ROCKY MOUNTAIN POWER
A DIVISION OF PACIFICORP

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RE: UT Docket No. 17-035-61
     Vote Solar 12th Set Data Request (1-4)

Please find enclosed Rocky Mountain Power's Responses to Vote Solar 12th Set Data Requests 12.1-12.4.

If you have any questions, please call me at (801) 220-2823.

Sincerely,

___/s/___
Jana Saba
Manager, Regulation

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Vote Solar Data Request 12.1

Please refer to lines 60-66 of the Direct Testimony of Mr. MacNeil, filed on February 3, 2020, regarding the use of the Generation and Regulation Initiative Decision Tool (GRID) model.

(1) Please describe PacifiCorp's long-term plans for the GRID model.

(2) Is PacifiCorp continuing to service updates to the GRID model?

(3) Does PacifiCorp plan to replace the GRID model with another tool in the future? If so, why?

(4) Under what timeline does PacifiCorp intend to sunset its use of the GRID model?

(5) What model will replace the GRID model and why was that option selected?

(6) Will stakeholders be offered free, web-based access to the new model in a similar fashion as with GRID? Please explain.

Response to Vote Solar Data Request 12.1

(1) PacifiCorp is currently planning to cease using the Generation and Regulation Initiative Decision Tool (GRID) for rate making purposes by 2022.

(2) The GRID software was developed in-house by PacifiCorp and the Company provides its own technical support.

(3) Yes, PacifiCorp is planning to replace GRID with another production cost model that has capability for the anticipated nodal pricing model (NPM) methodology and external support.

(4) Please refer to the Company's response to subpart (1) above.

(5) For regulatory net power costs (NPC), PacifiCorp is currently in the process of testing and implementing the AURORA model from Energy Exemplar. For integrated resource planning (IRP), PacifiCorp is currently in the process of testing the PLEXOS model, also from Energy Exemplar. Any change of model under the proxy/partial displacement revenue requirement (PDDRR) methodology would be identified as a non-routine change as part of PacifiCorp's required quarterly avoided cost input updates. The most recent quarterly filings have been made in Docket 19-035-18.

(6) Energy Exemplar offers regulators and other parties a version of its software licenses at a cost.

Vote Solar Data Request 12.2

Please refer to lines 79-85 of the Direct Testimony of Mr. MacNeil, filed on February 3, 2020:

(1) Please explain Mr. MacNeil's opinion that the hourly results from the GRID model are not appropriate for development of the export credit.

(2) Please explain why the method employed by RMP in support of its avoided energy cost is preferred to use of the hourly GRID results.

(3) Please describe why the GRID model's hourly results can reflect changes that span multiple hours. Please provide an example from the GRID run in this instance.

(4) Did RMP make any adjustments to specific inputs to the GRID model, including but not limited to adjustments to plant dispatch, in support of the analysis that underlies the avoided energy cost calculation? If so please list and explain each adjustment made.

(5) What is the minimum sized resource that Mr. MacNeil would recommend be modeled in the GRID model in order to produce accurate results?

Response to Vote Solar Data Request 12.2

(1) Hourly detail within the Generation and Regulation Initiative Decision Tool (GRID) is confidential, so it provides a limited opportunity for stakeholder review. In contrast, the proposed hourly shaping is based on publicly available data. In addition, certain aspects of GRID results are attributable to events that span multiple hours. For example, a natural gas plant that is cycled off-line will have a minimum down time and will incur startup costs when it is brought back on-line. To the extent it is cost-effective to cycle the plant, the cost savings from using alternate generation resources or market purchases more than compensate for the associated startup costs, but those startup costs are not assigned to specific hours, nor are they reported by GRID. Coal plants with minimum take requirements can also produce results that span multiple hours, as the impact of a minimum take requirement varies depending on the annual output rather than a single hour.

(2) Please refer to the Company's response to subpart (1) above. The use of non-confidential data for on-peak / off-peak shaping is preferred for transparency.

