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November 4, 2014

VIA ELECTRONIC FILING & U.S. MAIL

Oregon Public Utility Commission
Attn: Filing Center
P.O. Box 1088
Salem, Oregon 97308-1088

Re: In the Matter of Public Utility Commission of Oregon Investigation Into Qualifying Facility Contracting and Pricing
Docket No. UM-1610

Dear Filing Center:

Enclosed for filing please find the original and five (5) copies of the Testimony of David W. Brown along with Exhibits 201 and 202 on behalf of Obsidian Renewables, LLC in the above-referenced docket.

Thank you for your assistance with this filing. Should you have any questions, please feel free to contact me.

Very truly yours,

/s/ Chad M. Stokes

Chad M. Stokes

CMS:tjb
Enclosures
c: UM-1610 Service List

BEFORE THE PUBLIC UTILITY COMMISSION

OF THE STATE OF OREGON

TESTIMONY OF DAVID W. BROWN

ON BEHALF OF

OBSIDIAN RENEWABLES, LLC

NOVEMBER 4, 2014

INTRODUCTION

Q. PLEASE STATE YOUR NAME, AND CURRENT EMPLOYMENT POSITION OR TITLE.

A. My name is David W. Brown. I am the Owner of Obsidian Renewables LLC ("Obsidian"). My business address is 5 Centerpointe Drive, Suite 590, Lake Oswego, Oregon 97035. Obsidian is in the business of developing renewable generating facilities, many of which are and will be located in the State of Oregon. Although Obsidian is not limited to a single generating technology, Obsidian does have experience in developing utility-scale renewable solar projects in Oregon.

Q. IS YOUR TESTIMONY BASED ON YOUR PERSONAL KNOWLEDGE AND EXPERIENCE?

A. Yes, my testimony is based on my personal knowledge gained through my experience as a developer of renewable generating facilities.

Q. DID YOU RELY ON SOURCES OF INFORMATION THAT YOU REGARD AS RELIABLE AND ARE ORDINARILY AND CUSTOMARILY USED AND RELIED ON BY THOSE INVOLVED IN THE ELECTRIC INDUSTRY?

A. Yes.

Q. WHAT IS THE PURPOSE OF YOUR TESTIMONY?

A. The purpose of my testimony is to address the issue of the appropriate solar capacity payment that should be made to standard renewable solar qualified facilities ("QF") pursuant to the Public Utility Regulatory Policy Act ("PURPA").

Q. WAS THIS ISSUE ALREADY RESOLVED BY THE COMMISSION IN ORDER 14-058?

A. Although the issue of capacity contribution payments was raised in Phase I, the application to renewable solar QF projects of the methodology for calculating capacity payments adopted by Commission in Order 14-058 remains in need of clarification.

Q. WHAT DOES ORDER 14-058 SAY ABOUT CAPACITY CONTRIBUTION PAYMENTS?

A. In Order 14-058, the Commission held that "[w]e agree on the need to adjust for capacity contribution of each resource type and adopt Staffs proposed method or calculating capacity adjustments, as set forth in Staff/102-103, using input estimates derived from the utility's acknowledged IRP." In other words, the Commission agreed that it would be appropriate for purchasing utilities to compensate QFs for capacity consistent with the methodology described by Commission Staff.

Q. CAN YOU BRIEFLY SUMMARIZE THE STAFF'S PROPOSED METHODOLOGY FOR CALCULATING CAPACITY PAYMENTS AS ADOPTED BY THE COMMISSION IN ORDER 14-058?

A. The Staff testimony in Phase I stated that it is appropriate under PURPA for purchasing utilities to compensate QFs for capacity. The Staff testimony included detailed analysis concerning the methodology by which the capacity contribution payment should be calculated and allocated for different types of QF projects. The Staff testimony concludes that the capacity contribution should be discounted for certain types of QF projects to reflect their expected availability during the purchasing utility's high load hours. Base load QF resources would receive the full capacity payment, whereas the capacity payment paid to variable resources would be discounted to reflect their reduced availability during high load hours. This discount is reflected in the capacity value assigned to each resource type, which produces a capacity payment "rate" that varies by resource type.

Q. DOES THE CALCULATION METHODOLOGY SET FORTH IN THE STAFF TESTIMONY WORK FOR RENEWABLE SOLAR QF PROJECTS?

A. No. Obsidian found that, when applied to renewable solar QF projects, the methodology described by Staff in its testimony actually resulted in a *double* discount of the capacity payment. Obsidian has confirmed with Staff that this double discount was *not* intentional and should be corrected.

The issue is that, according to the initial Staff methodology, the already discounted capacity payment rate would only be paid to the QF as an adder to the power rate, rather than as a stand-alone payment for capacity. Because the power rate is, by definition, only paid for those hours in which power is actually delivered, this means that the discounted capacity payment also would be paid only for those hours in which power is actually delivered. Thus, the capacity payment paid to solar renewable QF projects would be discounted once in the calculation of the resource-specific capacity rate, and then it would be discounted again by only applying that rate for certain high load hours. In other words, the fact that a variable resource is not available for all high load hours is already reflected in the resource specific capacity rate and it should not be reflected again by limiting the number of hours to which that rate is applied.

Q. DID OBSIDIAN BRING THIS DOUBLE-DISCOUNT ISSUE TO THE ATTENTION OF THE COMMISSION?

A. Yes. On April 24, 2014, Obsidian timely filed for clarification of that portion of Order 14-058 as it applies to capacity payments to renewable solar QF projects. Obsidian explained that, when applied to renewable solar QF projects, the proposed methodology for calculating the capacity contribution payments results in a double discount of the payment amount. There is nothing in the Staff testimony or Commission Order that reflects an intent to apply a double discount to the value of capacity contributed by renewable solar QF projects.

Q. DID OBSIDIAN'S MOTION FOR CLARIFICATION ASK THE COMMISSION TO REVERSE ITS INITIAL DECISION REGARDING CAPACITY PAYMENTS?

A. No. Obsidian was clear in its motion for clarification that it was not challenging the conclusion to pay a different capacity rate to different resource types. Nor did Obsidian disagree with Staff's recommendation to pay only for capacity that is available during peak hours. Obsidian sought clarification that the capacity payment for renewable solar

QF projects would be discounted just once—either in the rate or in the hours paid, but not both.

Q. DID ANY PARTY TO THIS PROCEEDING OBJECT TO OBSIDIAN'S MOTION FOR CLARIFICATION OF THE CAPACITY PAYMENT FOR RENEWABLE SOLAR QF PROJECTS?

A. No. There were no parties to this proceeding that objected to Obsidian's motion for clarification. Nobody came forward to suggest that Obsidian's reading of the proposed capacity payment methodology was incorrect. OneEnergy and the Community Renewable Energy Association filed their own motion concurring with Obsidian's motion.

