BEFORE THE PUBLIC UTILITY COMMISSION OF OREGON

UM 1461

In the Matter of an Investigation into Electric Vehicle Charging Rates and Infrastructure	STAFF"S RESPONSE to COMMISSIONERS' BENCH REQUEST OF NOVEMBER 15, 2010

INTRODUCTION

On August 28, 2010, parties to docket UM 1461, Investigation Into Electric Vehicle (EV) Charging Issues, submitted Opening Comments. In September 2010 the Commissioners attended a public workshop. In November 2010 the Commission issued a Bench Request, with questions from the Commissioners. In this response, staff offers answers to the Commissioners' questions and some changes to its proposed policies.

RESTATEMENT OF GOALS FOR THIS INVESTIGATION

In its Opening Comments, Staff listed the goals for this investigation as:

1. Enable the development of both privately owned and publicly available charging infrastructure in a way that is flexible and keeps all options open to different EV charging business models as the market matures.

2. Manage the impact of EV charging on utility load profiles and infrastructure by encouraging charging at off peak periods, and anticipate the potential for EV's to provide ancillary services.

3. Ensure no undue shifting of EV related costs onto non participating ratepayers

After reviewing other parties' opening comments, staff continues to recommend that the Commission adopt these goals.[1]

EV FOCUS HAS SHIFTED SINCE THE OPENING OF UM 1461

At the start of this investigation, most discussion centered on residential EVs. But since the parties' Opening Comments in August 2010, the EV industry and its proponents have shifted their emphasis to fleets of business and government vehicles.

At a national level, the Electrification Coalition issued a detailed report in November 2010, explaining why fleets are a particularly good market for EV adoption. The

[1] Parties did suggest changes in emphasis. Pacificorp advised against emphasizing EV's as an ancillary service. Gridmobility emphasized EV's potential for greenhouse gas reductions. Other parties generally supported the goals as written.

Governor's Transportation Electrification Executive Council (TEEC)[2] has shifted its emphasis towards fleet adoption as well.

Earlier comments focused largely on how rate polices might affect residential customers. Staff now recommends increased focus on how different rate polices would affect commercial customers. Detailed reasons for this shift in emphasis, and implications for the Commission, appear at section II.A of these comments.

ORGANIZATION OF STAFF'S RESPONSE TO THE COMMISSION'S BENCH REQUEST

Staff's Response to the Bench Request is arranged as follows:

- Executive Summary, with Staff's basic response to the Commission's questions.
- Detailed explanation and supporting arguments for staff's answers to the Commission's questions
- Attachment A: Alternative Rate Policies for EV Charging

I. Executive Summary of Staff's Responses to the Commissions' Bench Request

Commissioners' Question 1: (Criteria for Rate Based EVSE[3] and ORS 757.355 Analysis):

Staff recommends a high bar for recovery of utility investments in public charging. Consistent with the goals of this investigation, rate-based charging should not compete unfairly with third party public charging, and should not unduly shift costs from EV owners to non-EV owners. Any utility investment in public charging should provide an overall benefit to ratepayers. Criteria for rate recovery of utility investments in public charging should ensure that:

1. Investment costs for public charging are recovered from the EV rate class. Staff believes recovery of utility investments in public charging from all ratepayers would be inconsistent with the goal to avoid undue cost shifting.

2. A station at or near that location in the company's service territory is essential in order to remove a barrier to EV adoption.

3. A station near that location is unlikely absent utility investments.

These are difficult criteria to meet, but staff believes the utility should be required to make a compelling case for rate recovery. Staff's detailed reasoning and supporting arguments appear in Section II.A below.

[2] The TEEC was created by Executive Order 10-09, to promote Oregon's leadership in EV adoption and recommend ways to bring EV related jobs to Oregon. The OPUC is a standing member
[3] "EVSE" is Electric Vehicle Service Equipment.

The Commission also requested an analysis of ORS 757.335. With advice of counsel, staff believes ORS 757.335 does not preclude cost recovery for utility investment in charging stations. The detailed analysis appears in Section II.A below.

Commissioners' Question 2a (distribution system upgrades): 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? If so, should the last to the system EV customer(s) be burdened with the full cost of the distribution system upgrade? If not, what are reasonable rate alternatives to assigning full cost responsibility to the last to the system EV customer(s)?

Staff believes it is not necessary or practical to charge the "last to the system owners" for local distribution upgrades. The home or fleet owner who most recently purchased an EV is not necessarily the one whose load required the upgrade. Any need for a local upgrade is the cumulative result of several new loads, including non-EV loads. All of these new loads contribute to the need for the upgrade.