(3) Please refer to the Company's response to subpart (1) above. Because the change in resources contemplated in this analysis is small, the commitment of most existing natural gas plants was locked in place in the base case to reduce the potential for disproportionate variances. This is done by setting the "Can Cycle" thermal resource attribute to zero (i.e. cannot cycle, so the unit must run when it is available) and

adding planned outage inputs that match the economic shutdowns last calculated in GRID. The Company has not reviewed the hourly avoided cost results to identify circumstances that reflect impacts that span multiple hours.

(4) The inputs to GRID are consistent with the avoided cost calculations used for qualifying facilities (QF), as of the January 10, 2020 avoided cost inputs compliance filing. Natural gas plant commitment was fixed as discussed in the Company's response to subpart (3) above. Battery charge and discharge schedules (which are input through the demand file) are also portfolio specific, as they vary with load net of renewable generation, so these inputs are also specific to the portfolio being evaluated.

Note: certain outputs from GRID are modified to accurately represent avoided costs. First, GRID does not support negative numbers or zero for thermal fuel costs. Curtailable renewable resources may have a dispatch cost of zero, and may have a negative dispatch cost if their renewable energy credits (REC) have been contracted or if they are producing production tax credits (PTC). To enable GRID to economically dispatch these units, all dispatchable resources with a cost less than $0.01 per megawatt-hour ($/MWh) are scaled such that the cost is greater than zero. This scaling is reversed in the GRID results template on tab "Trapped Adj". Second, GRID dispatch and the avoided cost results reflect incremental coal costs, while GRID reports a point estimate of average costs (i.e. based on a single pre-determined volume). Tab "FuelCalc" contains the calculations used to calculate the total coal cost as a function of the volume reported by GRID.

(5) The Company generally recommends that a resource be sized equivalent to the expected deliveries in the forecast period. Given that Schedule 137 program participation is unknown, the Company used participation in Schedule 136 as a proxy. The Company uses a 10 megawatt (MW) nameplate capacity to calculate avoided costs for small QFs – modeling an export profile with a maximum of 10 MW (roughly 25 percent of the filed level) should also produce a reasonable estimate. As modeled resource size gets smaller, changes in gas plant commitment or battery shaping can sometimes have a disproportionate and unrealistic impact on avoided costs, as these elements do not have that level of precision. In the monthly results, these changes may manifest as generation changes that are larger than the resource being added. If these variances do occur, they can generally be corrected, but it can be time-consuming to do so. As a result the effective size limit for GRID analysis is mainly practical, rather than fundamental.

Vote Solar Data Request 12.3

      Please refer to PaciCorp's Official Forward Price Curve:

(1) Please describe the inputs and assumptions in the fundamentals portion of the OFPC.

(2) What assumptions are included in the fundamentals portion of the OFPC regarding individual utility participation in the energy imbalance market (EIM)? Please explain.

(3) How often are assumptions regarding EIM entrants updated in the fundamentals portion of the OFPC?

(4) Please explain whether the EIM Day-ahead market (EDAM, or similar) is assumed to operate over the timeline of the OFPC forecasts. Please include assumptions concerning timing, entities that are assumed to participate, and list entities that are assumed to participate in the EIM and EDAM through 2040.

(5) Please list and explain each modification to the OFPC for each quarterly update beginning with the OFPC that underlies the 2019 IRP (dated September 2018) up to and including the most recently developed OFPC.

(6) How does the OFPC hourly price forecast differ from expected EIM prices?

    1. If they differ, what is the cause of the difference(s); and

    2. How do the EIM and OFPC differ by time of day, month, year and location? Please include any relevant work papers in spreadsheet format.

(7) Does the OFPC account for transmission constraints? If so, how?

(8) Does the OFPC account for the dispatch of resources in neighboring systems? If so, how are these dispatch positions account for in the OFPC?