Q. DID THE COMMISSION STAFF AGREE THAT THE APPLICATION OF ITS CAPACITY PAYMENT METHODOLOGY TO RENEWABLE SOLAR QF PROJECTS REQUIRED CLARIFICATION?

A. Yes. On May 9, 2014, Staff filed a response to Obsidian's motion for clarification in which it *agreed* with Obsidian that the proposed methodology would result in a double discount of the capacity contribution payment for renewable solar QF projects and therefore should be clarified. "Staff agrees with Obsidian . . . that there appears to be a second and unintended discounting of the avoided capacity value in the design of the volumetric avoided cost prices." Staff's response further states that "Staff recommends that the Commission allow parties to address this limited question regarding the design of the volumetric avoided cost prices in the investigations currently open to address the utilities' recent filings to comply with Order No. 14-058."

Q. WHAT WAS THE RULING ON OBSIDIAN'S MOTION FOR CLARIFICATION?

A. On June 10, 2014, the administrative law judge ("ALJ") issued a Ruling that resolves a number of procedural issues including Obsidian's motion for clarification. The ALJ's Ruling notes that "Staff agreed with the concerns raised by Obsidian . . . regarding the application of Staff's methodology to renewable solar QF resources . . . ." The ALJ notes

that Staff recommended further input from interested parties in order to clarify the issue raised by Obsidian. In light of this, the ALJ's Ruling states that Obsidian's "request for clarification of Staff's methodology for adjusting rates to reflect a solar QF's capacity contribution is granted. The parties should address the methodology applicable to renewable solar QF resources . . . in the investigations currently taking place for Pacific Power's and Idaho Power's compliance filings in this docket."

Q. WERE THE PARTIES ABLE TO RESOLVE THE METHODOLOGY APPLICABLE TO RENEWABLE SOLAR QF PROJECTS IN THE COMPLIANCE FILING INVESTIGATIONS, AS DIRECTED BY THE ALJ?

A. No. Although several workshops were held to discuss the utilities' compliance filings, the double-discount issue identified and raised by Obsidian was never resolved.

Q. WHAT IS THE CURRENT PROCEDURAL STATUS OF THE RENEWABLE SOLAR QF CAPACITY PAYMENT ISSUE RAISED BY OBSIDIAN?

A. Staff, PacifiCorp and several intervening parties entered into a Partial Stipulation on or about August 11, 2014, in which PacifiCorp's compliance filing was allowed to go into affect subject to the subsequent resolution of several outstanding issues in Phase II of UM 1610. In this Partial Stipulation, the stipulating parties agreed that the renewable solar capacity issue would be resolved on an expedited basis in Phase II. Although Obsidian did not join the Partial Stipulation, on August 15, 2014 Obsidian submitted comments to the Commission in which it stated that it did not object to the Partial Stipulation due to an overriding interest in moving this UM 1610 proceeding forward. In its comments, however, Obsidian urged the Commission to resolve the outstanding legal issues associated with PacifiCorp's compliance filing as expeditiously as possible. Staff subsequently set a procedural schedule specific to the renewable solar QF capacity payment issue to allow for its resolution independent from the other issues to be addressed in Phase II of this docket.

Q. DID OBSIDIAN PARTICIPATE IN THE WORKSHOPS SCHEDULED BY STAFF TO ADDRESS THE RENEWABLE SOLAR QF CAPACITY PAYMENT ISSUE?

A. Yes. In addition to the earlier workshops addressing PacifiCorp's compliance filing, as noted above, Obsidian also participated in person at the workshops held on September 24 and October 14, 2014, for the specific purpose of discussing the methodology for calculating capacity payments for renewable solar QF projects.

Q. ARE YOU FAMILIAR WITH THE "STRAW MAN" PROPOSAL MADE BY STAFF FOR CALCULATING THE RENEWABLE SOLAR QF CAPACITY PAYMENT?

A. Yes, I am familiar with the "straw man" proposal made by Staff on September 24, as revised on October 14. As I understand it, Staff's goal was to eliminate the double discount to capacity contribution payments for renewable solar QF projects. Staff's proposal sets forth a three step process that: (1) Determines the purchasing utility's avoided cost of capacity on a kW per year basis; (2) Calculates a target annual capacity payment amount based on the purchasing utility's annual avoided capacity cost and the incremental capacity contribution of the QF project; and (3) Converts the target annual capacity payment into a volumetric rate that is spread over the project's expected annual hours of operation and added to the energy payment.

Q. PLEASE DESCRIBE YOUR UNDERSTANDING OF THE FIRST STEP OF STAFF'S REVISED PROPOSAL.

A. The first of Staff's proposal is to determine the cost per kW per year of the utility's avoided capacity resources. My understanding is that Staff made its proposal based on illustrative figures taken from PacifiCorp's 2012 avoided cost update filing. In the example provided by Staff, the avoided capacity resource is a 405 MW single cycle combustion turbine ("SCCT"), which has a capital cost of $364,905,000. The cost per kW is $901, which, when applying a payment factor of 8.41% to account for taxes and amortization, yields a cost per kW per year of $75.77. This figure represents the avoided

cost of capacity per kW per year to the utility—which is the underpinning of Staff's capacity payment proposal.

Q. DO YOU GENERALLY AGREE WITH THE FIRST STEP OF STAFF'S REVISED PROPOSAL?

A. Yes. Although I have not confirmed the actual figures from PacifiCorp's avoided cost update filing, I generally agree that the first step is to determine the purchasing utility's avoided cost of capacity on a kW or MW per year basis. The capacity payment that is made to renewable solar QF projects should be a function of the purchasing utility's avoided capacity costs. Choosing a capacity resource and its annual cost over the heavy load hours (which I also refer to as "peak hours") seems like a sensible approach for valuing the purchasing utility's avoided cost of capacity.

Q. PLEASE DESCRIBE YOUR UNDERSTANDING OF THE SECOND STEP OF STAFF'S REVISED PROPOSAL.

A. The second step of Staff's proposal is to calculate a target annual capacity payment for the renewable solar QF project based on its contribution to the purchasing utility's peak capacity requirements. In its proposal, Staff uses the term Contribution to Peak ("CTP") to describe the incremental contribution that the project makes to the purchasing utility's capacity requirements during heavy load hours. The CTP, which may also be referred to as the project's "capacity value," is then multiplied by the utility's avoided capacity cost (the dollar value determined in Step One) to come up with a dollar amount. This dollar amount reflects the total annual capacity value of the renewable solar QF project to the purchasing utility.

