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February 10, 2011

Via Electronic Filing and U.S. Mail

Oregon Public Utility Commission
Attention: Filing Center
550 Capitol Street NE, #215
PO Box 2148
Salem OR 97308-2148

**Re: UM 1461 – INVESTIGATION INTO RATE STRUCTURES FOR ELECTRIC
VEHICLE CHARGING INFRASTRUCTURE**

Attention Filing Center:

Enclosed for filing in UM 1461 are an original and five copies of:

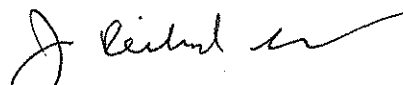
Response to Opening Comments and ALJ Bench Request of Portland General Electric
Company

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This document is being served upon the UM 1461 service list.

Thank you in advance for your assistance.

Sincerely,


J. Richard George
Assistant General Counsel

JRG:smc
Enclosures
cc: Service List-UM 1461

**BEFORE THE PUBLIC UTILITY COMMISSION
OF THE STATE OF OREGON**

UM 1461

In the Matter of)	
)	
PUBLIC UTILITY COMMISSION OF)	RESPONSE TO OPENING
OREGON)	COMMENTS AND BENCH
)	REQUEST OF PORTLAND
Investigation of Matters Related to)	GENERAL ELECTRIC
Electric Vehicle Charging)	COMPANY

Portland General Electric Company (“PGE”) offers the following comments in response to the Oregon Public Utility Company (“OPUC”) Bench Request issued November 15, 2010. In the bench request, the Commission requests comments directed to five specific questions or issues. PGE’s comments are structured to respond one by one to those five questions.

Oregon has been selected as an early launch state for the Nissan LEAF and Ford Focus electric vehicles (“EV”) and benefits from receiving federal stimulus dollars through the EV Project¹; TIGER II grants²; and Clean Cities monies.

Regionally, the states of Washington and Oregon and the province of British Columbia are working together on a “Green Highway,” assuring EV drivers adequate EV charging infrastructure from the California Oregon border to Whistler, British Columbia. Locally, Portland State University, the City of Portland and PGE are working on a dedicated Portland street for EV parking with Level 2 and DC Quick charging. In

¹ Oregon is one of six states participating in the EV Project which leverages federal stimulus funding to build and study a mature EV charging infrastructure in select metropolitan areas. The Oregon communities include: Portland, Salem, Corvallis, Eugene and Ashland. Oregon is slated to receive up to 1950 charging stations, 900 of which are located at the residences of LEAF owners, 1000 publicly available stations and 50 DC quick charge stations.

² The \$2 million TIGER II federal grant was awarded in October 2010 for DC quick charging stations to be installed along Oregon highways. 26, 84, 20 18, 99-W and 101.

addition to providing EV only parking and charging, this “Electric Avenue” pilot approach is intended to educate consumers, identify and work through issues with the City of Portland on rights of way and parking, provide information about EV driver public charging usage and patterns, showcase the technology, and ultimately spur the adoption of alternate fuel vehicles. Much is in play while consumers and interested organizations await delivery of vehicles. The challenge is now for the auto manufacturers to produce and deliver EVs and for consumers to drive them. The final quarter of 2010 saw the delivery of just one Nissan LEAF with many more promised through third quarter 2011.

It is against this backdrop and the desire of all involved for rapid deployment of electric vehicles, that PGE encourages a keep-it-simple, flexible regulatory approach. The Commission should implement only those rules that are absolutely necessary and take care not to inadvertently create barriers to the deployment of the EV industry. Where possible the Commission should also seek to remove any existing barriers.

The EV industry is still in its infancy:

- The charging station market has yet to develop
- EVs cars, trucks and fleet vehicles have yet to arrive in large numbers
- Consumer charging preferences are unknown (Will consumers charge at public stations or at home? Will they use level 2 or quick chargers?)
- City right of way policies with regard to location of charging stations in the right of way and charging station ownership have not been fully explored.

The utility role in the context of the emerging EV market is also still developing.

Initially, the utility role will be to:

- Support customer education and efforts to gather useful customer data;

- Provide general integration of EV technology for optimal customer experiences;
- Explore issues raised by locating charging stations in the right of way;
- Investigate opportunities to increase utility adoption of alternate fuel fleet vehicles;
- Explore opportunities to leverage grant monies by working with partners in pilot or demonstration projects;
- Assure the existence of sufficient electrical utility infrastructure; and
- Monitor EV charging impacts on utility infrastructure.

