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October 16, 2015

VIA ELECTRONIC FILING

Public Utility Commission of Oregon
201 High Street SE, Suite 100
Salem, OR 97301-1166

Attn: Filing Center

Re: UM 1667—PacifiCorp's Reply Comments

PacifiCorp d/b/a Pacific Power encloses for filing its Reply Comments in the above-referenced docket.

Informal questions concerning this filing may be directed to Erin Apperson, Manager, Regulatory Affairs, at (503) 813-6642.

Sincerely,

A handwritten signature in cursive script that reads "R. Bryce Dalley" with a small mark above the name.

R. Bryce Dalley
Vice President, Regulation

Enclosures

**BEFORE THE PUBLIC UTILITY COMMISSION
OF OREGON**

UM 1667

In the Matter of
PACIFICORP d/b/a PACIFIC POWER
2015 Annual Smart Grid Report

PACIFICORP’S REPLY COMMENTS

1 On August 3, 2015, PacifiCorp d/b/a Pacific Power (PacifiCorp or Company) submitted
2 its 2015 Annual Smart Grid Report (Report) to the Public Utility Commission of Oregon
3 (Commission) under Order No. 12-158.¹ On September 19, 2015, the Company received
4 comments on the Report from Commission Staff, the Oregon Department of Energy
5 (ODOE), and the Citizens’ Utility Board of Oregon (CUB). The Company provides these
6 reply comments in response to the comments of Staff, ODOE, and CUB.

7 These comments also detail recent developments in PacifiCorp’s smart grid efforts,
8 which have occurred since the Report was submitted on August 3, 2015. An update on the
9 projects discussed in the Report, as well as suggestions for future reporting topics, are also
10 included.

11 PacifiCorp’s reply comments are organized by specific project or technology, in the same
12 manner as the Report.

13 **I. PacifiCorp’s Response to Staff’s Informal Written Comments**

14 PacifiCorp held a Stakeholder Meeting on June 12, 2015 to discuss the draft report. On
15 June 19, 2015, Staff submitted informal comments responding to PacifiCorp’s draft report.

16 The final Report, filed on August 3, 2015, contained additional information responding to
17 Staff’s informal comments. Specifically, the Company expanded the following sections in

¹ Docket No. UM 1460 (May 8, 2012).

1 the final Report: dynamic line rating (DLR), centralized energy storage (CES), distribution
 2 management, outage management, customer communications and programs, and time-based
 3 pricing. Table 1 outlines PacifiCorp’s responses to Staff’s informal comments:

4 **Table 1 – PacifiCorp’s Responses to Staff’s Informal Comments**

| Topic | Staff Informal Comments | PacifiCorp Actions |
|-------------------------------------|---|---|
| | Conduct at least one stakeholder workshop to review the results of the Oregon Advanced Metering Project RFP, and discuss the Company’s criteria for moving forward, with a focus on the benefit assumptions. | A confidential workshop was held on June 12, 2015, to discuss the results of the Advanced Metering Project RFP. Staff was the only stakeholder to attend. |
| Dynamic Line Rating Project | Staff asked the Company to include information on its evaluation process and the criteria used in determining areas where DLR is considered in the main body of the final Report and future reports. | The Company clarified information on its evaluation process, preliminary conclusions, and status of the existing DLR projects. ² |
| Synchrophasor Demonstration Project | Staff asked the Company to report on progress in obtaining and operationalizing the use of synchrophasor data, and specifically identify remaining obstacles to gain access to the full range of phasor measurement unit (PMU) data on the transmission system. | No progress was made since the 2014 Smart Grid Report; therefore, there is no additional update on progress of obtaining PMU data between draft report and final report submittal. The 2016 Smart Grid Report will provide an update on the benchmarking, validation, and fine-tuning of system model evaluation. ³ |

² PacifiCorp’s Annual Smart Grid Report at 8.

³ *Id.* at 14.

| Topic | Staff Informal Comments | PacifiCorp Actions |
|--------------------------------------|---|--|
| CES/Non-wires | Staff asked the Company to include any non-wire alternatives to transmission or distribution upgrades that the Company is considering or actively researching. | The Company provided additional information regarding the pilot study comparative analysis of utilizing distributed energy resources as an alternative solution to traditional infrastructure upgrades. ⁴ |
| Outage Management | Staff asked for the status of any enhancements to the Company's current outage management practices (primarily relying on customer notifications) throughout the Company's footprint, and a timeline of planned upgrades to Oregon's transmission and distribution system that supports an upgraded outage management system. | <p>Outage management system equipment update considerations occur approximately every three years during bid events, including a capacitor controls bid event that took place during the third quarter of 2015 and evaluated future communications needs of the standard capacitor controls used at PacifiCorp.</p> <p>The 2016 Smart Grid Report will provide an update on any developments made within the Company's outage management system.⁵</p> |
| Customer Communications and Programs | Staff asked the Company to present reasoning for continued low participation of customers in time-of-use (TOU) programs offered in Oregon. | The Company provided additional information regarding customer participation in the Klamath Falls TOU pilot program in the Report. ⁶ |
| Time-based Pricing | Staff asked for a detailed explanation of the original Klamath Falls TOU program, what went wrong with the original program, what the Company changed in the new version, and what the Company believes is making the new TOU program more successful. | The Company provided additional information regarding the Klamath Falls TOU pilot program in the Report. ⁷ |

⁴ *Id.* at 16.

⁵ *Id.* at 19.

⁶ *Id.* at 26.

