ITEM NO. /

PUBLIC UTILITY COMMISSION OF OREGON
STAFF REPORT
PUBLIC MEETING DATE: August 7, 2013

REGULAR X **CONSENT** ____ **EFFECTIVE DATE** ____ **N/A**

DATE: July 31, 2013

TO: Public Utility Commission

FROM: Juliet Johnson and Marianne Gardner

THROUGH: Jason Eisdorfer, Maury Galbraith, and Aster Adams

SUBJECT: PORTLAND GENERAL ELECTRIC: (Docket No. UM 1657) Annual Smart Grid Report.

STAFF RECOMMENDATION:

Staff recommends the Commission accept Portland General Electric's (PGE or Company) 2013 Smart Grid Report filing as having met the requirements of Order No. 12-158 established in UM 1460. Staff also recommends the Commission accept the recommendations described herein for future PGE Smart Grid Reports.

DISCUSSION:

Background

Order No. 12-158 in UM 1460 established reporting requirements for electric utilities in Oregon related to smart grid. Prior to this filing, PGE held a workshop on May 6, 2013, to gain stakeholder input. Some parties provided comments on the pre-filing draft report by May 8, 2013. PGE filed its 2013 Smart Grid Report on May 31, 2013. Commission Order No. 12-158 required utilities to include, at a minimum, the following main elements in their Smart Grid Annual Reports:

1. Smart Grid Strategy, Goals, and Objectives

2. Status of Smart Grid Investments, including transmission, distribution networks, customer information, distributed resources and demand-side management and general business enhancements. In addition, the Company must describe smart grid investments and applications it plans to undertake over the next five years and at a minimum address how the planned investments fit in the utility's Integrated Resource Plan (IRP).

3. Smart grid Opportunities and Constraints over the next five years including evaluations and assessments of technologies the utility plans to undertake and a description of any pilots and programs the utility is monitoring.

4. Targeted Evaluations of technologies and applications pursuant to Commission-approved stakeholder recommendations.

5. Related Activities

Order No. 12-158 lists Commission Guidelines for Utility Action when considering, evaluating, and implementing potential smart grid investments. OPUC Order No. 12-158 at 6-7.

The standard of review Staff plans to use for annual Smart Grid Reports, as set out in Order No. 12-158 is (OPUC Order No. 12-158 at 4-5):

1. Whether the Company met the guidelines set forth by the Commission in Order No. 12-158; and

2. Whether the Company addressed prior Commission-approved recommendations from previous year's Smart Grid Report reviews regarding potential smart grid investments and applications.

Because this is PGE's first Smart Grid Report filing, there are no previously agreed to Commission-approved recommendations from prior reports.

Description of the Filing

In the report, PGE explains it will follow the strategic principles summarized below to introduce incremental smart grid developments (PGE's 2013 Smart Grid Report at 6):

- Enable smart grid capabilities when equipment fails or becomes obsolete,
- Be strategic with regard to the smart grid technologies pursued,
- Use proven and interoperable technology as industry standards emerge,
- Work collaboratively to demonstrate technologies in the early stages of commercialization, and
- Track early stage technologies through industry organizations.

PGE listed the following as significant actions the Company intends to take during the next five years (PGE's 2013 Smart Grid Report at 32):

- Replace obsolete customer and distribution enterprise systems with modem systems that enable smart grid applications,
- Build on the capabilities of the Advanced Metering Infrastructure (AMI) system to enable demand response and pricing programs to improve asset utilization and reduce the need for peaking resources in the IRP,
- Develop and enhance customer services that build on the capabilities of the AMI system,
- Accelerate SCADA build-out to the remaining substations without this capability, and
- Expand Research & Development (R&D) efforts in support of smart grid applications and pilots.