To put the EV added load in perspective, a 1% of new automobile sales penetration by 2020 represents 4000 vehicles in PGE's service territory and an added load of 1aMW; a 10% penetration represents 25,000 vehicles and a 7aMW increase; and a 50% penetration represents 100,200 vehicles and a 26aMW increase.³ Industry participants have widely varying projections of market development depending on their views of consumer confidence in the technology, vehicle variety and functionality, and comparative affordability.

In summary, we are advocating a flexible approach. While the market is developing and while there is optimism regarding vehicle delivery and customer adoption, early overly prescriptive regulation could adversely affect EV deployment and customer experience.

³ The numbers are based on figures of new car sales in Oregon, PGE's service territory accounting for 40% of the state and projecting EV adoptions to have strong initial growth rate and then taper. In modeling load impacts, we assumed that at lower adoption rates, more customers would purchase plug in hybrid EVs rather than pure battery EVs.

**Utility Ownership of Electric Vehicle Supply Equipment
("EVSE" or charging station) Guideline**

Request:

If the Commission permits utilities to own publicly available charging stations, what standards of review should the Commission use to determine when recovery of utility investment in publicly available charging stations is warranted? What are the implications, if any, of the used and useful standard (ORS 757.355) for utility investment in charging stations?

Response

Short Answer

The standard of review should be prudence. The used and useful standard would not apply to the actual use of the charging station, but rather that it is in-service providing electricity to end user EV drivers. Unless EV sales do not materialize or charging stations quickly become obsolete, PGE anticipates charging station will be used by customers. We envision that PGE-owned public charging stations could be necessary to address market gaps or a lack of supply. In this case PGE would be acting in our role as a provider of last resort.

Discussion

Context

PGE has no plans to install a network of charging stations at this time. PGE is not interested in establishing a nonregulated affiliate that would own charging stations. We would like to see a competitive market develop and successful competitive charging station ownership business models emerge. Questions remain about whether car charging can become a consumer service or will simply be an equipment sales opportunity. In the former category, start-ups hope to generate revenue in addition to hardware and equipment sales from monthly network subscription sales, to customers and fleet owners,

advertising at charging stations and grid services to utilities. It is too early to determine which model will be successful.

Presuming that EV drivers would have Level 1 or 2 chargers *at home*, the optimal *public* charging station would be a DC quick charger. The cost of a DC quick charger is around \$50,000 plus installation. The high cost of the charger coupled with the fast pace of technological change and obsolescence, suggests that providing DC quick charging service would be profitable only with considerable use. Projections by auto manufacturers and other industry participants estimate that 80-85% of all charging will occur at home⁴, with the rest at public chargers, assuming vehicle compatibility with the DC quick charger.⁵ Although public chargers may not be frequently used, they are key in developing driver confidence that the car will not strand drivers. It is in this context that PGE does not think it is prudent to rule out the possibility of utility ownership of charging stations, where it may be in the public interest for PGE to install such facilities.

In the initial adoption period, utility-installed DC quick chargers could be viewed as providing backup utility service to meet customers' needs. The utility provides the electrical service at the home charging point and could also provide the backup to such service through public charging stations. This is similar to providing backup capacity in transformers in the distribution system. For example, with regard to substation transformers, the loading guideline is that the transformer not be loaded more than 80% at peak capacity so that it may be used as backup in case another transformer goes out. It provides assurance to customers that the system is built to meet customers need for

⁴ Home charging depends in part whether EV owners live in homes with garages or carports. Pike Research reports that 64% of all charge points in the US will be at home.

⁵ Some plug in hybrid EVs may not be DC quick charge compatible. The General Motors Chevy Volt is Level 1 and 2 charging compatible only.

reliable service. In much the same way as a public charging station, the excess capacity on the transformer may not always be used but it is still there as part of the distribution system available to serve customers.

Standards

Recovery of publicly available, utility-owned charging station costs is subject to the same standards as other utility investment that ask whether the costs are prudently incurred utility costs.

In the fledgling period of EV introduction and adoption, the Commission's charging station investment review standards should incorporate flexibility and consider the purpose of the utility's charging station investment, which could vary from initial deployment to allay range anxiety, limited deployment as part of a demonstration or pilot project aimed at gathering data, or deployment only as necessary to reach underserved customers. The Commission may wish to require that the utility provide plans or objectives for ownership, cost estimates and later results.

The Commission may also consider whether the ownership costs are supported by financial arrangements and/or a tariffed service reasonably likely to recover costs. For example, charging stations could be owned by a utility and costs recovered from particular customers similar to municipal streetlighting service. The utility owns the end-use equipment, and the municipal customer is responsible for costs under terms of a tariffed service. PGE, however, is not advocating this model.