⁷ *Id.*

| Topic | Staff Informal Comments | PacifiCorp Actions |
|-------------------------|---|--|
| Irrigation Load Control | In addition to price, Staff would like the Company to clarify its criteria for “feasibility” of an irrigation demand response pilot program in Oregon that could be introduced in 2016. | <p>The Company provided an evaluation of feasibility is an on-going process and identified as a future action for the Company.⁸</p> <p>The 2016 Smart Grid Report will provide an update on a seven megawatt pilot program under consideration for California and Oregon.</p> |

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II. Response to Formal Comments

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A. Overview of PacifiCorp’s Response

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The Commission adopted non-substantive smart grid reporting requirements to ensure

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that “utilities are systematically evaluating promising smart-grid technologies and

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applications, that the Commission is kept apprised of utilities’ progress, and that

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stakeholders, Commission Staff, and the Commissioners have an opportunity to provide

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input into utility evaluations of smart-grid technologies and applications, as well as their

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plans for smart-grid investments.”⁹ Recognizing that “smart grid is comprised of many

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technologies, in different stages of development and affordability,” the Commission has

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expressly declined to require utilities to submit comprehensive “smart grid plans.”¹⁰

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Furthermore, the Commission has declined to adopt “detailed and ... prescriptive”

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guidelines for smart grid reports “given the early stages of smart grid development.”¹¹ To

⁸ *Id.* at 29.

⁹ Order No. 12-158 at 1.

¹⁰ *Id.* at 2.

¹¹ Order No. 11-172 at 2.

1 that end, the Commission established a series of “general Commission guidelines” for utility
2 smart grid reports via an “informal process” that allows for stakeholder input.¹²

3 Table 2 outlines PacifiCorp’s responses to formal comments filed by Staff, ODOE, and
4 CUB and includes updated information relative to Oregon smart grid activities.

¹² Order No. 12-158 at 2.

Table 2 – PacifiCorp’s Response to Formal Comments

| Topic | Staff | ODOE | CUB | PacifiCorp Reply Comments |
|-----------------------------|--|------|--|---|
| Dynamic Line Rating Project | <p>Address whether any additional work related to the two DLR-related activities has been performed.</p> <ol style="list-style-type: none"> 1. Verification of line thermal capacity from LiDAR surveys. 2. Validation of static ambient weather assumptions on portions of the system where thermal constraints were identified. <p>Provide full explanation if no additional work performed.</p> <p>Include specific analyses used and conclusions reached related to DLR and IRP process.</p> | | Provide explanation for postponement of West-of-Populus completion date from 2015 to 2016. | <p>LiDAR survey confirmed the static ratings of the line.</p> <p>Clearance issues were identified during LiDAR surveys performed on the East-of-Populus line as routine maintenance. The clearance issues are being addressed. After these are addressed, the calibration period of the DLR system will continue. This will result in the postponement of completion from 2015 to 2016.</p> <p>PacifiCorp standard transmission lines are generally rated by an assumption of worst-case condition of the season (e.g., hottest summer day or coldest winter day).</p> <p>No additional surveys were performed related to DLR. PacifiCorp is evaluating the use of thermal replicating relays.</p> <p>Reporting of additional work performed and completion of project will be available in the 2016 Smart Grid Report.</p> |

| Topic | Staff | ODOE | CUB | PacifiCorp Reply Comments |
|-------------------------------------|---|------|---|---|
| Synchrophasor Demonstration Project | Provide reassurance that “efforts surrounding benchmarking, validation, and fine tuning” of synchrophasor data will be included in the 2016 Smart Grid Report | | Provide more substance than restatement of previous smart grid reports. | <p>Western Interconnection Synchrophasor Project (WISP) scope of work was to provide Peak Reliability with PMU data. This portion of the project is complete.¹³</p> <p>Since completion of this portion of WISP, PacifiCorp’s involvement with this project has been minimal.</p> <p>PacifiCorp continues to pursue gaining access to PMU data for transmission system planners to benchmark, validate, and fine tune system planning models.</p> <p>NERC Reliability Standard MOD-33 is a new validation standard to address directives related to validation, and PacifiCorp is investigating the use of PMU data to validate models to meet MOD-33 requirements by enforcement date of July 2017.</p> <p>Reporting of additional work performed will be available in the 2016 Smart GridReport.</p> |

¹³ See, <https://www.peakrc.org/aboutus/Pages/WISP-Information.aspx>.

| Topic | Staff | ODOE | CUB | PacifiCorp Reply Comments |
|--|---|---|-----|---|
| Centralized Energy Storage / Non-Wire Alternatives | Address request for “more information regarding the three applications of battery technology for use in distribution infrastructure.” | Encourages PacifiCorp to “conduct a more comprehensive, integrated evaluation of energy storage.” | | <p>Three CES studies performed: one at PacifiCorp, NVE, and MEC. PacifiCorp study is summarized in the response.</p> <p>PacifiCorp is partnering with OSU in its application for an energy storage project with ODOE.</p> <p>A circuit in Redmond, Oregon has been identified for potential CES application as alternative to traditional solution.</p> <p>Future Actions section of the Report addresses a more comprehensive evaluation of energy storage to benefit Oregon customers.¹⁴</p> <p>A module is currently under development to guide PacifiCorp planning engineers with centralized storage alternatives to offset traditional system reinforcement investments.</p> |

¹⁴ PacifiCorp’s Annual Smart Grid Report at 16.