Q. DO YOU GENERALLY AGREE WITH THE SECOND STEP OF STAFF'S REVISED PROPOSAL?

A. I generally agree that it is appropriate to multiply the utility's avoided capacity cost by the renewable solar QF project's capacity value in order to calculate a target annual capacity payment. As discussed below, the renewable solar QF project's capacity value

is discounted to reflect the actual availability of the resource during peak hours. This approach ensures that the renewable solar QF project is not over-compensated for peak hours in which the project does not contribute to the utility's capacity requirements. In relation to Obsidian's motion of clarification of Order 14-058 described above, this step of Staff's proposed methodology results in a single discount of the capacity payment and helps to avoid applying a second discount. In other words, I agree with Staff's focus on the total annual value expressed in dollars of the capacity provided by the QF project to the purchasing utility—and then deriving the volumetric rate based on that total value.

What is particularly important about this step, as I will explain in greater detail below, is using and applying a correct figure for the renewable solar QF project's capacity value.

Q. PLEASE DESCRIBE YOUR UNDERSTANDING OF THE FINAL STEP OF STAFF'S REVISED PROPOSAL.

A. The final step of Staff's proposal is to design a volumetric rate by which the target annual capacity payment will be paid to the renewable solar QF. Staff indicates in its proposal that there are several options for designing a volumetric rate. Staff emphasizes that the volumetric rate design is intended to result in the same target annual capacity payment (determined in Step Two) so long as the renewable solar QF is available and operational during each hour over which the payment is spread.

Q. DO YOU GENERALLY AGREE WITH THE FINAL STEP OF STAFF'S REVISED PROPOSAL?

A. I generally agree that it is appropriate design the volumetric rate based on the target annual capacity payment dollars that have been calculated in Step Two. Designing the volumetric rate in this manner is essential to ensure that the total capacity payment for renewable solar QF projects is discounted only once, and not twice, to account for its lower capacity value as compared to a base load resource.

Q. DO YOU HAVE A PREFERENCE AS TO WHICH VOLUMETRIC RATE OPTION THE COMMISSION SHOULD APPLY?

A. Yes. Although a renewable solar QF project should be, from a mathematic perspective, indifferent to the volumetric rate structure so long as the total annual payment remains the same, I believe that the most appropriate volumetric rate option is an adjustment to the energy price based on a specific renewable solar QF project's expected annual hours of generation.

The design and application of this volumetric rate structure would be straightforward. For example, if the renewable solar QF project has an expected annual full time equivalent generation amount of 1,500 hours, then the target annual capacity payment dollars determined in Step Two would be divided by 1,500 to calculate the appropriate volumetric energy rate adjustment for that project. This volumetric rate would then be paid to the renewable solar QF project for each hour of generation. To the extent that there is a significant deviation between the expected production and actual production for a specific project, then an appropriate adjustment to the capacity payment may be made by the purchasing utility.

I think that this is the best option because it most closely correlates to the renewable solar QF project's actual contribution to the utility's capacity and reliability needs. This rate structure would also be easy for the utility and the QF to administer. Renewable Solar QF Projects are required to provide the purchasing utility with their project energy output, along with supporting analysis, when requesting a standard power purchase agreement. The information needed to implement this rate design structure is already available during the contracting process.

Q. FOR PURPOSES OF YOUR VOLUMETRIC RATE DESIGN PROPOSAL, HOW WOULD THE RENEWABLE SOLAR QF PROJECT'S EXPECTED ANNUAL HOURS OF GENERATION BE DETERMINED?

In my experience, it is possible to determine with a high degree of accuracy what a solar project's expected annual hours of generation during high load hours will be. As

stated above, the renewable solar QF project must provide the purchasing utility an estimate of expected production. This projection of expected hourly production is objectively verifiable from the project's PVsyst reports, as well as its 8,760 reports to the purchasing utility. In the alternative to using the expected annual hours of generation for a specific project, the volumetric rate may also be derived from the expected hours of generation of a representative, or a "proxy," project. In my view, however, the project-specific approach is better because it accounts for differences in technology (fixed vs. tracking) and location (more sunny vs. less sunny) that is likely to exist between different renewable solar QF projects.

Q. PLEASE EXPLAIN YOUR PREVIOUS STATEMENT THAT THE DETERMINATION OF THE RENEWABLE SOLAR QF'S CAPACITY VALUE IS CRITICAL FOR CALCULATING THE APPROPRIATE TARGET ANNUAL CAPACITY PAYMENT.

A. As I explained above, the key to eliminating the double-discount error is to derive the volumetric rate from the target annual capacity payment. The target annual capacity payment is a function of the purchasing utility's avoided capacity cost multiplied by the renewable solar QF project's incremental contribution to capacity during peak hours—which staff labels "CTP" in its straw man proposal. If the renewable solar QF project's CTP is understated, then the target annual capacity payment will likewise be understated. The obvious problem is that it is easy for the utilities to provide a CTP for renewable solar resources in their respective IRPs that is severely understated. In such case, the entire capacity payment ratemaking exercise would be compromised.

Q. DO YOU AGREE WITH USING PACIFICORP'S CAPACITY VALUE FROM ITS 2013 IRP?

A. No. In its proposal, Staff suggests using the CTP assigned to solar resources by each utility in its IRP. In this case, the capacity value for solar in PacifiCorp's 2013 IRP is 13.6%. This is an unreasonably low assumption. Based on my experience as a solar developer, I believe that the capacity contribution value of a single axis tracking solar

project in Oregon actually should be about 38-39%. This is based on actual operating data that shows the availability of solar projects during peak load hours. Thus, I strongly disagree with using PacifiCorp's 13.6% number as the basis for determining the CTP for renewable solar QF project.

Q. WHY IS THE CAPACITY VALUE IN PACIFICORP'S 2013 IRP SO LOW?

A. PacifiCorp's 2013 IRP number of 13.6% is the product of a flawed methodology. As I understand it, in its 2013 IRP PacifiCorp used its own "Exceedance Methodology" for determining a solar project's contribution to PacifiCorp's peak load. The basic problem with PacifiCorp's Exceedance Methodology is that it only values the capacity contributed by the solar project during an arbitrary sub-set of critical peak hours determined by the utility—rather than all of the peak hours in which the project contributes capacity. In simple terms, PacifiCorp's methodology would only compensate the renewable solar QF project for a fraction of the total capacity that it contributes. PacifiCorp's unusual methodology is inconsistent with accepted practices in the electric industry. The more appropriate and widely accepted methodology for calculating a resource's capacity contribution is called the Effective Load Carrying Capacity ("ELCC").