During review, the Commission may also wish to consider the following:

- Location and accessibility of the charging station, including any right of way considerations;

- Sufficiency of charging stations relative to the anticipated demand for EV charging and non-duplication of stations owned by non-utilities;
- Reasonableness of installation costs;
- Utility efforts to create public awareness of charging station locations and costs to charge; and
- Payment options and the amount of revenue collected.

Used and Useful

The “used and useful” standard (ORS 757.355) is applicable to utility-owned (rate based) investment. The standard states:

: . . . a public utility may not, directly or indirectly, by any device, charge, demand, collect or receive from any customer rates that include the costs of construction, building, installation or real or personal property not presently used for providing *utility service* to the customer. [emphasis added]

PGE is a “public utility” under ORS 757.005 and “service” is defined by ORS 756.010(8) to mean service “in its broadest and most inclusive sense and includes equipment and facilities related to providing the service or the product served.” Once utility-owned publicly available charging stations are placed into service and are available to provide electricity for customers’ vehicles, the investment would be used and useful. Actual use of the station would not be a determinant in any used and useful test, particularly in the early stages of EV deployment. In the early stages, the challenge is to develop an appropriately sized away-from-home charging station infrastructure. Insufficient publicly available charging stations will slow deployment while too many could be viewed as imprudent. As noted above, the purposes served by the station are not just to charge vehicles but also to increase driver confidence and allay range anxiety. This

important ancillary purpose supports the need for charging station availability whether or not they are heavily used.⁶

With regard to utility ownership of charging stations, PGE recommends the Commission:

1. Set policy that allows utilities to own publicly available charging stations and recover costs from general ratepayers, as a component of a pilot program, on a limited basis to provide backup capacity for customer vehicle charging, or as necessary to reach underserved customers. The utility ownership of charging stations would be subject to review for prudence.
2. Acknowledge that the utility services associated with the supply of electricity to a charging station is part of the public utility's requirements to provide service to customers.

Distribution System Upgrades Guidelines

Request:

- 1) Will it be possible to assign responsibility for a utility's need to make significant distribution system upgrades to one or a limited number of "last to the system" EV customers?**
- 2) If so, should the last to the system EV customer(s) be burdened with the full cost of the distribution system upgrade?**
- 3) If not, what are reasonable rate alternatives to assigning full cost responsibility to the last to the system EV customer(s)?**

⁶ Tokyo Electric Power Company study of EV charging station deployment found that before the placement of key stations around the city, drivers returned their EVs with a significantly higher state of charge than when there were charging stations placed about the city. Drivers used the publicly available DC quick chargers a few times a month but the stations served to address EV driver concerns about vehicle range. Before placement of DC quick chargers, the average monthly EV mileage was 203km and after 1472km.
http://climate.dialogue.org.hk/files/res/69/en_HiroyukiAoki.pdf; <http://www.cars21.com/files/news/EVS-24-3960315%20Botsford.pdf>, page 7;

Response

Short Answer

No, it *will not* be possible to assign responsibility for a utility's need to make significant distribution system upgrades to one or a limited number of "last to the system" EV customers. Moreover, the "last to the system" EV customer *should not* be burdened with the full cost of the distribution upgrades. A rate alternative to assigning full cost responsibility to the "last to the system" EV customer could be a system connect fee for customers adding an EV charging station. Such a fee could be devised as a flat charge that represents average estimated upgrade costs. However, PGE is not advocating this approach.

The Commission need not distinguish charging stations from other end uses for purposes of recovering costs for distribution system upgrades or changes. Utility practices, including line extension allowances, are adequate; however, as EV deployment increases, policies and allowances should be reviewed to incorporate knowledge and experience gained from the advancement of charging infrastructure.

Discussion

New EV charging load requirements are not likely to trigger rapid and/or significant levels of distribution system investments. With some exceptions possible for clustered adoption in given neighborhoods, the loads are likely to be scattered around the service area and impacts would emerge gradually, if at all.

Even if distribution system impacts are significant as in the clustering of battery EVs, it is nearly impossible to assign responsibility to a single customer. PGE distribution planners liken anticipated EV adoption to air conditioning loads added during

the 1990s and 2000s or the addition of plasma televisions during the 2000s. These loads came on gradually and while customers were required to notify the utility of material changes in load, residential customers seldom considered the addition of air conditioning or plasma televisions a material change. When a transformer became overloaded as a result of significant unanticipated increases in load, PGE replaced it but found it was unable to trace such impacts back to an end use customer to apportion cost.