| Topic | Staff | ODOE | CUB | PacifiCorp Reply Comments |
|--|--|------|--|---|
| Distribution Management | <p>Discuss “feasibility of study recommended by Staff in its 2014 Staff Report.”</p> <p>Study recommended by Staff: “Determine which switches and reclosing devices in Oregon are prime candidates for automation based on cost-benefit analysis.”</p> | | | <p>Feasibility of conducting study for smaller section of system in Oregon for distribution automation (DA) cost benefit could be included in the 2016 Smart Grid Report.</p> <p>Fuse Saving devices with “smart” capability are being deployed in Oregon.</p> <p>Additional outage management equipment under evaluation for “smart” functionality including recloser and regulator controls.</p> |
| Communicating Faulted Circuit Indicators | <p>Discuss “reasons for delay in anticipated information regarding CFCI.”</p> <p>If results are pending, provide “any preliminary results and/or conclusions.”</p> | | <p>Provide cost-benefit analysis referenced in the 2014 Smart Grid Report or comment on exclusion from report.</p> | <p>Development of a secure network architecture that permits the joining of cellular based sensors with PacifiCorp’s outage management system has delayed complete integration of the CFCI sensors.</p> <p>A cost-benefit analysis of the sensors is highly dependent on full outage management system (OMS) integration.</p> <p>The AMI communications infrastructure proposed in Oregon may provide a medium for CFCI data.</p> |

| Topic | Staff | ODOE | CUB | PacifiCorp Reply Comments |
|--------------------------------|--|------|------------------------------|--|
| Conservation Voltage Reduction | | | Provide an overview of CYME. | Cyme is a software provider owned by EATON / Cooper Power Systems., which makes several different distribution system modeling applications, including CYMDIST and CYMCAP. CYMDIST is commonly referred to as “Cyme”. ¹⁵ |
| AMI | <p>Staff would like greater transparency into calculations and methodologies used to determine costs and benefits.</p> <p>Staff will submit discovery requests to accomplish this.</p> | | | <p>PacifiCorp will comply with discovery requests.</p> <p>Further evaluation of AMI is being conducted in an on-going effort to provide maximum benefits to customers and determine the financial impacts of an AMI deployment in the state of Oregon.</p> |

¹⁵ See, <http://www.cyme.com/software/>

| Topic | Staff | ODOE | CUB | PacifiCorp Reply Comments |
|-------------------|--|---|--|---|
| Customer Outreach | Present “reasoning for continued low participation of customers in TOU programs offered in Oregon.” | | | <p>Information regarding observed customer behavior and participation in OR TOU program was included in the Report.¹⁶</p> <p>Based on feedback provided from meetings with customers, PacifiCorp modified its pilot for 2015 by: 1) including a greater on- to off-peak rate ratio for increased potential savings; 2) expanding opportunity to participate in pilot to all 95 meters that signed up in 2015; and 3) increasing maximum pilot participation cap</p> |
| Demand Response | Staff commented on “potential of implementing a small-scale behavioral demand response pilot to...gain understanding of customer participation, load changes, and facilitation of customer engagement in demand-side management programs.” | Would like PacifiCorp to “implement a demand response pilot that tests a load with year round availability...on either west side of Oregon or the Klamath Basin.” | Provide update on Cool Keeper program in regard to claim from the 2014 Smart GridReport: “upgrade is expected to further increase overall efficiency of direct load control system.” | <p>High level research indicates that utilities offering behavioral demand responses (BDR) options for their customers are doing so by leveraging their existing AMI infrastructure.</p> <p>Feasibility of demand response pilot that tests a load with year-round availability will be investigated.</p> <p>The improved overall efficiency of the two-way communication network upgraded within the Cool Keeper demand response program can be divided into real-time operations and data analysis categories, which were not available prior to the 2014 system upgrade.</p> |

¹⁶ PacifiCorp’s Annual Smart Grid Report at 26.

| | | | | |
|------------------------------|---|---|--|--|
| Distributed Energy Resources | | Encouraged to “evaluate smart inverters in interconnection of distributed resources whenever the system impact studies show that the distributed resource results in an operational problem.” | | <p>Smart inverter manufacturers are still in the process of developing and certifying the technology. PacifiCorp will continue to monitor the technology and relevant standards.</p> <p>Two distribution circuits in Oregon were chosen to model varying levels of penetration of DER and their impacts to the system.</p> |
| Reliability Metrics | <p>SAIFI, SAIDI, and CAIDI should be used to evaluate reliability-initiated smart grid investments.</p> <p>Discuss what PacifiCorp believes is the “most appropriate way to determine what other metrics should be included in future reports.”</p> | | | PacifiCorp submits an annual report on Service Quality Measures (SQM) that contains UE 94 R1, R2, R3, and R4 performance measures. These performance measures include SAIDI, SAIFI, CAIDI and MAIFI _c as standard indices, applied at the state level. ¹⁷ |
| Interconnection Policy | | Encouraged the Company to “include the evaluation of smart inverters in ... interconnection policy update.” | | When IEEE 1547 is updated, PacifiCorp Policy 138 will be updated to reflect smart inverter standards. |

¹⁷ PacifiCorp *Annual Report on Service Quality Measures for 2014*, page 9, Docket No. RE 58, May 1, 2015.

1 **B. Specific Comments and Response to Commission Recommendations and**
2 **Staff and Intervenor Comments**

3 The Commission addressed PacifiCorp’s 2014 Smart Grid Report in Order No. 15-
4 050, and provided a series of suggestions for PacifiCorp to consider when developing its
5 2015 Report. This section addresses the Commission’s recommendations, as well as
6 recommendations made by Staff, ODOE, and CUB.