Q. PLEASE BRIEFLY SUMMARIZE YOUR UNDERSTANDING OF THE ELCC METHOD OF CALCULATING SOLAR CAPACITY CONTRIBUTION.

A. My understanding of the ELCC methodology is that it is an estimate of the statistical probability that a particular resource type will contribute towards meeting a utility's reliability needs during any given peak hour or hours. Although I do not purport to be an expert in statistical probabilities, I understand that ELCC calculations have been conducted for conventional resource types for decades and that the methodology is now commonly used for variable resources as well. Based on my experience as a developer, the ELCC method of estimating of solar capacity contribution produces results that more

closely correlate to the actual availability of solar resources during all peak hours than do other methods that arbitrarily select a subset of peak hours.

Q. PLEASE EXPLAIN YOUR STATEMENT ABOVE THAT THE ELCC METHOD IS WIDELY ACCEPTED IN THE ELECTRIC UTILITY INDUSTRY.

A. It is my understanding that the ELCC method has been accepted as the preferred means of determining the capacity value of solar resources by electric industry leaders including, but not limited to, the National Renewable Energy Laboratory ("NREL"), the North American Electric Reliability Corporation ("NERC") and state utility regulators such as the Utah Public Service Commission ("Utah PSC").

In fact, on August 16, 2013, the Utah PSC issued an Order in Docket 12-035-100 in which it expressly rejected PacifiCorp's Exceedance Method of calculating solar capacity value. Relevant excerpts of the Utah PSC order are attached hereto as Exhibit 201. The Utah PSC stated that "PacifiCorp's Exceedance Method is not an industry standard approach." The Utah PSC explained that PacifiCorp's method "arbitrarily weights company data" and "fails to consider reliability measures" in the determination of the hours evaluated. The Utah PSC concluded that "[g]iven the evidence demonstrating significant flaws in the Exceedance Method and the fact that it results in a [] capacity contribution assumption for reliability planning and QF capacity payments substantially different from values used or approved in the past, we reject its use in this case."

The Utah PSC directed PacifiCorp to calculate the capacity contribution of solar resources using either the ELCC method or an approximation of that method. The Utah PSC ordered that, pending PacifiCorp's completion of an ELCC or equivalent study, it would accept a capacity value of 84% for tracking solar QFs. Following the Utah PSC order, PacifiCorp has in fact switched to an approximation to the ELCC methodology for its 2015 IRP.

Q. DO YOU AGREE WITH USING THE CAPACITY VALUE THAT PACIFICORP INTENDS TO USE IN ITS 2015 IRP?

A. Yes, as a basis of compromise. On September 25-26, 2014, PacifiCorp held a public input meeting concerning its 2015 IRP. In its written report for the public meeting, PacifiCorp explained that it had updated its wind and solar capacity contribution study for 2015. PacifiCorp further explained that its revised study was based on an approximation of the ELCC methodology, as directed by the Utah PSC, rather than the Exceedance Method. Using this revised methodology, PacifiCorp determined that the capacity value for a single axis tracking solar facility in Oregon is 36.7%. Relevant excerpts of PacifiCorp's revised capacity value estimates are attached hereto as Exhibit 202. Although I still believe this to be a low estimate, it is certainly more consistent with my experience, as a solar developer, of the availability of solar capacity during peak hours and I would accept it as being "close-enough" so as to warrant no further objection.

Q. DO YOU AGREE WITH USING PGE'S CAPACITY VALUE FROM ITS 2013 IRP?

A. No. PGE's 2013 IRP proposes to assign a solar capacity contribution value of just 5%. For the reasons stated above in connection with PacifiCorp's 2013 IRP, in my opinion PGE's proposed solar capacity value grossly underestimates the capacity contribution of solar projects. PGE's 2013 IRP actually runs both the Exceedance Method and the ELCC method. The Exceedance Method yields a number that PGE averages to 5%. The ELCC methodology, on the other hand, produces a capacity value that is closer to 20%. Nevertheless, PGE proposes to discard the higher ELCC results and use only the Exceedance Method.

I have two objections about the capacity contribution factor in PGE's 2013 IRP. First, PGE should be required to use the industry standard ELCC methodology, rather than the Exceedance Method, for purposes calculating the capacity value for renewable solar QF projects. As explained above, this is the only way to compensate a renewable

solar QF projects for all of the capacity that it actually provides during peak hours rather than an arbitrary subset of peak hours.

My second objection is that I believe that PGE's application of the ELCC method in the 2013 IRP still significantly underestimates solar's capacity value. The capacity value of a variable resource is directly related to the amount of hours during high-load-hours (or peak hours) that the resource is available. In my experience, a utility scale solar resources with single-axis tracking in a commercially viable location in Oregon is available about 90% to 100% more often than a rooftop resource located in the Willamette Valley. If PGE believes that 20% is the capacity value of a solar facility in the Willamette Valley, I would expect the capacity value of a solar project with tracking that is located in a sunny part of the state to be in the range of 33% to 38% (which more closely coincides with PacifiCorp's 2015 IRP results). The Commission should ensure that the assumptions being made by PGE in its ELCC study are commercially reasonable and consistent with industry standards. Observing that solar capacity differs based on the location and technology, PacifiCorp uses a table rather than a single value for solar capacity.

Q. WOULD IT UNDULY BURDEN THE PURCHASING UTILITIES TO REQUIRE THEM TO USE THE ELCC METHOD?

A. No. As discussed above, both PGE and PacifiCorp are already doing the ELCC analysis as a basis for determining capacity values of solar resources. Thus, the problem is not in requiring the utilities to do the calculation. The problem is that PGE simply refuses to use the ELCC results and PacifiCorp refuses to use the ELCC results until its 2015 IRP is acknowledged.

Q. PLEASE SUMMARIZE YOUR RECOMMENDATION FOR THE COMMISSION.

A. In summary, my recommendation is for the Commission to use Staff's straw man proposal as the basis for calculating the capacity payment for renewable solar QF

projects. Specifically, I recommend calculating the purchasing utility's avoided cost of capacity on a kW per year basis as Staff has suggested. I further agree with Staff that the purchasing utility's avoided capacity cost should be multiplied by the renewable solar QF project's capacity value to determine a target annual capacity payment to the project. Finally, I generally agree that the target annual capacity payment should be the basis of the volumetric rate paid to the renewable solar QF project. In terms of the volumetric rate design, I recommend an adder to the project's energy payment that is based on the target annual payment amount divided by the renewable solar QF project's expected annual hours of production.

In order to properly implement Staff's straw man proposal, the Commission should require the purchasing utilities to calculate the solar capacity value—or CTP in the Staff proposal—using the industry standard ELCC method (or an accepted approximation of that method).