Moreover, if the Commission and utilities successfully promote off peak charging or "smart charging,"[4] the EV charging may not require distribution upgrades at all.

Utilities' current line extension policies provide a reasonable rate alternative and do a good job of fairly assigning costs of upgrades from increased loads. For residential customers, utilities have established policies for assigning the costs of local distribution upgrades from a variety of new loads (e.g. AC, expanded floor space, etc.). These policies could work for EV adopters as well. For Fleets and Public Charging, business customers already work directly with the utility and this practice would work just as well for EVSE load.

Staff's detailed analysis appears in Section II.B below.

Commissioners' Question 2b (alternatives to assigning the cost of implementing a separate EV rate schedule to all customers): Address the relative pros and cons of assigning the metering, billing and data collection costs associated with the implementation of a separate rate schedule for EV charging to the EV customer class.

In its opening comments staff recommended a separate EV rate schedule, assigning the associated metering and billing costs to all ratepayers.

Assigning all costs directly to the EV class would send a true price signal to those customers. If EV owners have the choice of a separate EV rate versus a TOU (time-of-use) rate for the entire premise, then having EV owners pay the metering and billing costs of a separate rate would send a true price signal on which to base that choice. Customers who choose the separate rate would not receive "free" submetering. This would be consistent with traditional cost causation principles.

[4] In these comments, Smart Charging refers to direct utility control over charging speed, perhaps in exchange for a reduction in electric rates. Smart charging is discussed in greater detail in Section II .

However, during the early adopter phase, staff believes it is fair to assign the initial costs of implementing the separate EV rate schedule to all ratepayers, because a separate rate class has benefits to all ratepayers. The detailed explanation of these benefits is the subject of Question (3). But to summarize these benefits, a separate rate class:

i. Promotes off peak charging for customers who do not want a TOU rate for their entire load (this may be especially true for the commercial sector)
ii. Improves the utilities' load profile and avoids new capacity investments
iii. Removes home EV charging from the inclining block structure
iv. Levels the playing field for a third party public charging market, and
v. If the Commission wants to allow some utility investment in public charging infrastructure, it will want a separate EV class to assign those investments to.

These benefits go to all ratepayers, for reasons explained fully under Question (3).

However, in the short run, spreading the implementation costs might be the only way to realize these benefits. The meter itself is a small cost. Assigning that cost to the EV owner would not be a significant disincentive to EV adoption or to a separate EV rate. But billing and data collection costs also include back-office costs. The back-office costs of setting up a new customer class will likely be larger than the cost of the submeter. These one-time costs may be large relative to the small initial number of early adopters. Assigning all implementation costs to EV owners at the outset would penalize early adopters. Since we cannot assign initial one-time costs to later customers in the EV class, staff supports spreading the back-office costs to all customers. The Commission can revisit this cost assignment in the future if the number of EV adopters grows.

In summary, staff believes all customers benefit from the existence of the EV class. But in the short run, spreading the initial implementation costs over all ratepayers is a necessary step to establish the separate rate. The more complete explanation is found in these comments at section II.C.

Commissioners' Question 3a: Discuss a seasonal/TOU rate with separate or sub-metering versus a TOU rate for the entire home or business with an EV charging station.

Goal #2 of this investigation is to manage the impacts of EV charging on the grid by promoting off peak charging. As noted above, off peak charging has system benefits for all ratepayers. The utility could realize these benefits either through a separate EV rate or by placing the entire house or business on a mandatory TOU rate.

Placing the entire premise on a TOU rate would avoid extra metering and billing costs. Designed properly, a TOU rate would send a true price signal to customers for all their loads, not just EV charging. Placing the entire house or premise on a mandatory TOU rate would leverage the advanced meters that utilities have already installed. Also, a whole-premise TOU rate avoids any potential for bypassing the separate EV submeter during the day and charging the vehicle during the day at standard flat rates.

However, staff believes a separate EV rate should be offered because:

1) It promotes off peak charging to EV owners who are resistant to EV rates for the entire house.
    a. Utilities already offer TOU rates, but so far the opt in rate is about 2%
    b. Some customers (fleets in particular) might resist a whole-premise TOU rate because they cannot shift other loads. For fleets the investment in submetering might make business sense in the long run compared to putting the whole business on TOU rates.
    c. A separate EV rate could be designed to provide a stronger price signal than the whole-house TOU rates currently offered. For example, TOU rates for PacifiCorp's large commercial class currently have little difference between off peak and shoulder periods.