7 **1. Advanced Metering Project Recommendation**

8 In Order No. 15-050, the Commission recommended that the Company conduct at
9 least one workshop to review the results of the Oregon Advanced Metering Project RFP and
10 to discuss the Company’s criteria for moving forward, with a focus on the benefit
11 assumptions.

12 PacifiCorp held a confidential workshop on June 12, 2015, to discuss the results of
13 the Advanced Metering Project RFP. Staff was the only stakeholder in attendance.

14 *Staff’s Comments*

15 Staff stated that it understands PacifiCorp’s position that the best AMI outcome for
16 customers is one where the Company’s system is equipped to handle all of the benefits of
17 current AMI technology. Staff indicated that it would like greater transparency into the
18 calculations and methodologies used to determine the costs and benefits presented at the
19 workshop and in the 2015 Report. Staff has indicated that it will be submitting discovery
20 requests to accomplish this.

21 *PacifiCorp Response*

22 Further evaluation of the Advanced Metering Project is being conducted in an on-
23 going effort to provide maximum benefits to customers and determine the financial impacts

1 of an AMI deployment in the state of Oregon. Additionally, the Company is evaluating and
2 analyzing the impact of any necessary changes to CSS and interdependencies with AMI. As
3 the evaluation progresses, PacifiCorp will keep the Commission apprised of any significant
4 changes. The Company continues to analyze the appropriate phasing of IT system
5 improvements and upgrades and the impact of those system upgrades on the timing of AMI
6 implementation.

7 The Company will continue to keep the Commission apprised of new developments
8 in this area through subsequent smart grid reports.

9 **2. Dynamic Line Rating (DLR) Project**

10 In Order No. 15-050, the Commission recommended that the Company include an
11 update on its use of the two applications of DLR technology described in the 2014 Smart
12 Grid Report, and on any additional applications of DLR technology evaluated.

13 ***Staff's Comments***

14 Staff asked PacifiCorp to address whether it has conducted any additional work
15 related to the two DLR-related activities and provide a full explanation if it has not done
16 so. Staff would like PacifiCorp to include the specific analyses used and conclusions
17 reached, such as potential candidate lines and cost metrics, related to DLR, and the IRP
18 process.

19 ***PacifiCorp Response***

20 In Oregon, although considered alternative solutions in the planning process, DLR
21 has not been extensively evaluated due to the lack of constrained pathways and situations in
22 which DLR might apply.

1 The West-of-Populus DLR project is currently producing data and is being monitored
2 by PacifiCorp grid operations. Although not explicitly part of the DLR project, the line
3 thermal capacity has been verified with LiDAR surveys, and clearance issues have been
4 addressed. Transmission lines are generally rated by an assumption of worst-case condition
5 of the season, e.g. hottest summer day or coldest winter day, according to PacifiCorp
6 standards. This is the case on the West-of-Populus line where thermal constraints were
7 identified, and those assumptions remain in effect on the line and its rating.

8 As articulated in the Report, the Platte line DLR project is complete and the rating of
9 the line has been modified to reflect the correlation between wind generation in the area and
10 the cooling effects of wind on the line. This project has been considered a success and is
11 complete.

12 PacifiCorp expects to have a complete analysis on the West-of-Populus line DLR
13 project for the 2016 Smart Grid Report; however, initial data observations are inconclusive
14 due to the actual line loading not having approached the thermal capacity of the line during
15 the calibration period thus far.

16 No further analysis has been performed regarding candidate lines and cost metrics
17 relating to DLR and the IRP process other than transmission planning's engineering
18 judgment in considering DLR as alternatives to traditional solutions. To date, these planning
19 engineers have not recommended additional DLR studies beyond those that have already
20 been completed or initiated. Additional DLR studies remains in the planner's toolbox for
21 future consideration as issues arise.

22 Recently, PacifiCorp transmission planning has begun evaluating a related technology
23 known as thermal replicating relays. These devices monitor the thermal properties of the line,

1 and if these devices sense the conductor damage thermal limits are being exceeded, they send
2 a trip signal to open the line. Under NERC standard PRC – 023, transmission lines meeting a
3 certain criteria are required to have thermal trip settings equal to 150 percent of their
4 emergency winter rating. This setting requirement enables manual emergency remedial
5 action during contingency outages to prevent cascading outages, but can put the line at risk
6 for conductor damage. PRC-023 allows an exception to this practice where line tripping will
7 not cause cascading outages or other line overloads and where thermal replicating relaying is
8 installed.

9 PacifiCorp is investigating the use of these devices in the Soda Springs area of Idaho,
10 where the loss of two transmission lines in the area will overload a third line until remedial
11 action is taken. Immediately tripping the line with the use of thermal replicating relays will
12 reduce the risk of conductor damage or eliminate the need for an expensive remedial action
13 scheme in this area.

14 More information regarding this evaluation will be available in the 2016 Smart Grid
15 Report.

16 ***CUB's Comments***

17 CUB asserts that the Company failed to explain why the West-of-Populus dynamic
18 line rating project is being postponed and did not provide a status update.

