

PacifiCorp - Stakeholder Feedback Form

2019 Integrated Resource Plan

PacifiCorp (the Company) requests that stakeholders provide feedback to the Company upon the conclusion of each public input meeting and/or stakeholder conference calls, as scheduled. PacifiCorp values the input of its active and engaged stakeholder group, and stakeholder feedback is critical to the IRP public input process. PacifiCorp requests that stakeholders provide comments using this form, which will allow the Company to more easily review and summarize comments by topic and to readily identify specific recommendations, if any, being provided. Information collected will be used to better inform issues included in the 2019 IRP, including, but not limited to the process, assumptions, and analysis. In order to maintain open communication and provide the broader Stakeholder community with useful information, the Company will generally post all appropriate feedback on the IRP website unless you request otherwise, below.

Date of Submittal 12/26/2018

*Name: Noelani Derrickson

Title: Government and Regulatory Affairs -
Program Manager

*E-mail: Noelani.derrickson@firstsolar.com

Phone: 415-935-2498

*Organization: First Solar, Inc.

Address: 135 Main Street, Floor 6

City: San Francisco

State: CA

Zip: 94103

Public Meeting Date comments address: 12/3/2018

Check here if not related to specific meeting

List additional organization attendees at cited meeting:

[Click here to enter text.](#)

***IRP Topic(s) and/or Agenda Items:** List the specific topics that are being addressed in your comments.
Reliability capabilities of utility-scale solar.

Check here if any of the following information being submitted is copyrighted or confidential.

Check here if you do **not** want your Stakeholder feedback and accompanying materials posted to the IRP website.

***Respondent Comment:** Please provide your feedback for each IRP topic listed above.

First Solar recommends that PacifiCorp model inverter-based utility-scale solar resources as fully flexible assets capable of following dispatch signals when evaluating replacement power and grid reliability given accelerated coal plant retirements.

Utility-scale solar and other inverter-based technologies with dispatchable characteristics can be operated more flexibly to contribute to meeting the reliability needs of the grid, replacing older, inflexible and inefficient thermal units. Leveraging these untapped capabilities provides tangible cost savings while supporting system reliability in a lower carbon grid. Prioritization of renewables that have been designed to be flexible and to deliver grid services can allow for the remaining fossil fleet to operate in more efficient modes. Two recent initiatives sponsored by First Solar highlight these capabilities:

TECO/E3 Study: First Solar sponsored a study performed by Energy and Environmental Economics (E3) and Tampa Electric Company (TECO), which modeled a series of high solar penetration cases on TECO's balancing area. Solar penetration assumptions ranged from 0% to 28% annual energy potential, and it was also assumed that solar could be dispatched in four distinct operating modes:

(1) Must-Take: Solar is treated essentially as a net load impact and cannot be curtailed

* Required fields

(2) Curtailable: Solar can be curtailed in oversupply situations; however, regulation and forecast error reserve requirements are still determined based on net load and must be met by conventional generation resources

(3) Downward Dispatch: Solar is allowed to provide its own downward reserves (footroom) and can be ramped down in cases where demand is lower than forecast

(4) Full Flexibility: Solar can provide both footroom and headroom, where it can be under-scheduled day-ahead, reducing its own forecast error (and associated headroom) as well as providing upward ramping capabilities (regulation, spinning reserves)

The study demonstrated that the system could double the amount of "must-take" PV generation a system could accommodate by maximizing PV value through optimal dispatch. Power system modeling often treats PV as a "must-take" asset, however significant system cost savings, lower emissions, and reduced curtailment result from allowing utility-scale solar to act as a flexible and dispatchable asset on the grid. In other words, the study showed that utility-scale solar could be operated to reduce the impacts of variability associated with the solar resource, such that reliance on inflexible thermal resources could be reduced and emission/cost benefits could be enhanced.

CAISO/NREL Study: First Solar demonstrated the ability of utility-scale PV to play a role in reliable grid operations by providing a suite of essential reliability services as part of a 2017 study with the National Renewable Energy Laboratory (NREL) and the California Independent System Operator (CAISO). Our utility-scale solar PV installation demonstrated the ability to provide required NERC services and the operating flexibility usually provided by natural-gas-fired peaker plants through services such as following frequency regulation commands via automatic generation control (AGC), and using the PV plant for voltage, power factor, and reactive power control. Importantly, the report concluded that the PV plant demonstrated the ability to deliver some of those capabilities (e.g., regulation service) with greater precision than a gas-fired alternative under all tested solar conditions. Specifically, it was found that while best-in-class gas resources provide regulation services with approximately 60 percent accuracy against operator signals, dispatchable PV resources are capable of response accuracy of approximately 90 percent. These grid-support capabilities, which normally require the use of conventional fuel resources, can be strategically optimized to provide cost-effective system flexibility reducing risk and cost to ratepayers.

The results of these two studies indicate that PacifiCorp can leverage inverter-based renewable generation for more than just energy and not sacrifice flexibility in dispatch or system reliability for grid operators. Moreover, when utility-scale solar capabilities are maximized, significantly greater solar penetration can be achieved with cost savings, lower emissions, and reduced curtailment. In order to leverage renewables in this manner PacifiCorp will need to support an evolution in procurement and contracting of these resources so that projects are properly designed and incentivized to be dispatched in a fully flexible manner rather than simply maximizing energy production.

As PacifiCorp analyzes grid reliability with early retirement of its coal fleet, it must also effectively model the full capabilities of utility-scale solar in providing reliability with low cost, renewable energy.

First Solar appreciates the opportunity to comment.

PacifiCorp Response:

PacifiCorp appreciates the feedback and will explore in its modeling efforts the potential value from curtailment and reserve capacity provided by renewables. PacifiCorp would note that the costs and constraints associated with downward dispatch requirements and day-ahead forecast error are not incorporated in the 2019 Integrated Resource Plan (IRP) analysis, so these factors are not constraining the adoption or value of renewable resources in the IRP models.

Data Support: If applicable, provide any documents, hyper-links, etc. in support of comments. (i.e. gas forecast is too high

* Required fields

- this forecast from EIA is more appropriate). If electronic attachments are provided with your comments, please list those attachment names here.

"Investigating the Economic Value of Flexible Solar Power Plant Operation", October 2018:

<https://www.ethree.com/wp-content/uploads/2018/10/Investigating-the-Economic-Value-of-Flexible-Solar-Power-Plant-Operation.pdf>

"Demonstration of Essential Reliability Services by a 300-MW Solar Photovoltaic Power Plant", March 2017:

<https://www.nrel.gov/docs/fy17osti/67799.pdf>

Recommendations: Provide any additional recommendations if not included above - specificity is greatly appreciated.

[Click here to enter text.](#)

Please submit your completed Stakeholder Feedback Form via email to IRP@PacifiCorp.com

Thank you for participating.

* Required fields