2) Shifting charging loads to off peak benefits all ratepayers by improving the utility's load profile. It makes use of fixed generation, transmission and local distribution assets while avoiding new capacity investments. The improved load profile benefits everyone.

3) A separate rate removes EV charging from the inclining block rate structure. This allows the Commission to retain the inclining block structure for non-EV loads, encouraging conservation and efficiency without penalizing EV drivers for the increased kwh usage of charging the vehicle. This is fair because
    a. The Commission might want to retain inclining block for other loads
    b. EV charging is more easily shifted in time than other loads.
    c. EV charging can actually provide a system benefit if managed properly; and shouldn't be penalized by being on an inclining block schedule.

4) A separate EV rate levels the playing field for a competitive market in public charging by having all entrants pay the same electric rate. It provides rate certainty for independent public charging providers, helping them plan their business.

5) A separate EV rate could be designed without demand charges. For large commercial customers, a high demand charge due to EV charging could distort the customers' overall rate. This could be a particular problem for public charging at businesses that do not currently see a high demand charge.

6) A separate EV rate facilitates collection of data on charging times and habits. That data is useful for future utility planning. Data could be collected from the EVSE but the utility will have no right to it without a separate rate.

Submetering Issues

The Bench Request notes that "…several parties questioned whether separate metering or sub-metering could be effectively implemented." The concerns regarding submetering appear to be cost, installation delays and required safety inspections. Staff addressed the

cost concern by proposing to assign metering and billing costs over all ratepayers. Staff believes this is fair and not undue cost shifting, as explained in its response to Question 2.

Regarding installation concerns, staff acknowledges efforts by Building Codes Division (BCD) to streamline EVSE inspection.[5] Staff believes submetering can be effectively implemented without negating those efforts. BCD's minor label program applies only to residential installations, not fleets. For the residential class, staff offers two approaches to help meet staff's recommended goals while addressing the submetering concerns.

The first approach is to offer customers a choice of rates. The customer could choose a separate EV-TOU rate with submetering, or a mandatory TOU rate for the whole house without submetering. The Commission could offer this choice to residential customers, small commercial customers, all customers, or none.

In all, staff identifies five different alternatives for EV charging rate structures:

1. The status quo, with voluntary whole-premise TOU rates and no separate EV rate.
2. Mandatory whole-house rates for residential customers (status quo for non-residential customers)
3. Mandatory separately metered EV rates for all customers,
4. Allowing all EVSE owners the choice of a separate EV rate with submetering or a mandatory whole-premise TOU rate
5. Allowing only residential customers the choice, with all non-residential EVSE customers on a mandatory separately metered EV rate.

Staff's complete discussion of a separate EV rate and related metering issues is found in our comments at Section II.D, below. Attachment A to these comments is a comparison of the five identified alternatives and a staff recommendation.

A Possible Long Range Solution - the EVSE as an "embedded submeter"
As a different solution to the submetering concerns, staff suggests using the EVSE itself as the submeter. Some EVSE's already have this capability. EVSE Vendors refer to this as "embedded metering".

Embedded metering would resolve many of the cost and installation concerns of submetering. There are implementation details that are important and complex and are beyond the scope of UM 1461. However, Southern California Edison is already working with EVSE vendors to resolve the details associated with embedded metering. This suggests that those details can be resolved and are worth the effort. Staff suggests a separate and more focused investigation into these details. The implementation details of embedded metering are described in more detail at section II.D of these comments, along with staff's reasons for proposing a follow up investigation.

Question 3b: <u>consider alternatives other than mandatory TOU rates that could be used to encourage off-peak charging.</u> <u>For example, Staff has considered whether a discounted</u>

[5] BCD streamlined the EVSE code inspection by implementing a "minor label" program.

rate class should be created for EV charging in exchange for service being interruptible during on-peak periods.

Staff sees four approaches to encourage off-peak charging:

(i) Rate Incentives[6]
(ii) Direct utility control over charging speed, in exchange for a discounted rate[7]
(iii) Education
(iv) Leveraging the capability of advanced metering and home area networks so customers actively manage all electricity use including EV charging.[8]

No single approach will be as effective as a combination of all four. The approaches are not mutually exclusive. There is no reason for one approach to exclude any other.

In the short term, rate incentives and education are the simplest and easiest to implement. (Education is the subject of a separate question, addressed below). Smart charging (option 2) and leveraging smart grid capabilities are promising in the future but not ready in the near term. Staff recommends that utilities monitor the progress in these areas and plan for them as they mature. Staff's more detailed response to this question is in these comments at section II.E

Question 3c: should any approach used to encourage off-peak charging be initially implemented as a pilot program?