19 ***PacifiCorp Response***

20 LiDAR surveys were conducted on the West-of-Populus line as routine maintenance
21 to confirm the static ratings of the line. Clearance issues were identified during the LiDAR
22 surveys and were subsequently addressed through multiple construction projects that required
23 de-energization of the line and deactivation of the DLR system. The calibration period of the

1 DLR system has since resumed and PacifiCorp's grid operations is continuing to monitor the
2 data. Completion of the DLR project on the West-of-Populus line was postponed from 2015
3 to 2016 as a result of the clearance issues identified. No additional LiDAR surveys were
4 performed on other lines aside from the scope of work defined by routine maintenance on the
5 West-of-Populus line.

6 Reporting of additional work performed and completion of the project will be
7 available in the 2016 Smart Grid Report.

8 **3. Synchrophasor Demonstration Project**

9 In Order No. 15-050, the Commission recommended that the Company report on its
10 progress in obtaining and operationalizing the use of synchrophasor data, and identify
11 remaining obstacles to gaining access to the full range of PMU data on the transmission
12 system.

13 *Staff Comments*

14 Staff asked for any additional granularity regarding synchrophasors and efforts
15 surrounding benchmarking, validation, and fine tuning.

16 *CUB Comments*

17 CUB noted that it expected the company to provide more substance on this project.

18 *PacifiCorp Response*

19 The Western Interconnection Synchrophasor Project (WISP) scope of work was to
20 provide Peak Reliability with PMU data. This portion of the project is complete.¹⁸ PacifiCorp
21 continues to pursue gaining access to PMU data for transmission system planners to
22 benchmark, validate, and fine tune system planning models.

¹⁸ See, <https://www.peakrc.org/aboutus/Pages/WISP-Information.aspx>.

1 NERC Reliability Standard MOD-33 is a new validation standard to address
2 directives related to transmission system model validation. PacifiCorp is actively
3 investigating the use of PMU data to validate models to meet MOD-33 requirements by the
4 enforcement date of July 2017. PacifiCorp has contacted the manufacturer of the installed
5 PMUs, attended basic training on the PMU data interface tool and is working internally with
6 the manufacturer to port PMU data into the interface tool.

7 Although a thorough investigation has not yet been performed, the implementation of
8 PMUs may be required across PacifiCorp's service territory and could include installations in
9 Oregon. More information on the scope of utilizing PMU data for model validation will be
10 provided in the 2016 Smart Grid Report.

11 **4. Distributed Resource and Renewable Resource Enhancements**

12 *Staff Comments*

13 Staff noted that it appreciated the information on new developments and anticipates
14 status updates in PacifiCorp's next Smart Grid Report.

15 *PacifiCorp Response*

16 Reporting of additional work performed will be available in 2016 Smart Grid Report.

17 **5. Centralized Energy Storage (CES) / Non-Wire Alternatives**

18 *ODOE Comments*

19 ODOE encouraged PacifiCorp to conduct a more comprehensive, integrated
20 evaluation of energy storage, which includes assessing more than one potential system
21 benefit from an energy storage system investment.

1 ***PacifiCorp Response***

2 PacifiCorp is currently evaluating an opportunity for energy storage research by
3 partnering with Oregon State University on its application in response to ODOE #15-013 for
4 energy storage projects. Some of the potential system benefits being studied include the
5 mitigation of transient over/under voltage and grid frequency excursions and distribution
6 feeder voltage support. The project is currently in the application phase, and progress will be
7 included in subsequent Smart Grid Reports.

8 PacifiCorp has also identified a circuit in Redmond, Oregon where a CES solution
9 could potentially offset the need for a traditional capital investment. The Redmond circuit
10 evaluation will be included in the 2016 Smart Grid Report.

11 Additionally, a module is under development to guide PacifiCorp planning engineers
12 with evaluating CES as an alternative solution to traditional reinforcement capital
13 investments, i.e. transformer replacements. A summary of the implementation of this module
14 will be included in the 2016 Smart Grid Report.

15 ***Staff Comments***

16 Staff requested more information regarding the three applications of battery
17 technology use in distribution infrastructure deferral upgrades.

18 ***PacifiCorp Response***

19 Studies regarding CES were conducted at PacifiCorp, NV Energy, and MidAmerican
20 Energy Company (MEC). These studies only addressed the peak shaving/capital investment
21 deferral benefit of CES. Only the transformer overload application at PacifiCorp in the
22 Moab, Utah area will be discussed in these reply comments, although it is interesting to note,
23 due to the high cost of the NV Energy traditional solution, a solar/battery storage solution

1 was determined to be more cost effective and was approved to move forward. Unfortunately,
2 local communities denied permitting and the project was cancelled.

3 The Moab pilot comparative analysis, studying a traditional solution versus a
4 distributed energy resource (DER) solution for a common loading issue, demonstrated the
5 traditional solution provides the most cost effective and least risk solution when compared
6 with alternative DERs. The analysis also revealed that due to its intermittency and inherent
7 generation profile, solar generation was not a viable alternative. If used in conjunction with
8 energy storage, it becomes feasible, but not cost effective. The conclusion of the study is that
9 DER alternatives, in particular energy storage, can be a legitimate alternative to traditional
10 solutions given the traditional solution is expensive or difficult to build/permit.

11 The traditional solution to the transformer overload issue in Moab is to replace Moab
12 City #2 (7 MVA) transformer with a 14 MVA 69-12.5 kV transformer. Once replaced, one
13 feeder (CB 12) from #1 transformer will be reconfigured to move load onto an open feeder
14 position (existing) fed by the #2 transformer. New regulators and a new pad will be required
15 to replace the transformer. A review of the distribution system and load will be required in
16 2017 to project whether the #2 transformer can be offloaded entirely to the #1 transformer
17 during the spring while the transformer is being replaced. The total traditional solution cost is
18 estimated at \$2.1 million.

