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MEMORANDUM

To: Utah Public Service Commission

From: Utah Division of Public Utilities
Phil Powlick, Director
Energy Section
Artie Powell, Manager
Thomas Brill, Technical Consultant
Abdinasir Abdulle, Technical Consultant

Date: November 30, 2010

Re: Docket No. 07-035-T14 – Three Year Assessment of the Solar Incentive Program, Schedule 107

RECOMMENDATION (Conditional Acknowledgement)

The Division of Public Utilities (Division) recommends that the Utah Public Service Commission (Commission) acknowledge the Three-Year Assessment of the Solar Incentive Program filed by the Rocky Mountain Power (Company) on September 30, 2010 as compliant with the Commission-ordered reporting requirement. In addition, the Division recommends that

1. The Solar Incentive Program should continue through the end of the originally planned five years. With the continuance of the pilot program, the Division recommends the following enhancements,

    a. The Company should continue to collect interval data but from a larger sample of participants and including more southwesterly oriented projects;

    b. Reduce the incentive rebate amount by 23% (the same percentage that the unsubsidized costs of installed solar systems have decreased) from $2 to $1.55 per watt; and

c. The Commission should direct the Company to provide adequate responses to issues 1 and 4 of the list of issues identified by the parties.

2. The Commission should approve the proposed energy storage demonstration project. The Company should be directed to make a proposal for funding of similar projects in the Company's next rate case. In the mean time, the Division proposes that the project be funded through the DSM program.

ISSUE

In compliance with the Commission's Order in this Docket dated August 3, 2007, the Company filed its three-year assessment of the Solar Incentive Program on September 30, 2010. This report contains the Company's findings and recommendations. On October 6, 2010, the Commission issued a Request for Comments on the Company's three-year assessment due no later than November 30, 2010. This memorandum is the Division's response to the Commission's Request for Comments.

DISCUSSION

On April 4, 2007, the Company filed with the Commission a request for approval of a five-year pilot program, Schedule 107 – Solar Incentive Program. The Program was to provide financial support to those customers who purchase and install solar photovoltaic systems. On August 3, 2007, the Commission issued an Order approving the program subject to certain conditions. In this Order, the Commission required that the following data be developed from the Program.

- Market-based data on the integration of distributed photovoltaic resources into the electric system;
- The ability of solar power to meet peak demand;
- Customer's willingness to participate and make investments in solar technology; and
- Cost-effectiveness.

This Order also directed the Company "to provide a report within three years assessing whether changes are warranted in any element of the Program, including the caps."

In compliance with the Commission Order, on September 30, 2010, the Company filed with the Commission its three-year assessment of the Solar Incentive Program. The report addresses the goals listed above as well as issues raised by the parties on the Company's 2009 Annual Report that the Commission identified in its Order[1].

The result of the three-year evaluation indicates that customer willingness to participate and invest in solar technology has improved since the inception of the Program in 2007. The report shows that from 2007 to August 2010, the total number of installed solar PV systems owned by net metering customers has increased by 650 percent from 82 installations to 615 installations. The Division notes a minor calculation error on page two of the Report. The percentage increase in the number of solar customers enrolled in net metering should be 650 percent (615/82-1) instead of 750 percent (615/82*100). Similarly, total installed capacity increased by 1,287 percent from 107 kW to 1,487 kW. The report also indicates a significant increase, 85 percent, in the average size of installations from 1.3 kW to 2.41 kW.

Of the additional number of solar customers participating in net metering, only 19 percent received program incentives. In other words, over 80 percent of those installing photovoltaic systems do so without the financial assistance offered by the Company. The willingness of customers to install solar systems without the Company's financial support is at least partially due to the fact that the cost for solar systems has decreased by approximately 23% since 2007. Nevertheless, both of these facts, the growth in the number of installations and the low percentage of customers receiving Company assistance, demonstrate a potentially independently sustainable market.

The Commission's order approving the Program required an assessment of the ability of solar power to meet peak demand. To meet this requirement, Program participation originally required customers to provide information about their power generation. This approach proved problematic and the little data gathered was questionable. Therefore, at the end of 2009 and early 2010, the

[1] Docket No. 07-035-T14, Order dated September 15, 2010.