The distribution system's specific facilities are load and location-dependent and are part of an interconnected system; further, the requirements of the distribution system include maintaining a safe and reliable system. Given that the system is interconnected, adjustments/additions in one part may over time affect other distribution upgrades and operational changes in other sections of the interconnected system. These changes do not occur rapidly but over time. Consequently, we conclude that with the gradual deployment of EVs and charging station loads, the ability to assign system upgrades is infeasible and potentially creates unjustified inequities among customers.

In planning for anticipated EV load, PGE has mapped hybrid owners in the service territory (based on zip code plus four digits) to determine feeder impacts if hybrid owners were to convert to battery EVs. The distribution system impacts were determined to be negligible. As data is available for other EV purchasers, PGE will map and anticipate the effects of clustering on feeders, conductors and other distribution service equipment.

The implied concerns in question two are that unfair customer subsidies may occur and so the utility should be required to directly collect certain costs from EV customers, either individually for upgrade costs or as an end-use class. We are

concerned, however, that collecting all the costs from EV customers could result in costs so prohibitive that it slows customer adoption. If EVs are viewed as just another customer appliance adding load, like air conditioning or plasma television sets, the “last to the system” customer should not be charged. Socializing such costs also recognizes the general benefits of greenhouse gas reduction, improved health from reduced air pollution, economic development and local investment for transportation fuel (rather than dependence on foreign oil).

Rate Design Guideline

Request:

The Commission asks parties to further discuss both approaches – a seasonal/time-of-use rate schedule separate or sub-metering for EV charging versus a time-of-use rates [sic] for the entire home or business with an EV charging station. The Commission also encourages parties to think more broadly about the issue to consider alternatives other than time-of-use rates that could be used by utilities and others to encourage off-peak charging. For example, Staff has considered whether a discounted rate class should be created for EV charging in exchange for service being interruptible during on-peak periods. The Commission asks parties to comment on the merits or disadvantages of this approach. Should any approach used to encourage off-peak charge of electrical vehicles be initially implemented as a pilot program? The Commission also asks parties to comment about the role of customer education with regard to EV charging during the off-peak.

Response:

The deployment of EVs will create an experiment in consumer behavior and strategies to encourage off-peak charging. There are numerous unknowns about EV user behaviors and preferences about how and when EVs need to be charged to give the users assured transportation. The more or less universal areas of inquiry include customer price sensitivity to on-peak and off-peak prices for EV charging, frequency of customer on-peak or daytime charging, and frequency of use of DC quick-charging stations.

A Commission requirement that electricity service may be supplied to charging stations only under separate metering and/or EV-charging rate schedules is premature and potentially discouraging to EV deployment.⁷ Meters or submeters add to customer costs and also could pose a potential significant delay in receiving service. Mandated separate metering for the purposes of time-of-use (“TOU”) pricing, will require a separate, new customer account to be established for nonresidential service, and another basic monthly charge. The EV separate account and basic monthly charge of \$12.00 for Rate Schedule 32, would offset savings that might otherwise be obtained from an EV TOU rate. This raises a host of issues, including the application of payment and disconnect rules. Additionally, mandated separate meters also potentially creates “bypass” incentives.

The challenge is to identify cost-effective solutions and options for customers to encourage off-peak charging. Of course, at this time, we know very little about the actual patterns of charging that customers will prefer. Customers may or may not opt to use the vehicle’s timer (if available) to charge off peak. The federally subsidized EV Project promises to provide more information on customer preferences and habits. Moreover, there are also several pilots throughout the United States that will provide useful information⁸ and PGE will be engaged in educating customers on its TOU rate and optimal charging habits.

The Commission encourages parties to think more broadly about the rate design issue, particularly with reference to off-peak charging. Pricing structures including dynamic pricing, critical peak pricing, real-time pricing and interruptible rates may be

⁷ See PGE opening comments.

⁸ The following utilities have EV pilot projects in development or being implemented: Hawaii Electric, San Diego Gas & Electric, Duke Energy, Progress Energy Carolinas, Baltimore Gas & Electric, Consumers Energy and Detroit Edison

useful pricing tools in the future, but the pricing structures should not be exclusively applied to EV charging.

Prior to designing any particular rate design, PGE recommends the parties collaborate in researching whether the EV and charging station on-board data collection capabilities are useful for metering purposes. Any rate design requires the capability to measure the correct billing determinants and then collect those determinants to compute and render bills. A research project comparing on-board information to actual metered information may help establish the validity of on-board data collection as well as create the needed protocols to make this work and avoid the need for duplicative measurement capabilities.