Staff does not suggest a pilot program for rate incentives. The federally funded Ecotality program is designed for 900 participants, and will produce useful data on customers' response to current rates. For this small number of early adopters, staff recommends using traditional cost of service principles in rate design, rather than pilots involving experimental rates. Staff also recommends using lessons learned from pilots that are already taking place in other states.

Staff also does not recommend a pilot for education. There are no cost savings in limiting outreach efforts to a pilot. Pilots may be appropriate for smart charging and leveraging of smart grid capability. Both approaches are new and technically challenging, so a pilot might be useful. Plans for pilots would be appropriate topics for the smart grid plan that staff recommended in Smart Grid Docket UM 1460.

Question 3d: comment on the role of customer education with regard to EV charging during the off-peak.

Education is essential, but education alone is not sufficient. Customers will require education to understand why charging at the "optimal time" is more complicated than

[6] This could either be a reduced off peak rate, or an incentive payment for off peak charging
[7] In these comments and in other states' dockets, this is also called "smart charging".
[8] This would require the Commission to direct utilities to deploy smart grid more quickly than is currently proposed in docket UM 1460.

simply charging after work. For example, many customers may not understand why the off-peak period begins as late at 10:00 pm.

If customers are allowed a choice between a separate EV rate and a whole-premise TOU rate, they will need clear information in order to make an informed choice. The point of purchase is one opportunity to educate. People buying a new EV will want information.

However, staff sees no direct Commission education role; the information will come from car dealers, ODOE, ODOT and third parties. Staff suggests that the Commission leverage the outreach activities of the Governor's Transportation Electrification Executive Council (TEEC), of which the OPUC is a standing member.

Utilities could recover expenses related to providing information and education on the benefits of charging off peak, rate alternatives, and how to program EV charging equipment. In making this recommendation, staff makes the traditional distinction between education and marketing.

Commissioners' Question 4: Comment regarding the reasons to either adopt or reject Staff's proposed IRP guideline for flexible resource planning

Staff continues to support the IRP guideline proposed in opening comments. In opening comments, some parties described this guideline as premature. Staff acknowledges that any application of EVs as a flexible resource could be many years away. However, the proposed guideline requires planning, not implementation. Staff's detailed reasons for its continued support of this guideline are at section II.# of these comments.

Commissioners' Question 5: What, if anything, should be required in terms of planning or reporting by utilities? How should the Commission and interested parties be kept informed on progress and lessons learned in the implementation of EV charging?

No additional reports are recommended. The Commission may leverage other reports such as the IRP and the Smart Grid plan recommended in UM 1460. The Commission will also learn from national reports such as the EVProject Report that Idaho National Lab will publish. Staff sees no need to impose another reporting requirement.

Commissioner Question 6: The Commission encourages parties to propose new guidelines with full explanations regarding the need for, benefits of and considerations of the proposed guidelines.

Staff proposes no new guidelines, but would modify the guidelines proposed in opening comments. Specifically, staff now supports giving some or all customers the choice of a separate EV-TOU rate or a whole-premise TOU rate. Staff opposes allowing EV's to charge on existing rate schedules other than the voluntary TOU rates.

Staff's detailed discussion of all these questions follows, in Section II of these comments.

II. Detailed Staff Analysis of Commissioners' November 2010 Bench Request

A. **Commissioners' Question 1**: (Utility Ownership of EVSE): If the Commission permits utilities to own publicly available EVSE stations, what standards of review should the Commission use to determine when recovery of utility investment in publicly available EVSE stations is warranted? What are the implications, if any, of the used and useful standard ORS 757.355 for utility investment in charging stations?

Review criteria for utility investments in public charging should ensure that:

1. Utility owned public charging infrastructure will not put an independent EVSP[9] at a competitive disadvantage, and
2. Utility owned public charging will not unduly shift the cost of EV adoption onto non-participating ratepayers.

Staff recommends a high bar for cost recovery of utility investments in public charging. If a public charging station can earn a return on investment based on its own revenue, there is no reason for utilities to recover the investment cost in rates. An unregulated affiliate or an independent EVSP can provide the service. Allowing the utility to recover the investment in rates would put independent EVSP's at a competitive disadvantage. Conversely, if a charging station at a given location cannot generate enough sales to earn a fair rate of return, then allowing the utility to recover the investment in rates may be shifting the cost onto non-EV owners. This leaves a very limited set of circumstances in which the utility could make a case that recovering the investment in rates is in the ratepayers' interest.