19 Given the objective of 90 percent loading on the Moab substation following the DER
20 solution implementation, a loading analysis was performed to quantify the needed resource.
21 Using 2014 substation loading and historical load growth, the 2018 load was forecasted in
22 relation to the 90 percent loading objective. This analysis demonstrated a 1.6 MVA offset
23 requirement.

1 Centralized energy storage is a feasible resolution/deferment to the Moab substation
 2 loading issue. The technology and control systems are available for energy storage to be able
 3 to discharge during the 1.6 MVA offset requirement, and recharge during light load periods.
 4 The loading analysis confirms there is sufficient light load duration to charge the required
 5 storage. The evaluation of energy storage consists of sizing the equipment and identifying
 6 physical integration. The table below describes the basic specifications and requirements of
 7 the storage necessary for the Moab substation deferment.

| Energy Storage Specifications | |
|--------------------------------------|---|
| MW | 1.6 MVA Requirement 2.0 MW Commercially Available |
| MWhr | 6.5 |
| Battery Type | Sodium Sulfur/Lithium Ion |
| Physical Dimensions | 2 – Storage Mgt. System (30’x12’ ea.) 4 – Battery Containers (40’x12’ ea.) |
| Equipment and Installation Cost | \$4.5 M |
| Civil/Other Costs | \$350k |
| Maintenance | \$300k |

8 The MVA requirement is merely the offset requirement, and the MWhr requirement
 9 calculation is based on the area under the offset requirement profile. Either the sodium sulfur
 10 or lithium ion technology would be used for this size of battery, and these have similar costs.
 11 Therefore, the Company concluded that energy storage is a feasible DER solution for the
 12 Moab substation deferment; however, the traditional solution is more cost effective in this
 13 situation.

1 **6. Distribution Management**

2 *Staff's Comments*

3 Staff would like PacifiCorp to discuss the feasibility of conducting a study of its
4 distribution automation (DA) potential including a cost-benefit analysis and based on cost
5 and distribution system assumptions that will enhance reliability and yield benefits to
6 customers.

7 *PacifiCorp's Response*

8 PacifiCorp believes that conducting a study of its distribution automation (DA) potential
9 based on cost and distribution system assumptions that will enhance reliability and yield
10 benefits to customers by determining which switches and reclosing devices in Oregon are
11 prime candidates for automation based on cost-benefit analysis. Multiple steps should be
12 identified and followed to achieve a desired result of such a study:

- 13 • Key criteria and requirements for selection of potential locations should be defined.
- 14 • Necessary communication equipment and protocols at a site should be identified.
- 15 • Switch types and operators to be installed should be defined.
- 16 • Potential candidates would be screened based on determined criteria.
- 17 • Requirements for system integration into SCADA or a DMS should be documented.
- 18 • Cost benefit evaluation of screened candidates could be performed.

19 Devices with DA functionality are included as part of PacifiCorp's current scoping
20 processes. However, opting for DA devices may not always be advantageous, or cost-
21 effective, depending on certain criteria, such as available communication technology at a
22 given site. In order to effectively leverage the DA technology, a communication backbone
23 should be available to provide improved situational awareness to an outage management

1 system or distribution management system. If sufficient communication requirements are
2 met, costs for DA devices might be reduced. Regardless of devices selected, based on the
3 cost-benefit analyses performed on a site-by-site basis, PacifiCorp prefers to select devices
4 that should be capable of integration with any future deployment of a distribution
5 management system.

6 As an example of DA functionality included in current scoping processes, several
7 Fuse Saving devices are currently being deployed in reliability improvement projects in
8 Washington, California, and Oregon. Although not considered “smart devices” because of
9 their autonomous functionality as installed, their specifications do include two-way
10 communication capability. PacifiCorp recently launched an investigation to determine the
11 feasibility and cost of establishing communications with these Fuse Saving devices to give
12 dispatch indication of their open/closed status. It is anticipated that the communications
13 medium for Fuse Savers may be able to leverage the CFCI communications architecture
14 already in place for testing. While only in its very initial stages, an update on this
15 investigation and its feasibility will be included in the 2016 Smart Grid Report.

16 As mentioned in the 2015 Report, efforts to include smart functionality in standard
17 PacifiCorp outage management equipment are ongoing. In addition to capacitor bank
18 controls mentioned in the Report, recloser controls with communication functionality and
19 regulator bank controls for two-way flow of electricity are currently under evaluation. It is
20 anticipated that standard changes will be implemented and equipment will be deployed and
21 benefiting customers in Oregon in 2016.

1 **7. Communicating Faulted Circuit Indicators (CFCI)**

2 *Staff Comments*

3 Staff asked PacifiCorp to discuss the reasons for the delay in anticipated information
4 regarding CFCI, and if results are pending, if any preliminary results and/or conclusions are
5 available.

6 *CUB Comments*

7 CUB stated that PacifiCorp did not provide the cost-benefit analysis referenced in the
8 2014 Smart Grid Report and provides no justification.

9 *PacifiCorp Response*

10 Development of a secure network architecture that permits the joining of cellular-
11 based sensors with PacifiCorp’s outage management system (OMS) has delayed complete
12 integration of the CFCI sensors. It is anticipated that the completion in the beginning of 2016
13 of PacifiCorp’s new OMS (Monarch) will enable the progress of the CFCI integration.