Q. DOES THIS CONCLUDE YOUR TESTIMONY AT THIS TIME?

A. Yes.

- BEFORE THE PUBLIC SERVICE COMMISSION OF UTAH -

In the Matter of the Application of Rocky Mountain Power for Approval of Changes to Renewable Avoided Cost Methodology for Qualifying Facilities Projects Larger than Three Megawatts	DOCKET NO. 12-035-100 ORDER ON PHASE II ISSUES

ISSUED: August 16, 2013

SHORT TITLE

PacifiCorp Large Renewable QF Avoided Costs

SYNOPSIS

The Commission approves an avoided cost method to determine indicative prices for power purchases from certain QF projects larger than three megawatts. Further, the Commission determines: (1) RECs shall be retained by QFs, unless provided for otherwise by a negotiated contract; and (2) the Proxy/PDDRR method is approved for determining avoided costs for all small power production QFs.

Finally, all renewable resources included in the IRP planned resources which are not cost-effective but are required to meet a state's RPS will be treated as system resources in the calculation of QF energy payments. We find this approach is consistent with the 2010 Protocol on inter-jurisdictional cost allocation approved in Docket No. 02-035-04.[21]

B. Capacity Contribution of Intermittent Renewable Resources

1. Parties' Positions

a. Exceedance Method

According to PacifiCorp, capacity contribution represents the percentage of a generator's nameplate capacity PacifiCorp can reliably use to satisfy the system peak load requirement. To measure the historical capacity contribution of renewable resources, PacifiCorp introduces an approach referred to as an Exceedance Method which it developed and presents for the Commission's consideration in this docket. The Exceedance Method measures the level of intermittent capacity necessary to provide the same level of reliability in the system peak hour as expected from the next deferrable resource in the IRP, a Combined Cycle Combustion Turbine ("CCCT") in this case. Because the full output of a CCCT is expected to be available in more than 90 percent of peak load hours, the Exceedance Method measures the level of power achieved or exceeded by PacifiCorp's intermittent resources in 90 percent of the top 100 summer peak load hours each year.

PacifiCorp testifies the capacity contribution values described below are used in the IRP to select resources based on their ability to meet system peak load in a least-cost, least-risk manner. Further, PacifiCorp explains the capacity payment in the Proxy/PDDRR method

[21] *See In the Matter of the Application of PacifiCorp for an Investigation of Inter-Jurisdictional Issues*, Docket No. 02-035-04, (Report and Order; February 3, 2012).

accounts for partially deferring resources selected in the IRP. Therefore, PacifiCorp argues the capacity contribution value used in the Proxy/PDDRR method should be the same value used in the IRP for consistency and to ensure the capacity payment to renewable QFs is valid.

i. Wind Resources

To calculate wind resource capacity contribution, PacifiCorp identifies the top 100 summer peak load hours in each year between 2007 and 2011 and aligns the aggregate capacity factor from both PacifiCorp's owned and non-owned wind resources occurring with the corresponding load hour. Between 2007 and 2011, PacifiCorp represents its portfolio of wind resources provides an average capacity contribution of 4.1 percent of nameplate capacity in more than 90 percent of the 100 peak load hours.

ii. Solar Resources

PacifiCorp states it has limited historical solar data from which it can develop the capacity contribution value of a class of geographically distributed solar resources on its system. Consequently, PacifiCorp testifies it uses the average solar energy production data developed by the National Renewable Energy Laboratory ("NREL") from five locations within PacifiCorp's service territory (Pocatello, Idaho; Yakima, Washington; Pendleton, Oregon; Lander, Wyoming; and Salt Lake City, Utah) to determine the capacity contribution value.

PacifiCorp compared the simulated hourly solar data to the top 100 summer load hours in each year during the period 2007 through 2011 using the Exceedance Method. PacifiCorp claims, unlike wind resources where levels of generation change each year depending on the output of the resource set, simulated solar output remains constant in each year and is compared to changes in the timing of the top 100 peak summer load hours from year-to-year.

In its solar resource analysis, PacifiCorp differentiates between classes of solar resources based on whether the solar resource is configured to maximize energy output ("Fixed Solar") or whether it is configured to maximize output during peak load periods, i.e., solar aligned more towards the West or with a tracking device ("Tracking Solar"). The analysis is performed twice: first, with all of the resources configured to simulate Fixed Solar, and second, with all of the resources configured to simulate Tracking Solar. PacifiCorp's Exceedance Method yields recommended capacity values of 11.5 percent for Fixed Solar and 25.9 percent for Tracking Solar.

b. Criticisms of Exceedance Method

The Division, Office, UCE, SunEdison, and Scatec are critical of the Exceedance Method. The Office claims the Exceedance Method is overly simplistic and cannot measure the reliability benefits of renewable QFs. The Office argues reliability needs impact PacifiCorp's reserve margin requirements which, in turn, may drive the need for new capacity resources. From a reliability perspective, the Office argues it is not the average availability or the availability of a resource in 90 percent of the top 100 load hours that matters, but rather the availability of a resource in all hours and particularly during extreme conditions that matters the most.

The Division asserts the Exceedance Method sets arbitrary thresholds and is incongruous with PacifiCorp's IRP studies. The Division further contends that while the IRP may use system peaks to determine the timing of additional resources, all hours of the year are evaluated to consider the type of resources needed. Thus, similar to the Office's argument, the Division contends the value of a resource in the context of PacifiCorp's choice of a least-cost,

least-risk IRP preferred portfolio is based on the resource's contribution in all hours of the year, as opposed to the top 100 load hours in a given study period.

The Division, SunEdison and UCE criticize PacifiCorp's use of the Exceedance Method for solar resources because the method compares simulated hourly NREL solar profile data to PacifiCorp's actual 100 high load hours. Additionally, SunEdison criticizes PacifiCorp's method because it fails to assign value to renewable resources that provide capacity beyond the 100 high load hours.

Scatec and SunEdison argue PacifiCorp's use of simulated solar data from five locations within Company territory (Pocatello, Idaho; Yakima, Washington; Pendleton, Oregon; Lander, Wyoming; and Salt Lake City, Utah) is unrealistic based on the location of likely Schedule 38 solar facilities in southern Utah. At hearing, PacifiCorp stated the five locations selected by PacifiCorp for its study are not consistent with the location of large-scale solar projects planned for development.

PacifiCorp does not dispute the assertion that renewable resources provide capacity value beyond the 100 hours utilized by the Exceedance Method and acknowledges the Exceedance Method is a new capacity valuation approach used solely by PacifiCorp. At hearing, PacifiCorp stated that comparing a five-year, five-state average simulated solar production data to actual load data could result in a possible mismatch but indicated that due to a lack of actual solar data, PacifiCorp was forced to rely on the average solar production data.

c. Support for a Capacity Factor Allocation Method

The Division, Office, SunEdison and UCE contend the Effective Load Carrying Capability ("ELCC") and the Equivalent Conventional Power ("ECP") capacity calculation

methods put forward by NREL, and contained in UCE Exhibit 4.1 (D) ("NREL Study"), are more appropriate methods to calculate capacity values for renewable resources. These parties argue both methods, characterized as reliability-based, seek to capture the reliability value of the renewable resources through use of a Loss of Load Probability ("LOLP") or Loss of Load Expectation ("LOLE") modeling approach.[22]

Although it supports a reliability-based method such as the ELCC method for calculating (wind) capacities, the Division states alternative methods which approximate the ELCC and ECP approaches, as put forward in the NREL Study, may be warranted because the ELCC and ECP approaches are data-intensive and difficult to execute. For example, the Division further testifies the LOLP calculation requires considerable data including the distribution of the loads and resource availability. Moreover, to calculate the LOLE, the LOLP for each hour must be calculated.