Overall, the Commission should encourage innovative pilot approaches to maximize efficient EV charging. Nevertheless, the most effective way to encourage efficient EV charging is to price the electricity in a manner consistent with the pricing for other customer uses.

IRP Flexible Resources Guideline

Request:

The Commission asks parties to comment regarding the reasons to either adopt or reject Staff's proposed integrated resources plan (IRP) guideline for flexible resource planning?

Staff's Proposed IRP guidelines to address the potential for EVs to provide ancillary services for the integration of renewable generation.

1. Forecast demand for flexible capacity: The electric utility shall forecast the balancing reserves needed at different time intervals (e.g. ramping needed within 5 minutes) to respond to variation in load and renewable intermittent generation over the 20 year planning period.

2. Forecast the supply of flexible capacity: The electric utility shall forecast the balancing reserves available at different time intervals (e.g. ramping available within 5 minutes) from existing generation resources over the 20 year planning period.

3. Evaluate flexible resources on a consistent and comparable basis: In planning to fill any gap between the available demand and supply of flexible capacity, the electric utilities shall evaluate all resource options including the use of EVs on a consistent and comparable basis.

Response:

Staff's original proposed IRP guidelines in this docket focused on the estimation of the ability of EV charging as an ancillary service to address load and renewable resource generation variability on a 5 minute basis for 20 years. While the first two guidelines may seem reasonable, the anticipated adoption of EVs is among the very least of the drivers for the identified forecasting. PGE is increasing non-controllable variable generation (wind) and losing access to controllable flexible generation (hydro), which means that assessing flexible generation is a key component of PGE's IRP planning going forward. The linkage of these two guidelines to the third regarding use of EVs as a resource option is remote given the outlook for the commercial viability of EV charging for ancillary services. PGE does not support adopting the additional guidelines for the reasons that follow:

The commercial viability of EVs providing ancillary services is beyond the capability of the current generation of EVs and likely a decade away from availability. At this point, the vehicles are built assuming electricity is flowing one direction from the grid to the vehicle for charging; we understand auto manufacturers intend to disclaim warranties on EVs if there is evidence of battery tampering.

Adoption of IRP guidelines is premature--the additional work that would be required by the guidelines represents significant additional analysis and modeling, and places an unwarranted burden on the planning process. The proposed guidelines would impose long range speculative assumptions, in the absence of any material market information, about amounts and diurnal timing of any ancillary services that EVs could provide (or consume). PGE resource planners are already monitoring signposts related to EV adoption and charging, and technological developments that might support two way grid activities. Adoption of IRP guidelines is unnecessary and not cost effective at this time.

While adopting such guidelines is not recommended, PGE is open to pilot projects that are aimed at collecting information that may later inform policy with regard to EV use for ancillary services. Before the Commission accepts the Staff proposed guidelines, it should assess whether the additional analysis is likely to be cost-effective and provide useful additional information for EV charging evaluations and for integrated resource plans in the next few years. We do not think it will.

Planning and Reporting Guidelines

Request:

The Commission asks parties to consider whether additional reporting or planning guidelines are needed. What should be required, if anything, in terms of planning and reporting by utilities? How should the Commission and interested parties be kept informed on progress and lessons learned in the implementation of electric vehicle charging?

Response:

The central issue for utility planning and reporting is an assessment of the local distribution impacts of EV charging. This cannot occur before the vehicles arrive in

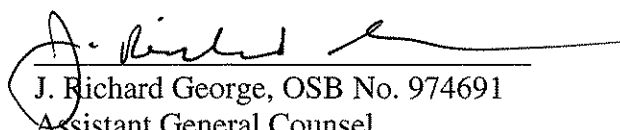
numbers great enough to gauge consumer driving and charging behavior. Accordingly, PGE recommends no further planning or reporting guidelines at this time. In lieu of additional guidelines or regulations, PGE encourages the Commission to facilitate a discussion among the parties as to the kinds of pilot or demonstration projects that may be undertaken for learning that may then influence the further development of appropriate policy. This approach is the one taken by the Michigan Commission, for example.

Additional Guidelines

PGE submits no additional guidelines at this time.

DATED this 10th day of February, 2011.

Respectfully submitted,



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CERTIFICATE OF SERVICE

I hereby certify that I have this day caused **Response to Opening Comments and ALJ Bench Request of Portland General Electric Company** to be served by electronic mail to those parties whose email addresses appear on the attached service list, and by First Class US Mail, postage prepaid and properly addressed, to those parties on the attached service list who have not waived paper service from OPUC Docket No. UM 1461.

DATED at Portland, Oregon, this 10th day of February, 2011.



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