Summary of Other Parties' Comments

Citizens' Utility Board of Oregon (CUB) and NW Energy Coalition (NWEC) filed comments. Smart Grid Oregon provided some comments through email to Staff. Party comments are summarized by key points below:

Advanced Metering Infrastructure (AMI)

CUB comments that PGE's 2013 Smart Grid Report does not sufficiently link the projected possibilities of the AMI system proposed in docket UE 189, "Joint Exhibit with Staff of Proposed AMI Conditions (2007)," with the current status of those anticipated benefits. "CUB believes that one of the primary benefits of the smart grid is its potential ability to establish a two-way communications system between the utility and its residential customers." CUB Comments at 1.

PGE addressed CUB's concerns in its Reply Comments as follows:

- PGE explained that at the time of OPUC Staff's AMI Audit Report dated October 11, 2011, a few AMI conditions were still in-progress and that all proposed conditions have been completed as of Q2 2012. PGE Reply Comments at 1-2.

- PGE maintains that the status of a number of AMI related smart grid benefits have been updated (PGE Reply Comments at 2) and that the Company has "Built systems that utilize Smart Meter data to identify overloaded transformers and confirm outages prior to dispatching crews." PGE's Smart Grid Report at 10. PGE explained the new Outage Management System (OMS) benefits in detail in its Report at page 11 and indicated its Distribution Asset utilization and Outage Management projects are still in-progress. PGE Reply Comments at 3.

- Regarding the two-way communications for load control, the Company stated that the market for load control via smart devices/appliances is still evolving. The Company continues to work with their vendor to evaluate two-way communication with AMI and will build capabilities and deploy if cost-effective. PGE believes it is premature to commit to a communication technology but favors control via the Internet as a first effort. PGE explained that a load control program for controlling air conditioning loads is not proposed currently. The Company finds Smart Water Heaters more attractive at this time, because they are least intrusive for customers and could offer thermal storage capability. PGE Reply Comments at 4.

Energy Efficiency and Low-Income Customers

NW Energy Coalition commented on the need for a more thorough evaluation and analysis by PGE in their 2013 Smart Grid report. NWEC focused their feedback on two areas: 1) smart grid and energy efficiency program interactions and 2) low income consumer concerns and protections. NWEC Comments at 1.

NWEC suggests that a thorough analysis of energy efficiency and smart grid would (NWEC Comments at 2):

- Ensure opportunities for energy and operational efficiencies that are not clearly within one department or project area are not overlooked.

- Provide interested parties with an understanding of PGE's strategy utilizing the smart grid to maximize energy efficiency.

- Distinguish between smart grid programs that promote long-term energy savings versus those that support short-term actions by consumers.

Further, NWEC suggested PGE address how smart grid technology and applications impact low-income customers in their report. NWEC requested that PGE address:

- The concerns low-income advocates and consumer protection groups have raised such as:
    - Automatic shut-off functions of automated metering technology
    - Time-of-use pricing
- Detail PGE's efforts to ensure all customers benefit from smart grid investments. NWEC Comments at 2.

PGE agrees with NWEC that the "smart grid will offer opportunities to enhance EE efforts." PGE Reply Comments at 1. PGE indicated that it launched PGE's Energy Tracker which offers customers energy tips, provides direct links to related Energy Trust of Oregon (ETO) programs, and allows customers access to their smart data. PGE also explained that it is currently participating in the "Green Button" program which will facilitate customized energy analyses for customers.

Further, PGE explained its efforts regarding Smart Appliances including its collaboration with ETO and Northwest Energy Efficiency Alliance (NEEA) on coordination of efforts in Smart Water Heating. The Company is forecasting a future joint initiative with ETO to promote Smart Thermostats and HVAC controls. PGE Reply Comments at 2.

Finally, regarding Low Income Consumer Concerns and Protections and the issue of automated shutoff functions and time-of-use pricing programs, PGE responded that these areas were already vetted in UE 189. The Company concluded that similar concerns would be addressed if presented during the approval process of other smart grid initiatives. PGE Reply Comments at 2.