Consistent with these goals, the Commission might consider allowing utilities to recover investments in public charging infrastructure if

- The utility's investment in charging stations can meet the same net benefit test that other utility investments must meet.
- There is no likelihood that third party EVSP's or unregulated affiliates can provide the same services at the same or similar locations
- Charging infrastructure in that location is essential for EV adoption
- The utility has established an EV rate class. If the Commission wants to allow cost recovery in order to remove a barrier to EV adoption, then those costs must be spread over a separate EV customer class, with no costs assigned to other ratepayers.

Staff believes net benefit to ratepayers must be determined within the Commission's traditional scope – quality of service, fair and reasonable rates, and prevention of undue cost shifting. For example, the utility might show that investments in public charging will

[9] EVSP is Electric Vehicle Service Provider (an independent company providing charging service)

help implement demand response or achieve better utilization of existing fixed assets. Even in this case, the utility must show that an independent EVSP or unregulated affiliate of the utility is unlikely to provide the same benefit.

If the utility implements a separate EV customer class, then the costs of utility owned public charging could be spread over that class, and the utility need only show a benefit to that class. In this case the Commission could allow a utility investment in public charging in an underserved location, if it wants to remove a barrier to EV adoption. However, without a separate EV class, the cost recovery in rates would shift costs to other customer classes. In this case the utility must show that a utility owned public charging station will provide a benefit to all ratepayers.

Questions the Commission might consider whether to allow a utility owned public charging station might be:

(i) is the EVSE in question in a "threshold" location, essential to fill-in a gap on an important travel corridor that is otherwise adequately served?
(ii) Does available data show that providing service in one location will enable private EVSE marketers to serve other locations competitively?
(iii) Has the Legislature mandated adequate charging on a particular travel corridor and named the utility as provider of last resort?
(iv) If there is a perceived "need" for charging in a particular location, should there be an open season for third parties to bid?

The Commission also asked about the implications of ORS 757.355, which says that a utility cannot recover (in rates) the cost of installations not used for providing utility service to the customer.

The question is whether charging electric vehicles is a "utility service". Note that ORS 757.005(1)(b)(G) says that a company that provides electricity as a motor fuel is not a public utility if it does not furnish "any utility service described in paragraph (a)…" Staff's counsel advises that the language of ORS 757.005(1)(b)(G) implies that charging electric vehicles is a utility service, but one which the statutory exemption allows non-utilities to provide. In other words, if EV charging were not a utility service, then the legislature would not have needed to create the ORS 757.005(1)(b)(G) carve-out. Therefore, ORS 757.355 does not preclude the Commission from allowing cost recovery.

B. Commissioners' Question 2a (distribution system upgrades): 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? If so, should the last to the system EV customer(s) be burdened with the full cost of the distribution system upgrade? If not, what are reasonable rate alternatives to assigning full cost responsibility to the last to the system EV customer(s)?[10]

[10] The same issue was raised in California Public Utility Commission (CPUC) rulemaking R0908009. In September 24, 2010 comments the Division of Ratepayer Advocates described a hypothetical neighborhood where the first EV owner does not create the need for an upgrade but a second EV owner "tips the local

Staff does not believe it is necessary or practical to assign the need for distribution upgrades to an individual EV owner. The most recently purchased EVSE is not solely responsible for a local upgrade. A number of factors affect loading on a given transformer, such as weather, non-EV electricity use and EV charging behavior. Local upgrades are needed because of the cumulative effect of several new loads.

If well managed, EV charging might not require distribution upgrades at all. Off-peak charging effectively extends the existing distribution system by providing load when the non-EV load is lowest. EVSE location is also a factor. Research in Ireland shows that EVSE's located close to a substation have less impact on distribution than EVSE's located toward the end of the line. [11] Rather than assigning costs to one EV customer, a better approach is to promote off-peak charging or, someday, smart charging. With smart charging, the utility can prevent all EV's in one neighborhood from charging simultaneously, further delaying need for system upgrades.

Staff maintains its recommendation that utilities' existing line extension policies are a good alternative to assigning distribution upgrade costs to individual EV owners. Under PGE's policy, for example, an EV owner would not bear full responsibility for a local distribution upgrade.[12] Under that policy a customer requesting a new line drop receives an allowance and pays for costs over and above that allowance. Once the line is in, PGE maintains it and spreads the cost of upgrades that are caused by residential load increases. For commercial and industrial customers, PGE's line extension policy is similar to the residential policy, but the allowance is higher and is often determined by the customer working with the utility on a case by case basis. Utilities do need to know where EV's are purchased, but only for planning purposes – not to assign the cost of upgrades to a particular EV owner.