14 A preliminary analysis of sensor alerts and loading data since deployment has
15 validated the technologies’ functionality and measurement capabilities. Sensor alerts and
16 loading data are currently being used extensively by field engineers to develop reliability
17 work plans and validate system studies.

18 Email-based outage alerts are made available to dispatcher and operations
19 management to supplement traditional outage notification and fault location processes. Full
20 adoption of the technology by dispatch personnel will require integration with the OMS
21 system that will allow information to be integrated with native applications currently used for
22 restoration. The vendor expects to release new firmware for the devices that will enhance
23 functionality and operation characteristics based on feedback provided by PacifiCorp.

1 Because full integration of the CFCIs into the OMS has not occurred, and
2 consequently the full benefit not yet quantified, the cost-benefit analysis of the sensors has
3 not been executed.

4 Also under evaluation is the possibility of utilizing the proposed AMI communication
5 network in Oregon to provide communication infrastructure for CFCIs. While complete AMI
6 implementation is proposed in phases, the first phase is primarily dedicated to meter
7 management. However, backhaul over the non- private network could include fault detector
8 data. This is currently under evaluation and additional information will be included in the
9 2016 Smart Grid Report.

10 **8. Conservation Voltage Reduction**

11 *CUB Comments*

12 CUB stated that PacifiCorp did not provide much detail as to what Cyme is or how
13 Cyme applies to low-voltage technology.

14 *PacifiCorp Response*

15 Cyme is a software provider owned by EATON / Cooper Power Systems. There are
16 several different distribution applications produced by EATON / Cooper Power Systems,
17 including CYMDIST and CYMCAP. CYMDIST is commonly referred to as “Cyme,” and
18 will be the principal distribution system modeling tool used by PacifiCorp distribution
19 engineers. It will benefit Oregon customers by improving the management of the progressive
20 network, including a more robust DER impact and resolution analysis. Optional modules
21 allow harmonic resonance, arc flash, long term dynamics, capacitor placement, transient
22 stability, protective device coordination and other analyses. Additional details regarding

1 CYME and applications can be found in literature provided by EATON / Cooper Power
2 Systems.¹⁹

3 **9. Customer Outreach**

4 *Staff Comments*

5 Staff asked PacifiCorp to present its reasoning for the continued low participation of
6 customers in TOU programs offered in Oregon.

7 *PacifiCorp Response*

8 The objectives of a comprehensive and robust smart grid strategic deployment
9 consistent with goals set forth by Commission can be achieved through implementation of
10 technologies that improve opportunities to provide additional choices, greater reliability, and
11 enhanced value to the customer. Success of such a strategic approach can be realized given
12 strong customer involvement and the ability to provide feedback for increased participation
13 throughout the process.

14 Time-based pricing can encourage customers to change energy usage patterns. The
15 most common price signals in the industry today are time-of-use (TOU), critical peak pricing
16 (CPP) and critical peak rebate programs. As discussed in the 2015 Report, PacifiCorp
17 conducted a two year pilot program in Oregon that was placed in-service beginning with the
18 2014 irrigation season, which implemented on-peak energy surcharges and off-peak energy
19 credits. Although the pilot program offered significant savings, the participation rate in 2014
20 was well below the threshold to initiate the pilot program. In 2015, more customer outreach
21 was performed to assess customer behavior by petitioning for and receiving feedback on the
22 2014 program. Using that feedback, the program was modified accordingly. The customer

¹⁹ See, <http://www.cyme.com/software/>.

1 outreach and changes are discussed in the 2015 Report and resulted in improved participation
2 rates.

3 **10. Demand Response**

4 *Staff Comments*

5 Staff asked about the potential of implementing a small-scale behavioral demand
6 response (BDR) pilot to accomplish a number of goals, including gaining understanding of
7 customer participation, load changes and facilitation of customer engagement in demand-side
8 management programs.

9 *PacifiCorp Response*

10 High level research indicates that utilities offering BDR options for their customers
11 are doing so by leveraging their existing AMI infrastructure. Since PacifiCorp does not have
12 this infrastructure available today, a pilot would not be feasible. Although BDR is possible
13 without AMI meter data available, it would require additional investments to capture
14 customer's daily energy use and provide real-time communications for customers to react.
15 These additional investments for system upgrades remain difficult to justify for a pilot.

16 *ODOE Comments*

17 ODOE would like PacifiCorp to implement a demand response pilot that tests a load
18 with year-round availability for both peaking and regulation services on either the west side
19 of Oregon or the Klamath Basin.

20 *PacifiCorp Response*

21 A three megawatt irrigation load control pilot program is under consideration for
22 Oregon. PacifiCorp's 2015 Integrated Resource Plan has selected capacity resources from
23 irrigation load management in Oregon and California beginning in 2022, the Company is

1 evaluating the feasibility of offering a pilot program to investigate whether its current
2 program design and approach operating in Utah and Idaho will be effective. The Company
3 will also assess whether the pilot program can be delivered at the price assumed in the
4 Company's resource plan. If deemed feasible, implementing a pilot program for the 2016-
5 2020 irrigation seasons would provide the Company and its irrigation customers the time
6 necessary to work through barriers and implement a permanent program in 2021 in time for
7 the 2022 resource need.

8 There are few demand response options that can provide impacts in all seasons. The
9 most common option is the commercial curtailment product assessed in the Company's 2015
10 DSM potential study, which the 2015 IRP Preferred Portfolio did not identify as a cost-
11 effective resource until 2023.²⁰ The cost and feasibility of this product does not vary as much
12 by jurisdiction as irrigation load control. As such, the Company does not believe a pilot is
13 warranted at this time.