Planning for the Future

Smart Grid Oregon (SGO) provided comments by email to Staff on PGE's Smart Grid Report. These comments are attached to this memo in Attachment A. Prefacing their comments on PGE's 2013 Smart Grid report, SMO makes these two general observations: 1) The move to a smarter grid should be made as quickly as possible without jeopardizing system reliability. "Many elements of smart grid can be implemented now, with others to follow." and 2) The report "2013 Grid Modernization Index" is the first ranking of states for their efforts in smart grid implementation. "The rankings are based on state policy, customer engagement, and grid operations.[1] Perhaps owing to the fact that there is no ISO in the Northwest, no Northwest state is in the top tier of the ranking. It might be a good idea for the OPUC staff to review that report to determine how Oregon utilities compare with their brethren elsewhere." SGO Comments at July 23, 2013, e-mail.

Commenting on PGE's 2013 Smart Grid Report, SGO believes PGE's plan "is probably the best and most comprehensive we have seen or heard of in the Northwest." SGO generally agrees with and supports PGE's Smart Grid Report, but adds that PGE's

[1]GridWise Alliance and Smart Grid Policy Center, "2013 Grid Modernization Index," (GridWise Alliance Inc., July 2013) http://www.gridwise.org/uploads/reports/GWA_13_GMIReport_FINAL.pdf

proposed R&D levels will not support the type of high technology shift required for a fully functioning smart grid. SGO Comments at July 23, 2013, e-mail.

Staff has reviewed the Smart Grid Modernization Index report, and notes that several of PGE's initiatives are in alignment with the "Common Practices for the Top 15 States" in the Policy, Customer Engagement, and Grid Operations areas. Staff's recommendations regarding metrics, and measuring the benefits of grid modernization investments, also align with the policy practices in those states.

Vehicle to Grid

NW Energy Coalition commented on the Vehicle to Grid potential citing success with current experimentation resulting in benefits to manufacturers, customers and the integration of renewable energy. NW Energy Coalition is pleased that PGE's revised report "appears to leave the door open for the potential of vehicle to grid in the 5-year timeframe" and requests PGE to closely monitor for application in the PGE service territory. NWEC Comments at 2.

PGE responded that they did update the Vehicle to Grid section to look further into the future as NWEC requested during the smart grid workshop. In the R&D section of their report, PGE has proposed a number of Electric Vehicle (EV) projects. These projects include a Vehicle 2 Home project. PGE relates they are working closely with major vehicle and charging station manufacturers and believe their R&D efforts are currently appropriate. PGE Reply Comments at 2.

Staff Comments

Staff has reviewed the report against the requirements and guidelines laid out in Order No. 12-158. In total the Company met the overall guidelines but the organization of the report could be improved to track more closely the requirements and guidelines of Order No. 12-158. Below Staff outlines those specific areas where additional or clarifying information would be beneficial:

Cost/Benefit Analysis - Even though Order No. 12-158 includes the "cost/benefit analysis" guideline, PGE's 2013 Smart Grid Report does not include analysis or estimate of costs and benefits (quantifiable or non-quantifiable) of the many projects and initiatives related to smart grid. The report vaguely makes references to customer benefits without any attempt to evaluate such benefits. The only quantification of benefits appears at page 33 where PGE explains that as a result of the AMI project, $18 million in targeted operational benefits were achieved as a result of reduced cost of

meter reading, early detection of meter theft and broken meters, and more effective handling of connection/disconnection practices. PGE's 2013 Smart Grid Report at 33 Appendix A: AMI - Customer Benefits.

Also related to cost/benefit analysis, PGE states that as part of its UE 262 General Rate Case, the Company identified 19 R&D opportunities related to smart grid for a total cost of $965,466. Although each opportunity has a short description of the project and its benefit, none of the benefits are sufficiently quantified. PGE's 2013 Smart Grid Report at 28 and Appendix C at 36-43.

Overall Roadmap - From this review, Staff concluded that more details are needed about PGE's long-term goals for smart grid and how current efforts fit toward those goals, including a roadmap (with dates) that includes how PGE plans to systematically evaluate the myriad of smart grid options available to the Company. Staff realizes that Oregon conditions are unique and some commonly cited benefits of smart grid may not apply to Oregon utilities as much as they would to locations with higher peaks and more expensive power. Staff would like the Company to list and prioritize specific benefits of smart grid investments, financial and otherwise, to Oregon customers and then show how the work plan and pilot projects will be organized in order to achieve the stated goals and benefits of smart grid projects.