Company installed interval metering at certain customer sites and started collecting data. However, this did not provide enough data on the orientation of the panels and kWh produced. The little data collected reveal that most of the customers orient their panels facing south to maximize energy production, which is logical from the customers' point of view. However, south-facing panels produce more energy at mid-day and less energy during the evening peak hours. To demonstrate this, the program administrator collected data on energy production on August 3, 2010 (the Wasatch Front peak day for the year) from a sample of nine participants with interval meters located in three different communities. These data showed that for each of the nine participants, the maximum energy production was around noon, whereas the system peak occurred in the late afternoon and early evening.

The Division believes that data collected for less than a year are not enough to provide meaningful conclusions to the Commission and parties. More time is needed to collect data on a variety of orientations to determine the orientation that would result in maximum energy production during the peak demand hours. Therefore, the Division concludes that this goal was not achieved. The Division recommends that the Program be continued in order to complete the five year pilot.

Regarding the integration of distributed photovoltaic resources into the electric system, the Company collected short interval (15-minute) data, which were collected from nine customers. The report graphs the hourly production from these nine over the course of one day (August 3, 2010) and shows that peak production from these systems did not match system peak. No information is provided as to orientation or other factors that might result in a better match between production and peak. A further subset of three customers' output data is shown for July 9, 2010 on a 15-minute basis in order to show intra-hour variability of production from changing cloud cover. No information is presented that would allow the reader to determine whether or not such results are typical of all of the days for which data were collected. Based on the results drawn from these data, the Company concluded that, at the current level of participation, it did not experience a negative effect on distribution system integration. It also concluded that solar systems do not provide significant system benefit in terms of mitigating peak demand. However, the Division does not believe that data from nine customers on one day, and then three customers on an additional day,

produces statistically meaningful results. While the Company has 15-minute data over many months for these nine customers, only a very limited volume of these data was presented. Therefore, the Division concludes that this goal was not achieved. To achieve this goal, the Division recommends that more interval data be collected from a larger sample of participants and that future reports provide the level of analysis that allows for a more meaningful analysis of system benefit.

In particular, the Division recommends that the Commission require that more data be collected on solar systems with a southwest orientation (225 degrees azimuth, +/- 5 degrees). Even the very limited data provided in the Company's report and follow-up technical conference show that such an orientation can shift a system's output to later in the day and closer to system peak. Without a complete analysis of systems oriented to produce more power in the late afternoon and early evening, the Commission will be unable to adequately analyze the potential system benefits of solar. With such data, the Commission will be able to explore a more robust and appropriate set of options as it determines whether to continue some form of solar rebate program at the expiration of the 5-year pilot.

The cost-effectiveness analysis in this report is reproduced from the 2009 Solar Incentive Annual Report, which the Commission acknowledged in its September 15, 2009 Order in this Docket. However, as the Company indicated in this report, the unsubsidized cost dropped from $10.37 to $8.02 per watt since the inception of the Program in 2007. This means that the $2 per watt incentive is now a larger portion of the cost of the installed solar. In addition, the federal and state tax policies provide additional incentives that reduce the installed cost of solar. Therefore, the Division recommends the Commission reduce the incentive by 23 percent (the same percent that the unsubsidized cost of installed solar decreased) from $2 to $1.55 per watt for normally oriented systems. (See below for southwest orientation.) This would maintain program cost-effectiveness at approximately the break-even point, as was originally the case when the $2.00 incentive level was established. This will reduce the total utility cost from $332,372 to $282,414 and increase the benefit/cost ratio for the utility cost test from 0.846 to 0.996. The Division proposes continuing the pilot program at this reduced level in recognition of the fact that solar

resources, while not coincident with system peaks, do contribute a percentage of energy during the higher load and energy cost hours of summer days. Requiring a higher number of southwest-oriented systems with interval-level meters should help to better determine how to improve system benefit.

At this time, the Net Metering tariff, Schedule 135, indicates that the energy production of the net metering participants will be subtracted from the energy consumption of the participant. The participant will, then, pay for the balance or get a credit for the excess. This does not differentiate the time of production. This incentivizes a rational participant to maximize energy production by orienting his panel south (mid-day) rather than southwest (later in the day). The Division recognizes that this tariff disincents southwest orientations that, while providing greater overall output to the participant, may provide less value to the overall system. In order to remove this disincentive for customers to participate in the rebate program with southwest orientations, the Division proposes that Schedule 135 be revised to permit a rebate of $1.65 per watt for those customers willing to install systems at an azimuth of 225 degrees (+/- 5 degrees) and to have 15-minute interval data collected from their systems. The derivation of the proposed rebate can be seen in the attached Exhibit 1. The National Renewable Energy Lab's PV Watts solar calculator was used to compare the annual output of a 180 degree azimuth (output maximized) system versus a 225 degree system. That difference was then compared to the value of net metering for a ten year period for each system. In order to eliminate the reduction in net metering value of a southwest orientation, $1.65 per watt is used to pay (up front) the foregone future value of maximized and net metered production.