Focus on fleet EV adoption – implications for the Commission
As noted in the Executive Summary, EV companies and EVSPs have increased their focus on fleets of light duty vehicles (delivery trucks and business vehicles).

In November 2010, the Electrification Coalition issued a report that explains in detail why fleets are a particularly good market for early adopters[13]. Fleets have highly predictable and consistent driving patterns. Charging is likely to be at the place of business, with less need for public charging. Fleet vehicles are not used for long weekend trips, so there is less concern over limited range. Charging at night is convenient. And, carmakers can install just the right size battery for the business's needs, reducing the

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system over the edge" and gets stuck paying the full cost of upgrades. Subsequent EV buyers then get a free ride.

[11] "Smart Grid Developments in ESB Networks, Ireland", Teresa Fallon,Mgr. Smart Networks Presented at Distributech 2011, San Diego, CA.
[12] In these comments we used PGE's line extension policy as an example. However, Pacificorp and Idaho Power, in their opening comments, generally supported the same policy.
[13] "Fleet Electrification Roadmap" November 2010, published by the Electrification Coalition

price. Finally, fleet owners base their buying decision on total cost of ownership over several years, taking into account fuel and maintenance costs.

For these reasons, in discussing Commission policies, staff explicitly considers the implications for EV fleet customers. For example, in its discussion of electric rate policies, staff includes commercial rates. Staff recommends that the Commission be mindful of fleet vehicles as it considers the issues in this investigation.

EV fleets and Local Distribution Upgrades

For fleet charging, there may be cases where a fleet is large enough to require a local distribution upgrade. [14] In these cases, the fleet owner should pay for upgrades to their own service, but costs "upstream" of the pole should be allocated across the business owner's rate class generally, unless there is compelling reason for a different allocation.

Many businesses already need upgraded service and work directly with the utility before installing a new large load. Compared with residential owners, EV charging by fleet owners is even less likely to be the determining factor in the need for local distribution upgrades because the distribution systems in commercial or industrial areas are already robust. For example, industrial customers may already have 480 volt, three phase power.

Fleet operations might be especially amenable to charging at night, particularly if there are rate incentives. Fleet owners may also be amenable to smart charging, in which the utility can manage the timing of EV charging so that not all EV's supplied by one transformer are charging simultaneously. Alternately, third party EV service providers or aggregators might offer such management as a service. These approaches could avoid or delay the need for local system upgrades. Any necessary upgrades would likely be the result of several different load increases, with EV charging being only one.

For these reasons, staff believes existing line extension policies fairly assign local upgrade costs and are adequate to handle any potential need for local distribution upgrades caused by EV fleets. For fleets, this would ensure that upgrades caused by EV fleets are paid for in the same way as service upgrades caused by non-EV loads in the commercial and industrial classes.

Utilities in other states have taken similar positions before their commissions. Southern California Edison, for example, stated[15]:

> " At this point in the evolution of the market, tracking and monitoring costs at such a granular level would be difficult to support, and is not necessary for the market to move forward in the shorter term. Separate tracking of distribution upgrades for PEV load would be a challenge to implement given the complexities in determining whether the "cause" of the upgrade is, in fact, the PEV load. In attempting to evaluate the impact on the distribution system, it would be difficult

[14] This concern was raised by the Electrification Coalition in its 11/2010 Fleet Electrification Report.
[15] SCE comments in CPUC docket R0900809.

to clearly identify which distribution upgrades were associated solely with PEVs and which are associated with other load changes."

C. Commissioners' Question 2b (assigning the cost of implementing a separate EV rate schedule): Address the relative pros and cons of assigning the metering, billing and data collection costs associated with the implementation of a separate rate schedule for EV charging to the EV customer class.

To address this question, staff first considers who benefits from the creation of a separate EV rate schedule. Staff next considers whether it is practical to assign the implementation costs of a separate class exclusively to EV owners.

Staff proposed the separate EV class for several reasons, including

1. To encourage off peak charging without requiring time of use (TOU) rate for the entire house or business
2. To create a level playing field for a competitive market in public charging
3. To remove EV charging from the inclining block structure for residential customers

Some of these goals could also be met by placing the EVSE owners' entire house or business on TOU rate. Staff's detailed comparison of the separate EV rate versus the whole house TOU rate is found in our answer to Commission question (3), below. But to summarize, staff considered both options and concluded that establishing a separate EV class has benefits for all ratepayers.