Prioritization - Staff would like the Company to clearly communicate the criteria that will be used to make prioritization decisions including capital costs, cost-benefit analysis, system or operations improvement, and others.

Metrics - Staff recommends the Company develop metrics whereby reliability improvements and potential savings can be demonstrated. These metrics could include reliability indices such as the System Average Interruption Frequency Index (SAIFI), the System Average Interruption Duration Index (SAIDI), the Customer Average Interruption Duration Index (CAIDI), Momentary Average Interruption Event Frequency Index (MAIFI), customer benefits metrics, customer engagement, and self-healing measurements.

Reporting Results - Staff would like PGE to include more information about how results will be reported in terms of both format and timing based on specific milestones.

Stakeholder Involvement – Order No. 12-158 (B)(1)(b) requires that utilities provide the public with opportunities to contribute information and ideas on smart-grid investments and applications. PGE held a workshop and provided opportunity for comments in May 2013. Although Staff believes this technically was sufficient to meet the requirement, however it does not meet the spirit of the requirement. Staff would like

to see more regular stakeholder involvement earlier in the process. Stakeholders were given very little time to review the report prior to filing, and there was only one public workshop held just days before pre-filing comments were due.

Alternatives to Smart Grid - Staff recommends that PGE consider and report, as part of a cost/risk/benefit analysis, existing procedures or technology options that would preclude a costly investment in technology while still meeting smart grid objectives.

AMI - AMI reporting is not explicitly mentioned in Order No. 12-158. However, AMI is a key smart grid technology PGE has employed that is linked to furthering and enhancing smart grid functionality and benefits. Staff recommends that PGE include a more robust status update regarding AMI investment that considers the Commission Guidelines for Utility Action and includes the Company actions, deliverables, evaluations, and condition completion dates.

Dynamic Pricing - Staff understands the Company does not plan to implement new dynamic pricing models until their new Customer Information System (CIS) and Meter Data Management System (MDMS) are in place. Staff supports the Company in using the time between now and then to evaluate current PGE pilots as well as pilots and programs undertaken by other utilities to explore which future dynamic pricing models might be considered going forward. Staff also recognizes the importance of involving stakeholders early in this process.

Conservation Voltage Reduction - Staff supports the Company in continuing to look closely at Conservation Voltage Reduction (CVR). Staff is interested in the results the Company mentioned from their simulated results that CVR implementation as a peak shaving method will be most beneficial during winter peak loading conditions. Staff asks that the Company provide regular updates on the CVR pilot the Company indicates they will begin this year. Smart Grid Report, Appendix E at 46.

Two-way communication and AMI - Staff has had a hard time understanding the current status of two-way communication relative to the installed smart meters. Since the two-way communication capabilities of Advanced Metering Infrastructure (AMI) are essential to the smart grid functionality, Staff requested that PGE clarify the following paragraph that is in their report:

> *"CUB also expressed interest in having PGE demonstrate usage of the two-way communication network for other purposes such as appliance control. At this time PGE has elected to leave the question of communication path inside the home open since it may ultimately be through the AMI system- but at this time it is too early to say. It should be noted that other utilities, such as Southern*

California Edison (SCE), are moving away from using Smart Meters as a gateway." PGE's 2013 Smart Grid Report at 7.

PGE responded to Staff's request for clarification with an email, attached to this memo as Attachment B. The email described how Southern California Edison and other California and Texas utilities moved forward with putting a home area network (HAN) communication device in their smart meters based on what is called the ZigBee® protocol. Unfortunately, as empirically demonstrated six years later, the number of homes making use of the HAN in the meter is in the low thousands, mostly as the result of pilots. PGE described that appliance makers are moving towards using WiFi™ in their "smart" appliances, not ZigBee®. WiFi™ enabled communication devices allow the customer to access information and control their appliance from the Internet or smart phones.