14 ***CUB Comments***

15 CUB would like PacifiCorp to provide an update on its Cool Keeper program in
16 regard to anticipated increase of overall efficiency of direct load control system based on
17 upgrade in summer of 2014 to improve remote devices and enable measurements and
18 verification of savings during events.

19 ***PacifiCorp Response***

20 The improved overall efficiency of the two-way communication network upgraded
21 within the Cool Keeper demand response program can be divided into Real-time Operations

²⁰ PacifiCorp, *2015 Integrated Resource Plan – Volume 1*, Table 8-7 [Online]. Available:
http://www.pacificorp.com/content/dam/pacificorp/doc/Energy_Sources/Integrated_Resource_Plan/2015IRP/PacifiCorp_2015IRP-Vol1-MainDocument.pdf

1 and Data Analysis:

2 • Real-time Operations provides PacifiCorp with an accurate view of demand response
3 resource availability through the following mechanisms:

4 ○ Daily Resource Analysis: The system sends a demand response test event
5 message to all enrolled devices and collects data from these devices to
6 measure system availability on a daily basis. The additional data allows the
7 operator to have knowledge of the number of available devices in order to
8 appropriately respond to a demand response event.

9 ○ Hourly Forecasting: The system uses local weather information, such as
10 temperature and humidity, to estimate the load reduction expected from the
11 Cool Keeper resources.

12 • Data Analysis allows PacifiCorp to perform Measurement and Verification (M&V)
13 analysis by collecting information from every enrolled Cool Keeper device. Benefits
14 of M&V include:

15 ○ Event Validation: Interval runtime data is collected from all devices in the
16 network. Data is analyzed to determine which devices have the potential to
17 deliver reduction after a demand response event has occurred. The information
18 allows PacifiCorp to strategically perform site inspections on non-performing
19 participants for increased program performance.

20 ○ Customer Segmentation: The interval data allows segmentation of Cool
21 Keeper participants into the following groups: single family, multi-family, and
22 small commercial. Analysis of each segment has shown that each segment has

1 a distinctive load shape and usage pattern. The load shapes and usage patterns
2 for each segment have been utilized to refine load forecast models.

3 ○ Specific Analysis: The interval usage data from all enrolled customers allows
4 for ad-hoc analysis to answer specific program questions. For instance, the
5 number of Cool Keeper participants that shut their AC units off and only
6 activate their AC units during times of perceived necessary cooling has been
7 quantified. The performance of certain groups of customers has also been
8 analyzed in order to determine their contribution to the Cool Keeper program.

9 **11. Distributed Energy Resources**

10 *ODOE Comments*

11 ODOE encouraged PacifiCorp to evaluate smart inverters in the interconnection of
12 distributed resources whenever the system impact studies show that the distributed resource
13 does result in an operational problem.

14 *PacifiCorp Response*

15 Smart inverters manufacturers are still in the process of developing and certifying the
16 technology. PacifiCorp will continue to monitor the technology and relevant standards,
17 including participating as a member of the IEEE 1547 standard committee.

18 Pacific Power is currently involved in a collaborative effort with Berkshire Hathaway
19 Energy's other electric utilities to assess DER network impacts by modeling circuits and
20 developing standards to offset the negative impacts and move to a progressive network. Two
21 distribution circuits in Oregon were chosen to model varying levels of penetration of DER as
22 part of this collaborative effort. The study will evaluate the DER impacts to the system and

1 recommendations for managing the two-way flow of electricity. A summary of findings from
2 the study will be included in the 2016 Smart Grid Report.

3 **12. Reliability Metrics**

4 *Staff Comments*

5 Staff noted that it would like all three investor-owned utilities to begin reporting
6 reliability metrics as well as other benchmarks in the companies' respective annual Smart
7 Grid Report filings. Staff asked PacifiCorp to discuss what it believes is the most appropriate
8 way to determine what other metrics should be included in future reports, beginning with the
9 2016 Smart Grid Report.

10 *PacifiCorp Response*

11 PacifiCorp submits an annual report on Service Quality Measures (SQM) in
12 compliance with OAR 860-023-0151 and Order No. 98-191 in Docket UE 94. The SQM
13 report contains programs and initiatives to evaluate and enhance reliability, along with UE 94
14 R1, R2, R3, and R4 performance measures. These performance measures include SAIDI,
15 SAIFI, CAIDI and MAIFI_e as standard indices, applied at the state level.²¹

16 PacifiCorp is interested in discussing reliability goals with Staff in order to determine
17 any additional reliability metrics to include in future reports.

18 **12. Interconnection Policy**

19 *ODOE Comments*

20 ODOE encourages PacifiCorp to include the evaluation of smart inverters in the
21 upcoming interconnection policy update being undertaken by the Company.

²¹ PacifiCorp *Annual Report on Service Quality Measures for 2014* at 9.

1 ***PacifiCorp Response***

2 PacifiCorp Policy 138, which defines facility connection (interconnection)
3 requirements for distribution systems, will be updated to reflect smart inverter standards
4 following an update of IEEE 1547 on the same topic.

5 **IV. Conclusion**

6 The Company appreciates Staff's, ODOE's, and CUB's comments, the opportunity to
7 respond to them, and to present the 2015 Report to the Commission and other Oregon
8 stakeholders.

Respectfully submitted this 16th day of October, 2015.

By:



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