While the Office argues the NREL Study results are not Company-specific and are of limited value for determining renewable resource capacity values in this proceeding, the Office does not believe the methods underlying the NREL Study are inappropriate. The Office recommends the Commission require PacifiCorp to implement a capacity value based on one of the reliability methods documented in the NREL Study or in the IEEE study attached as exhibit DPU 2.1 to the Division's rebuttal testimony.

In light of the complexity of the ELCC and ECP methods, the Division, the Office and UCE support use of the Capacity Factor Allocation Methodology ("CF") also described in the NREL Study. They testify the CF method is a much simpler method that reasonably

[22] The NREL Study defines LOLP as the "probability of a loss of load event in which the system load is greater than available generating capacity during a given time period."

approximates the results achieved by the ELCC method for calculating capacity values for renewable QFs. These parties argue the CF method is a reasonable alternative approach due to its simplicity and its relative accuracy. The CF method is a capacity value approximation technique that considers the renewable resource's output in each hour of a study period. According to the Division, it also considers the resource's capacity factor during periods in which the system faces a high risk of an outage event.

The Division claims that in addition to being reasonably accurate and simple to execute, the CF method has two other distinct advantages relative to the ELCC and ECP methods analyzed in the NREL Study: (1) it is transparent because - once the LOLP for each hour is calculated, the remaining calculations are relatively easy to follow and understand; and (2) it yields reasonably accurate results using a limited amount of data.

Both the Division and UCE reference the NREL Study conclusion which states that using as few as the top 10 percent of load hours in the capacity calculation may be sufficient for an effective CF analysis. To that end, UCE recommends a CF analysis be performed using PacifiCorp's top 10 percent load hours rather than the highest 100 load hours per year. Where the data may not be available, such as for solar resources, the Division recommends the use of the CF method described in the NREL Study, which shows the top 10 hours is sufficient for valid solar capacity contribution results.

As noted by the Division, PacifiCorp did not calculate wind capacity contribution using the ELCC or CF methods as requested in a Division data request. The Division states that in addition to the ELCC value, PacifiCorp's response would have provided the data necessary to calculate capacity values using the CF method. Since it lacks the data, the Division states the

Commission will need to determine a capacity value for renewable wind resources at least on an interim basis.

In order to identify an interim value, the Division calculates wind resource capacity values using a variation of PacifiCorp's Exceedance Method where the top 100 load hours in each year between the period 2007 and 2011 are aligned with actual hourly generation output from both PacifiCorp's owned and non-owned wind resources occurring with the corresponding load hour. The difference in the Division's approach is that it applies higher weights to the lowest wind output values, as these values are more representative of expected wind output.

Using this weighting approach, the Division employs the Exceedance Method to determine wind capacity values occurring at the 90th percentile of the weighted values. Under the "weighted" Exceedance Method approach, the Division calculates a wind capacity value of 8.72 percent. Applying a simple average to this entire data set, the Division estimates a wind capacity value of 12.03 percent.

The Division performs two additional iterations using its approach by halving the weights occurring above both the mean and median wind capacity values, resulting in wind capacity values of 10.51 percent, and 10.12 percent, respectively. Thus, the Division proposes a wind capacity contribution in the range of 8.72 percent to 12.03 percent on an interim basis. The Division further recommends the Commission convene technical conferences and collect party comments to resolve the issue of wind resource capacity values.

The Division does not calculate an interim solar capacity value. The Division states the NREL Study includes specific estimates for the Salt Lake City area based on the CF

method which ranges from 68 percent for Fixed Solar to 84 percent for Tracking Solar. The Division maintains these values could be used on an interim basis.

The Office contends a simple version of the CF method without use of LOLP is referenced in the NREL Study and can be used to estimate renewable resource capacity values. The Office calculates a wind capacity value by averaging the capacity factors of wind resources in PacifiCorp's east control area during the highest 500 summer hours over PacifiCorp's five year period. This yields a result of 20.5 percent. Similarly, the Office averages PacifiCorp's simulated solar resource data results over the same period and calculates capacity contribution values of 49.6 percent for Fixed Solar and 59.1 percent for Tracking Solar.

Like the Division, the Office notes the data necessary to calculate values using the LOLP weighting methods were not provided. The Office argues, however, that its solar capacity value estimates would be a reasonable set of values to use for this proceeding, and the 20.5 percent wind capacity value is a more reasonable alternative than PacifiCorp's result. The Office believes these estimates could be used on an interim basis, but a better study using the NREL methods should be performed with results made available to parties for review and comment. In terms of the impact on overall wind avoided costs, according to the Office, it makes little difference which method is used as the resource sufficiency period does not end until 2024.

d. Company's Criticism of CF Method

PacifiCorp contends a renewable QF should be paid for the amount of capacity it can defer at the time of system peak. PacifiCorp argues the methods proposed by parties (the ELCC and CF methods) are energy-based measures, and none of the other studies introduced by

NREL and proposed by the other parties addresses the issue of how much of a capacity payment should be provided to a QF.

PacifiCorp asserts the Commission should not use the capacity contribution numbers that come directly from the NREL Study. PacifiCorp states the NREL Study warns against using the values in their study at an individual utility level since they were based on WECC-wide load and resource data rather than individual utility load data. The Office concurs with PacifiCorp regarding the limited usefulness of the NREL Study data.

PacifiCorp also argues basing capacity values on the ELCC and CF methods would have the effect of reducing the reliability of the system to meet system peak load. PacifiCorp asserts system reliability would be significantly affected if these methods were adopted, and it would be inappropriate to inflate payments to renewable QFs when the result would be a reduction in system reliability. The only alternative in such a situation, according to PacifiCorp, would be to add additional resources to bring reliability levels back up to targets listed in the IRP with the result being that customers effectively pay twice for the same capacity.