PGE described that the approach most commonly discussed these days to support demand response is to use an energy management gateway in the home that uses Wi-Fi™ to enable cost effective demand response. PGE says they have been following this development, and while the concept is promising, there are numerous questions regarding implementing interoperability and there is still no market consensus on a specific approach. PGE Comments July 24, 2013 e-mail.

The smart meters that PGE installed have radio frequency technology that PGE has not yet fully implemented to enable two-way communication in the home. Staff understands that this type of two-way communication technology is still developing and Staff is unclear what additional effort and costs would be needed to implement two-way communication with the existing meters. Staff would like to be apprised of the progress of these pilots and see evidence of a decision analysis which demonstrates consideration of essential objectives of a two-way communication platform including efficiency, customer privacy and health concerns and customer benefits, reliability, and the components of a self-healing network.

Staff Recommendations:

Staff offers the following recommendation related to PGE's 2013 Smart Grid Report:

1. Staff recommends the Commission accept PGE's 2013 Smart Grid Report as having met the requirements of Order No. 12-158.

Staff offers the following recommendations related to smart grid investments and applications to be evaluated in PGE's next Smart Grid Report:

2. PGE should continue to evaluate and explore options for the use of its two-way communication platform and AMI in its next Smart Grid Report.

3. PGE should continue to evaluate and explore the use of Conservation Voltage Reduction (CVR) in its next Smart Grid Report.

Staff offers the following suggestions to PGE for improving its next Smart Grid Report:

4. PGE should seek stakeholder involvement earlier in the process of preparing the next Smart Grid Report.

5. PGE should include a roadmap (with dates) that includes how PGE plans to systematically evaluate the myriad of smart grid options available to the Company. PGE should list and prioritize specific smart grid investments and show how the work plan and any pilot projects will be organized in order to evaluate the smart grid projects.

6. PGE should evaluate traditional non-smart grid investments and applications as alternatives to smart grid investments and seek to identify the most cost-effective options for meeting its objectives and its customers' needs.

PROPOSED COMMISSION MOTION:

1. PGE's 2013 Smart Grid Report is accepted as having met the requirements of Order No. 12-158.

2. PGE will continue to evaluate and explore options for the use of its two-way communication platform and AMI in its next Smart Grid Report.

3. PGE will continue to evaluate and explore the use of Conservation Voltage Reduction (CVR) in its next Smart Grid Report.

From: Tom Foley [mailto:fthomas20@comcast.net]
Sent: Tuesday, July 23, 2013 2:39 PM
To: JOHNSON Juliet
Cc: James Mater
Subject: Fwd: Smart Grid Oregon's Comments of the PGE SG Plan

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From: "Tom Foley" <fthomas20@comcast.net>
To: "Tom Foley" <fthomas20@comcast.net>
Sent: Tuesday, July 23, 2013 1:52:06 PM
Subject: Smart Grid Oregon's Comments of the PGE Smart Grid Plan

Juliet: SGO provided comments to PGE on its Plan as it was coming together, and is happy to see that our comments were carefully considered and incorporated in the final Plan. Below we make a couple of general observations, and then provide a short summary of our comments on PGE's final Plan as it was submitted to the OPUC.

Observation 1. Smart Grid Oregon believes that we should move to a smarter grid as quickly as we can while not jeopardizing system reliability. Many elements of Smart Grid can be implemented now, with others to follow.

Observation 2. The GridWise Alliance (GWA) and Smart Grid Policy Center (SGPC) have created the first ranking of states, who are leaders in the movement towards Smart Grid. The rankings are based on state policy, customer engagement, and grid operations. Perhaps owing to the fact that there is no ISO in the Northwest, no Northwest state is in the top tier of the ranking. It might be a good idea for the OPUC staff to review that report to determine how Oregon utilities compare with their brethren elsewhere. The report can be seen at:

http://www.gridwise.org/uploads/reports/GWA_13_GMIReport_FINAL.pdf

Comments on the Plan:

3. With these general observations as a background, SGO believes the Portland General Electric (PGE) Plan to be a very good first plan. SGO would like to see more, and we understand the difficulties that PGE is under as it moves towards a smarter grid. But, it is the best and most comprehensive plan that we have seen or heard of in the Northwest.