Benefits of a separate EV rate schedule to all customers

One (but not the only) benefit of a separate EV rate is the ability to manage EV charging. Anything that promotes off -peak charging is a benefit to ratepayers in general.[16] With off peak charging, local distribution upgrades can be delayed or avoided. Off -peak charging uses existing capacity when other loads are lowest, improving the utility's load factor.

Conversely, with no price signal, even a small number of EVs clustered in one neighborhood might increase the peak load on a local distribution transformer. For example, on hot summer days, the peak load on a local distribution transformer can extend into the early evening.

The benefits of off peak charging and "smart charging" to system load factor are well understood. These benefits are shared by all ratepayers. Therefore, if a separate rate is used to promote off peak charging or to more easily implement "smart charging", then it is fair to spread the implementation costs of that rate over all ratepayers.

Creating a separate EV rate supports the goal of encouraging an open and competitive market in public charging. It ensures that all players in the public charging market pay the

[16] A whole-premise TOU rate would also promote off peak charging. In question (3), we consider the whole premise TOU rate as an option to a separate EV rate. This response to question (2) specifically addresses the question of how to spread implementation costs.

same electric rate. Without a separate EV rate, public charging stations would likely be on an existing commercial or industrial rate. These rates have demand charges that can unduly distort the electric rates paid by the EVSP host.[17] A separate EV rate can ensure that utilities do not make one-time negotiations with some EVSE providers or sell power at favorable rates to their own unregulated affiliates.

In the long run all ratepayers benefit from an open competitive market in public charging. Without such a market, public utility investment would be needed to provide a charging infrastructure. Third parties will be at a competitive disadvantage, and utility-provided charging service could become the only option.

But assigning metering and billing costs to EV public charging service providers could negate efforts to create a level playing field in public charging. Large public charging hosts could absorb these costs as a "loss leader". Utilities could absorb the metering and billing costs for any charging stations that they operate. But smaller entities trying to enter the market are less able to absorb these costs and will be at a disadvantage. Thus, spreading the implementation cost of an EV rate schedule over ratepayers in general helps to level the playing field.

Even if the competitive market develops, there may be some cases where public utility investment is needed to jump start the development of necessary infrastructure. This might be one way to remove a barrier to EV adoption, and would benefit EV owners. But in order to assign the cost of public charging infrastructure to EV owners, there must first be an EV customer class to assign those costs to. Successfully implementing a separate mandatory EV rate class now will enable the Commission to assign larger EV specific costs to that class in the future. That is fair to EV owners and non-EV owners alike.

Assigning costs to all ratepayers versus early adopters

If the Commission agrees that a separate EV rate class is desirable, then spreading the implementation costs over all ratepayers might be the only way to accomplish it. In the near term the implementation costs of a separate rate class could be too large for the small number of early adopters. The cost of the meter itself is small and might not be an unreasonable cost for the EV owner. But creating a new rate has back office costs that are more difficult to quantify. These costs could be much larger than the meter itself.

Projections by the Electrification Coalition, Ecotality, and the Governor's Alternative Fuels Infrastructure Working Group (AFWG) indicate that EV market penetration may not reach 5% of the car market until about 2020. If the EV market does reach the goals set by the AFWG, then assigning metering and billing costs to the EV customer class might not be prohibitive. But for the first few years, the EV population is expected to grow slowly. For example, the federally funded pilot project managed by Ecotality is limited to 900 participants. There are too few early adopters to bear the startup costs of a separate rate schedule, at least in the short run. If the EV population grows, a future Commission could revisit the question of metering and billing costs.

[17] The "host" is the business on whose property the publicly available EVSE is located. For example, a shopping mall that places publicly available EVSE in its parking lot would be the host.

Staff agrees that some of the system benefits of a separate EV rate could also be gained from a TOU rate for the entire house or business ("whole house TOU rate"). Staff addresses that issue in response to question (3). But for purposes of question (2), staff contends that assigning all metering, billing and back office costs to the EV rate class would unduly penalize early adopters. If the Commission decides to create a separate EV rate class, assigning all implementation costs to that separate rate class may prove a barrier to EV adoption.

Regardless of how metering and billing costs are assigned, EV customers will pay up-front costs. Some residential customers will need wiring upgrades to their home. If a sub meter is required, the utility would traditionally[18] own the submeter but the homeowner would still install the meter base, which can cost more than the meter itself. These costs would be paid by the EV owner and would not be shifted to other ratepayers.