Response to Vote Solar Data Request 12.3

(1) To generate its official forward price curve (OFPC), PacifiCorp uses the following inputs:

    1. Natural gas price forecast(s) supplied by expert third party forecasting services.

    2. PacifiCorp's macro-economic forecast of inflation for converting real-dollar assumptions to nominal dollars.

    3. Data regarding new units added to, and retired plants removed from Western Electricity Coordinating Council (WECC) is sourced from the United States

Energy Information Administration (EIA), and S&P Global.

4. Renewable builds, as required by states' renewable portfolio standards sourced from an expert third-party's forecast.

5. Transmission links, emission rates, and WECC loads are sourced from Energy Exemplar, the developer of AURORA. Note: AURORA is the model used in the development of PacifiCorp's OFPC.

6. Reserve margins, natural gas pipeline tariffs, and generic technology cost updates are sourced from Energy Exemplar and online tariff sheets.

7. Hourly scalars are then applied to the monthly OFPC to convert monthly values to hourly values.

(2) PacifiCorp's OFPC does not make any assumptions regarding the California Independent System Operator (CAISO) energy imbalance market (EIM).

(3) PacifiCorp's OFPC does not make any assumptions regarding the CAISO EIM.

(4) PacifiCorp's OFPC does not make any assumptions regarding the CAISO EIM.

(5) Natural gas prices as well as known builds and retirements are updated quarterly. Inflation is reviewed quarterly and updated when warranted. Inputs such as transmission, environmental policy, and emission prices are reviewed quarterly and updated if warranted. Other inputs such as unit characteristics (heat rates, outage rates, variable operations and maintenance (O&M), ramp rates, etc.), gas pipeline tariffs, endogenous new-build gas technology costs, WECC loads, and reserve margins are reviewed on an annual basis and updated accordingly.

(6) Please refer to the Company's responses to subparts 1. and 2. below:

1. EIM prices consist of the 15-minute market and the five-minute market, and are at every one of the thousands of locations (nodes) in the EIM footprint. The market prices are calculated for the upcoming time interval after bids have been submitted by the participants. The OFPC is a set of monthly heavy load hour (HLH) / light load hour (LLH) price curves for five markets (California-Oregon Border (COB), Mid-Columbia (Mid-C), Palo Verde (PV), NP15, and SP15). Hourly scalars can be applied to the OFPC to shape the OFPC by hour. Hourly scalars are calculated quarterly, using the most recent 24 full months of CAISO day-ahead hourly prices at the CAISO's Malin scheduling point (for PacifiCorp West (PACW)) and the CAISO's PV scheduling point (for PacifiCorp East (PACE)). EIM 15-minute market and five-minute market prices are not used in the creation of the hourly scalars.

2. Please refer to the Company's response to subpart (6) 1. above.

(7) PacifiCorp's OFPC is composed of 37 months of market forwards followed by 12 months of forwards blended with fundamental forecast prices that transition to a pure fundamentals forecast starting in month 50. The fundamentals are modeled using AURORA, a WECC-wide zonal linear programing model that optimizes total production costs subject to operating and transmission constraints. Transmission capabilities are modeled between zones, based on capabilities modeled by Energy Exemplar, the developer of AURORA.

(8) PacifiCorp's OFPC accounts for dispatch of resources in neighboring systems by using a WECC-wide model.

Vote Solar Data Request 12.4

Please refer to lines 120-125 of the Direct Testimony of Mr. MacNeil, filed on February 3, 2020:

(1) What analysis was undertaken to determine that exported load from approximately 9,000 customers was the appropriate size for modeling CG in GRID? Were other sizes evaluated? If so, please explain.

(2) Please provide work papers supporting the export credit profile utilized in the GRID model including each step from the raw LRS data to the average customer profile and the scaled profile used in the GRID run. Please provide all work papers in native format with formulas and links intact.

Response to Vote Solar Data Request 12.4

(1) The modeled volume is representative of the historical exports from customers on Schedule 136. No other sizes were evaluated.

(2) Please refer to the Company's response to Vote Solar 11.6 subpart (9) 2.