4. Key parts of the plan are discussed below in no order of priority:

a. PGE sees the adoption and implementation of SG as inevitable, and important as a business proposition. We agree with that assessment, and we would have liked to see it *high-lighted* and presented earlier in the document.

b. SGO is glad to see that PGE envisions implementing its smart grid plan through its existing IRP framework. In our opinion it is the way to proceed.

c. Appendix D spells out the staffing needs to plan for and implement SG successfully. We support those needs.

d. We would like to see spelled out a specific high-level intra-division team comprised of existing and new staff to work comprehensively on SG ideas and implementation, and that this team would also work within the IRP team. This would help to break down the silos that exist in every organization, and help to eliminate confusion moving forward.

e. SGO believes that additional R&D funding will be needed, because of the somewhat dramatic shift from today's grid to a *fully functioning* SG. (Simpler elements of the SG can and are being implemented now.) Certainly compared to private companies working in high technology (SG will make greater use of high technology than does the current grid), the R&D levels being proposed by PGE seem minimal to us.

f. As part of its R&D efforts we are very pleased with the Salem pilot project and other pilots being proposed in the Plan.

Thanks you for asking for our response to the final PGE "Smart Grid Plan"

James Mater: Chairman Smart Grid Oregon

Tom Foley : Vice Chairman Smart Grid Oregon

From: Spenser Williams [mailto:Spenser.Williams@pgn.com]
Sent: Wednesday, July 24, 2013 3:56 PM
To: GARDNER Marianne
Subject: Clarification on PGE Smart Grid Report

Marianne,

Apologizes for the late response to your question. I was pulled away in meetings this afternoon and am now getting back to my desk. I spoke with some of the Smart Grid folks in my area and was able to get a response that I hope helps clarify your questions. Please see the response below. If you have any further questions please let me know and I will try and get a speedy response for you.

Have a great day.

Spenser Williams | Rates & Regulatory Affairs Analyst
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Staff question:

Referring to PGE's statement, "It should be noted that other utilities, such as Southern California Edison, are moving away from using smart meters as a gateway." The CPUC press release states that the CA IOUs have installed more than 10 million smart meters with HAN functionality. The CPUC has now directed the IOUs to make the HAN "functionality and benefits accessible to customers on a consistent, statewide basis…".

Staff is confused by PGE's statement that SCE is moving away from smart meters as a gateway. Staff is unclear what is meant by gateway. Do PGE's smart meters have this same type of HAN functionality?

PGE's Response

In 2007, SCE developed strong technical arguments, on the grounds of demand response benefits, for putting a home area network (HAN) communication device in the meter. The concept was that by defining a standard communication method at the meter, that then, all end-use device makers would use this communication method to receive utility DR signals.

The argument was so persuasive that many utilities in Texas and California supported the approach and today more than 90% of the meters in these states have a HAN device based, on the ZigBee® protocol, in the meter. Unfortunately, as empirically demonstrated six years later, the number of homes making use of the HAN in the meter is in the low thousands, mostly as the result of pilots.

The four biggest sets backs are as follows:

1. Texas and California use two different versions of the HAN chip and they are not compatible with each other so the appliance makers cannot make one appliance that works in both markets.
2. The HAN devices have inconsistent ability to communicate with devices in the homes, especially in multi-family dwellings. The radio in the HAN device is often not powerful enough to provide reliable communication to devices in the home which leads to high customer support costs to troubleshoot poor reliability.
3. Cyber security flaws allow hackers to exploit the HAN communication protocol that can threaten the reliability of the meter function.
4. Appliance makers are moving towards using WiFi™ in their "smart" appliances, not ZigBee. Features on these high-end appliances allow the customer to access information and control their appliance from the Internet or smartphones.

For all these reasons the approach to support DR most commonly discussed these days is to use an energy management gateway in the home that uses Wi-Fi™ to enable cost effective demand response. PGE has been following this development, and while the concept is promising there are numerous questions regarding implementing interoperability. Many pilots are being implemented but there is no market consensus on a specific approach.