2. Findings and Conclusions

PacifiCorp's Exceedance Method is not an industry standard approach. Rather, it was developed by PacifiCorp, and this is our first exposure to this method. The record shows this method arbitrarily weights Company data because it fails to consider reliability measures, like LOLP, in the determination of the hours evaluated.[23] Therefore, the method may incorrectly state the reliability value of an intermittent resource and the capacity payment to intermittent QFs, and contravene the important objective of ratepayer indifference. Given the evidence

[23] *See* UCE Exhibit 4.1(D), p. 2.

demonstrating significant flaws in the Exceedance Method and the fact it results in a wind capacity contribution assumption for reliability planning and QF capacity payments substantially different from values used or approved in the past, we reject its use in this case.

We are persuaded by the parties opposing PacifiCorp's method that the ELCC and CF methods described in the NREL Study reasonably account for LOLP. Therefore, we direct PacifiCorp to calculate capacity contribution for wind and solar resources for the Proxy/PDDRR method using either the ELCC method or CF method considering LOLP.

In this proceeding, however, no party provides a capacity contribution study for wind or solar resources using the ELCC method or CF method considering LOLP and Company data. Accordingly, we adopt the Office's estimation of a 20.5 percent capacity payment for wind QFs, pending PacifiCorp's filing of an ELCC or CF method study. We accept the Office's recommendation because it is a simple average, rather than an arbitrary weighting, of historical wind resource capacity factors in PacifiCorp's eastern control area. Since all Utah QFs will be located in PacifiCorp's eastern control area, we find this is a reasonable value for Utah wind QF capacity payments. This decision is also similar to our prior ruling,[24] and, therefore, maintains a consistent value pending further review of the ELCC or CF study results. Moreover, it is partially corroborated by the Division's analysis.

Similarly, pending PacifiCorp's filing of the ELCC or CF study results for solar resource capacity contribution, we accept the Division's recommendation for capacity payments to Fixed and Tracking Solar QFs of 68 percent and 84 percent, respectively. These are the values derived using the CF method cited by the Division in the NREL Study based on WECC

[24] *See* Docket No. 03-035-14, pp. 22-23.

load and resource data and Salt Lake City solar data. We recognize PacifiCorp's loads and resources may produce different outcomes but accept the results in the NREL Study as a reasonable interim proxy representing a gradual change from our prior ruling on solar QFs which did not address capacity payments for solar resources under the Proxy/PDDRR method.

C. Wind Integration Cost

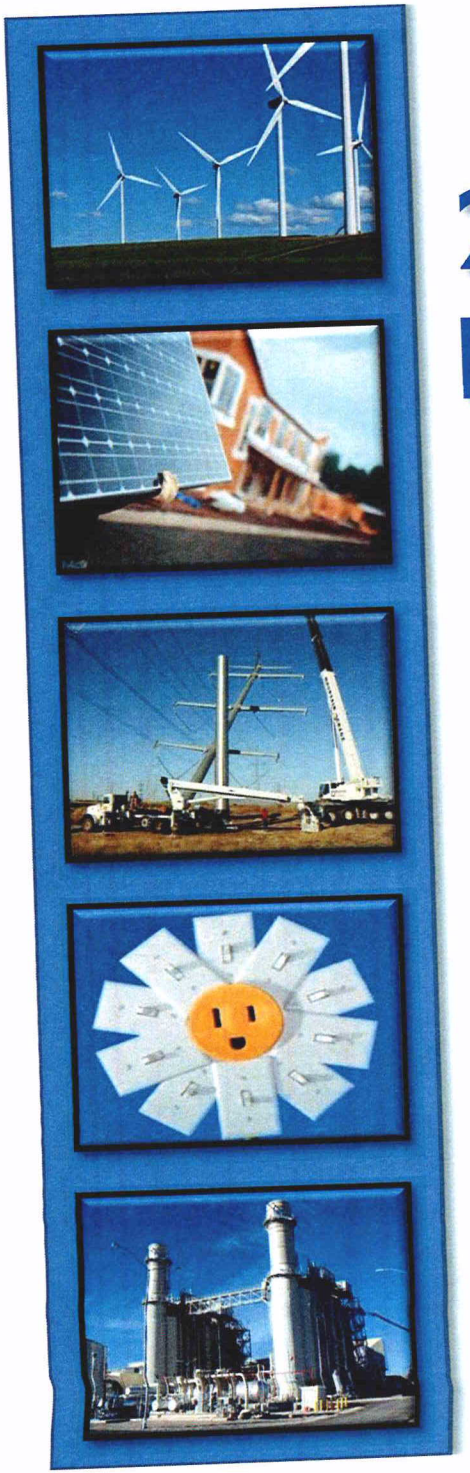
1. Parties' Positions

To account for wind integration costs, PacifiCorp proposes using its 2012 Wind Integration Study ("WIS"), as included in the 2013 IRP. In the WIS, PacifiCorp calculates wind integration cost to be $4.35 per megawatt hour, on a levelized basis over a 20 year period beginning in 2013.

No party opposes PacifiCorp's proposed wind integration costs as contained in the WIS. The Office states that while the WIS has not been approved by the Commission nor has it yet been endorsed by the Technical Review Committee ("TRC") guiding its development, it is the most practical alternative available at this time. The Office recommends implementing the proposed $4.35 wind integration charge. Once the WIS has been fully vetted by the TRC and the Commission in the IRP process or a future general rate case, the Office recommends the Commission consider applying any necessary changes to the wind integration value based on the comments.

2. Findings and Conclusions

Based on the general consensus among the parties to rely on the 2012 WIS, we find that for the present, the $4.35 per megawatt hour wind integration charge is reasonable for calculating Schedule 38 avoided energy costs for wind QF resources.



