential carbon tax or regulation, the reduction of fuel volatility risk as well as the reduction in health costs associated with traditional thermal production. Many of

these externalities can be quantified and explicitly included in the analysis, but for now we have incorporated them into our analysis by using a lower social discount rate.

Method of Analysis:

We use updated 2007 Schedule 37 avoided cost rates and include both energy and capacity payments in our analysis; you can see the results of this analysis on the "Tariff Page," worksheet. The avoided energy costs are taken from the Company's Schedule 37 peak summer prices. Summer peak prices were selected because most of the solar power production is during peak hours, with a large percentage produced during the summer when the sun shines longer and more intensely. (We performed a sensitivity using winter peak prices and found that it did not change the benefit-cost ratios.) Schedule 37 only projects avoided cost rates for a twenty year period; to obtain an additional five years of avoided costs (to account for the 25-year warranty of solar PV systems) we used the average rate of increase for the last three years which was approximately 2.4% per year. Next we adjust the capacity payments to reflect the fact that capacity payments for Schedule 37 are based on an assumed 85% capacity factor. The assumed solar PV capacity is 19.22%. This raised the capacity payments to reflect the added value that a peaking resource would provide to the system (see the "Tariff Page" worksheet, column J in yellow).

We add both avoided energy cost and avoided capacity costs associated with solar PV output for each of the twenty five years and then take the present value of this stream of benefits. We use two sets of discount rates; one using the Company's cost of capital and a lower social discount rate. We updated program expenditures to $313,000 per year for five years (this is $1,500 less per year than the Company's filing which we believe is in error). We discount these costs back to present value terms using the Company's current cost of capital of 7.18% to determine the total costs of the program.

Next we project the stream of benefits that the program will produce for the Company and its ratepayers. To calculate these benefits, we first determine the amount of energy that will be produced from the solar panels on a yearly basis. Sandia National Laboratory provided solar insolation data for Salt Lake City along with conversion factors to calculate the amount of electricity produced by the solar PV systems. This was adjusted to include line loss factors of 11% and a panel degradation factor of 1% per year over 25 years. The five year pilot will result in the installation of 535 kWs, yielding a total of 2,213,128 kWh. The dollar value of the benefits from this investment is calculated by multiplying the output of the panels by the avoided energy and capacity costs associated with this output.

Results

The utility cost-effectiveness test compares the costs incurred by the utility to implement this program with the benefits accrued by the Company and its ratepayers.
In this case, the benefits explicitly measured are the avoided capacity and energy costs. Other benefits such as reduced costs associated with emission permits, lower health care costs, lower risks associated with fuel price volatility and risks associated with future environmental regulations were NOT explicitly accounted for. The benefit-cost ratio is .96 using the Company's cost of capital and is 1.44 when we use the 4% social discount rate. The levelized cost of this program is $57.55 per MWh, which is lower than the levelized costs for an intermittent wind QF project and a bargain for a summer peaking resource. This pilot will provide peak power with no fuel cost volatility and no

environmental risk.

Viewed from the perspective of the ratepayer, the cost-effectiveness of this program improves dramatically. To achieve this perspective we compare the benefits of the program versus the costs that will be reflected in rates. The costs of this program will not show up in rates until August of 2008 at the very earliest, thus the first year of the program will be funded by shareholders. Under this perspective, the benefit-cost ratio, using the Company's cost of capital as the discount factor, increases to 1.17, and the benefit-cost ratio using the social discount rate increases to 1.75. From the ratepayer's perspective, this pilot rebate program is very cost-effective and should be pursued. This analysis is provided in the "Benefit Cost with no 1st year costs" worksheet. Under this analysis, we can increase the rebate to $2,500 and still pass a cost-effectiveness test from the ratepayer's standpoint. The benefit-cost ratio is exactly equal to 1 with a $2,500 rebate. It should be noted that our original proposal to the Company included a $2,500 rebate. Using the social discount rate, the benefit-cost ratio is a healthy 1.5.

Conclusion and Recommendations

Our analysis shows that this program under all scenarios passes or nearly passes the utility cost-effective test and when viewed from the perspective of the ratepayer is cost-effective under all scenarios. We recommend the immediate approval of this solar rebate program so that we can begin to achieve the benefits. We also recommend that the rebate be increased to $2,500 to insure that customers will participate in this program and that the critical information about this important peaking resource can be obtained. As aforementioned, we would like the RECs from the program be transferred to RMP in proportion to the funding the Company contributes to the program. Given the need to secure new peaking resources that will also protect us from future environmental and fuel price risk, the proposed solar incentive program is a worthy investment. Thank you for your consideration of these comments. If you have any questions, please contact Sarah Wright with Utah Clean Energy at (801) 363-4046 or Rich Collins, Project Consultant, at (801) 580-4596.

Sincerely,

The Salt Lake City Million Solar Roofs Partnership

Rich Collins, Project Consultant

Sarah Wright, Utah Clean Energy

Jordan Gates, Salt Lake City Mayor's Office