Finally, the report provides responses to seven issues raised by the parties on the Company's 2009 Annual Report to which the Commission directed a Company response. These issues are reproduced here for the reader's convenience.

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.

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.

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

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. Of particular concern are Tables 3 (Levelized Cost of Energy) and 4 (Results for Standard Economic Tests).

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

6. The administrative costs shown in the report are extremely high compared to the 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 negatively impact the cost effectiveness of the pilot program. The metering costs are a one-time expenditure intended for the purpose of data acquisition and should not be used to calculate the total cost of the program for the purposes of determining the program cost effectiveness.

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 administrative cost cap
   - Levelized Utility Costs with a 10 percent administrative cost cap

The Division reviewed these responses and concluded that the responses for issues 2, 3, 5, 6 and 7 are adequate. However, because the Company recommends the Program be terminated, it did not think that it necessary to provide responses for issues 1 and 4, which are forward-looking issues. Since the Division is recommending continuation of the Program for the five years, the Division recommends the Commission direct the Company provide adequate responses to these issues.

In conclusion the report indicated that solar is still expensive and has a limited ability to meet peak demand. In addition, as net metering participation increases, it may negatively affect distribution system integration. The Company indicated that solar may become cost-effective as technologies improve and storage capabilities expand. Therefore, the Company proposed to terminate the solar incentive program at the end of calendar year 2010, but continue the funding levels currently in rates through 2012 in order to fund an energy storage demonstration project.

The Division believes that the solar incentive program generated valuable data. However, as was explained earlier, the data collected to demonstrate the ability of solar power to meet peak demand and the impact of solar on distribution system integration are less than adequate to allow realistic conclusions to be drawn. Therefore, the Division recommends that the solar incentive program be continued through the end of the five years as originally planned. This will allow the collection of more data that can produce useful results.

Regarding the Company's recommendation of shifting the program funding to fund an energy storage demonstration project, the Division supports the proposed energy storage demonstration project. The Division participated in a technical conference held on November 4, 2010 in which EMB made a presentation on "Utility-Scale Bulk Electric Energy Storage Technology Proposed Demonstration Facility." The Division understands that the intent of the project is to demonstrate that the technology, when properly deployed, will

- Enable the large-scale deployment of central and distributed renewable generation by eliminating system barriers.

- Contribute to the long-term competitiveness of large industrial customers.
- Afford alternative to transmission expansions and fossil-fueled peaking generation.
- Contribute to the system-wide improvement of grid reliability, power quality, and customer service.

The Division believes that a storage technology with these capabilities could enhance the value of intermittent renewable generation to serve peak demand and reduce intermittence. Therefore, the Division recommends the Commission allow funding for this specific demonstration project.

The Division further recommends that, for the first year, the project be funded through the DSM program. The demand-side management statute (UCA 54-7-12.8 (1)) defines DSM as "activities or programs that promote energy efficiency or conservation or more efficiency management of electric energy loads." The load management aspect of the proposed power storage study project fit easily within the parameters of the DSM statute and, therefore, cost recovery through the DSM surcharge is appropriate. For the longer term, however, the Division recommends the establishment of a long term research and development fund for Rocky Mountain Power. There are ample opportunities for the Company to explore new technologies in power production, increased production efficiency, efficient transmission and distribution, power storage and management, and to develop specific resources. The exploration of such opportunities brings the potential for increased benefit to ratepayers. The Division has noted in several venues (e.g. comments on IRPs and the recent geothermal resource study) an apparent risk aversion on the part of the Company. At least some of this aversion seems to be for fear of regulatory disallowance. The Division believes that the establishment of a dedicated R&D fund, situs assigned to Utah and with appropriate regulatory guidance and oversight, could be a means to encourage the Company to undertake greater technological or resource risk with the certainty of regulatory recovery for approved projects. As a first proposal, the Division suggests that collection of $1 million per year from general rates be approved beginning in the next rate case. It is recommended that the Commission require the Company to propose, either in the next rate case or before, an appropriate collection amount and guidelines for the type of projects to be

financed with such a fund. Alternatively, the Commission may direct parties to meet prior to the next rate case to determine whether a consensus mechanism can be established.

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