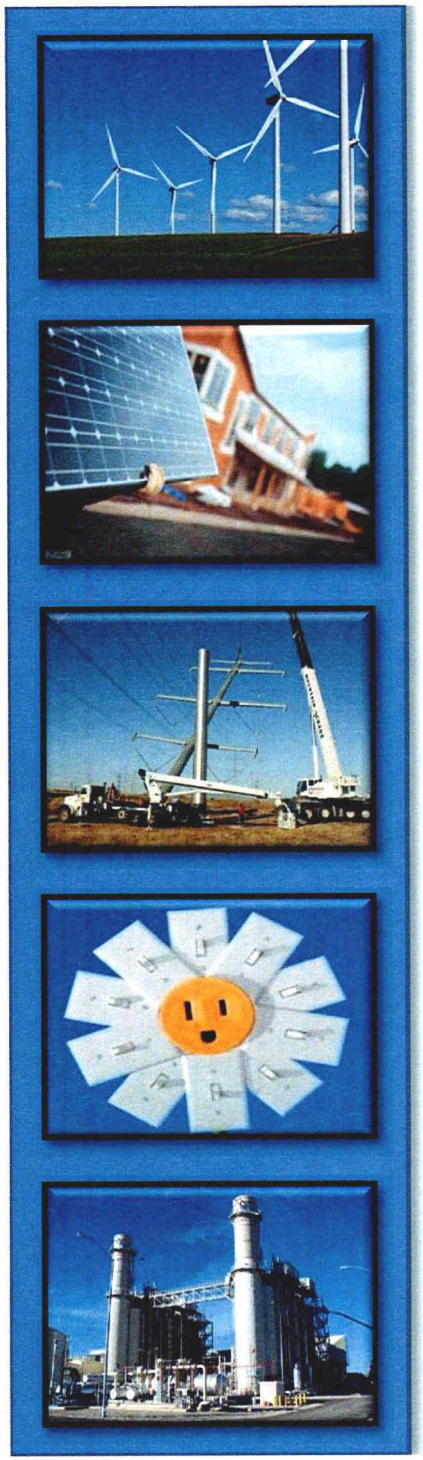
2015 Integrated Resource Plan

Public Input Meeting 4

September 25-26, 2014

PACIFICORP

Rocky Mountain Power
Pacific Power
PacifiCorp Energy



2015 Integrated Resource Plan

Resource Capacity Contribution Results

PACIFICORP

Rocky Mountain Power
Pacific Power
PacifiCorp Energy

Wind & Solar Capacity Contribution

- PacifiCorp has updated its wind and solar capacity contribution study for the 2015
- The methodology is based on a National Renewable Energy Laboratory ("NREL") report on Effective Load Carrying Capability (ELCC) approximation methods
- The methodology (the "CF Approximation Method") relies upon weighted hourly loss of load probability (LOLP) statistics based on the reliability model used in PacifiCorp's planning reserve margin study at the 13% planning reserve margin level
- Based on in its review of the literature, PacifiCorp will adopt the capacity contribution results from this study when developing resource portfolios for the 2015 IRP

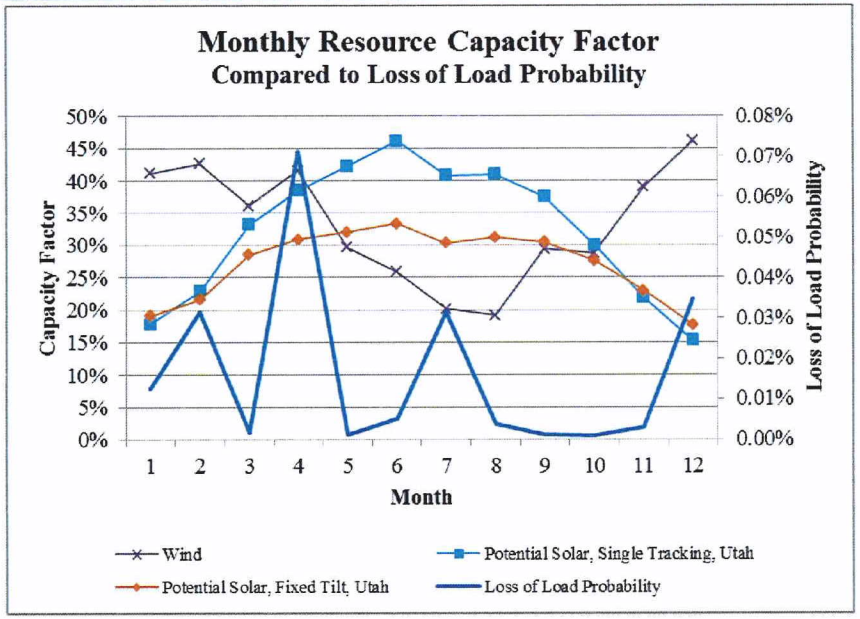
CF Approximation Method

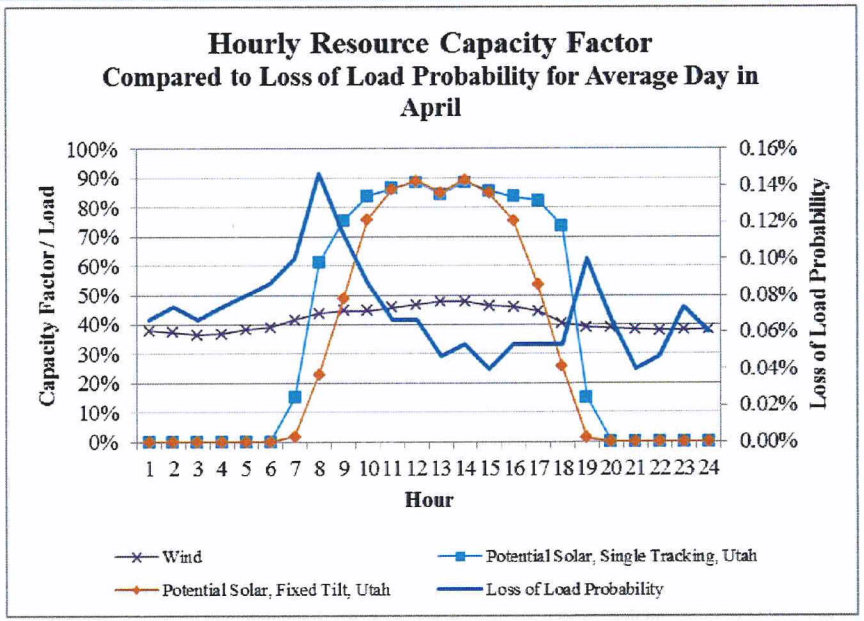
- Approximation of the computationally intensive Effective Load Carrying Capability (ELCC) method
- 500-iteration hourly PaR run (reliability model used in the planning reserve margin study)
- Each hour's LOLP is calculated, with weighting factors calculated by dividing each hour's LOLP to the total LOLP in the 2017 study year
- Capacity contribution calculated as the sum of hourly weighted capacity factors for each resource type
  - Wind
  - Proxy solar (fixed & tracking) in Milford, UT
  - Proxy solar (fixed & tracking) in Lakeview, OR

Wind and Solar Capacity Contribution Results

	Wind	Solar PV					
		OR Fixed Tilt	UT Fixed Tilt	Average Fixed Tilt	OR Single Axis Tracking	UT Single Axis Tracking	Average Single Axis Tracking
2013 IRP (90% probability among top 100 Load Hours)	4.2%	13.6%					
2015 IRP (CF Approximation)	18.1%	32.2%	34.1%	33.1%	36.7%	39.1%	37.9%

Sample of LOLP and Capacity Factor Data





- Seasonal distribution of LOLP shows highest time periods in spring (maintenance period), summer (July peak loads), and winter (December – February)
- Among April hours, LOLP events peak during morning and evening ramp periods

CERTIFICATE OF SERVICE

I hereby certify that I caused to be served the foregoing **TESTIMONY OF DAVID W. BROWN** via electronic mail and, where paper service is not waived, via postage-paid first class mail upon the following parties of record:

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4812-3211-2672, v. 1