Oregon would not be the only state to assign implementation costs for separate EV rates to all ratepayers. For example, "…the SDG&E [San Diego Gas & Electric] project is including the cost of the separate meter in the distribution charge paid by all ratepayers, per terms of a settlement related to AMI rollout..."[19]

In summary, staff believes a separate EV customer class gives the Commission options to adopt policies that benefit ratepayers in general. The chief benefits are improved utilization of fixed assets, the potential for demand response programs, and the development of a competitive market in public charging without excessive reliance on utility investment. These benefits are shared by all ratepayers, and it is fair for all ratepayers to share the initial implementation costs.

D. Commissioners' Question 3a: Discuss a seasonal/TOU rate with separate or sub-metering versus a TOU rate for the entire home or business with an EV charging station.

In our response to question (2) above, we discussed how a TOU rate for EV charging would promote off-peak charging and would provide benefits to EV owners and non-EV owners alike. All EV charging should be on a TOU rate. EV's are the first "smart" appliance. Any shifting of load from on-peak to off-peak has benefits for the grid but EV owners have unique ability to choose when to charge. EV owners can program charging time in advance using circuitry on the EVSE or the vehicle itself. No other end use has the same flexibility.

As a result, EV charging will have high time of use price elasticity. EV owners will be especially responsive to price signals in the form of a TOU rate.

[18] We say "traditionally" because in some utilities (SCE, for example) are exploring the use of metering capability that is embedded in the EVSE or the vehicle itself. We discuss this option further under Question 3 of this Bench Request.
[19] Email from Matt Crosby CPUC staff to Adam Bless, January 12, 2011

A mandatory TOU rate for the EVSE owner's entire house or business could also encourage off peak charging without separate metering and billing. The whole house TOU option would eliminate not just the second meter, but duplicative electrical work and inspection. Designed properly, a whole house TOU rate would send customers a true price signal for *all* their consumption. Placing all EV owners on the TOU rate option that utilities already offer would make efficient use of advanced metering infrastructure that is already installed. Finally, placing the EV owner's entire premise on one TOU rate removes any potential for on-peak EV charging from the non-TOU meter.

However, a separate EV rate has several advantages:

1) *Some EV owners are resistant to TOU rates for the entire house.*

PGE and Pacificorp have both offered a voluntary TOU rate for several years. For PGE, the opt- in rate has been approximately 2% of residential customers. More education might overcome this drawback, but there is no guarantee that education alone will get EV buyers to opt for whole-house TOU rates. Moreover, the current TOU rate schedule was not designed with the assumption of an EV load and may not be appropriate for a house with an EV.

A separate EV rate may be particularly advantageous to fleets. Fleet owners are most likely paying a commercial or industrial rate. Their loads are dictated by the needs of the business, giving them less ability to shift load in response to a TOU rate for their entire premise. A separate EV rate would enable businesses who charge their fleet at night to pay the true cost of off -peak charging without adversely affecting the rest of their business. Even if the fleet owners are required to pay their own submetering cost, that cost might be preferable to placing the entire business on a TOU rate. Requiring fleet owners to pay a TOU rate for their entire business could be a barrier to EV fleet adoption for some businesses.

In its "Fleet Electrification Roadmap", the Electrification Coalition projected that fleet vehicles would be in use during the day and recharge at night. But some fleet cars may recharge during the day. If a TOU EV rate is optional, fleet owners who charge during the day would likely choose a flat rate. The fact that the cost to serve their charging load is higher during the day argues in favor of making a TOU EV rate mandatory.

2) *A separate rate removes EV charging from the inclining block rate structure. This allows the Commission to retain the inclining block structure for non-EV loads, encouraging conservation and efficiency without penalizing EV drivers for the increased kWh usage of charging the vehicle.* [20]

Adding EV charging to the regular electric bill could put some residential customers onto a higher block because of the current "tiered" rate structure. Separating EV charging from the inclining block structure is fair to ratepayers in general and more accurately reflects the true cost of service. The inclining block structure has been used partly to promote

[20] This point applies only to residential customers. Fleet owners are generally on non residential rates, which do not have an inclining block structure.

conservation and partly because large users create the need for new investments in capacity if their load occurs during peak periods. Because of its unique flexibility, EV charging is less likely to require capacity upgrades, and can actually improve the utilities' load factor. Therefore, EV charging, priced to reflect true cost of service, should not force residential customers into a higher tier.

3) *A separate mandatory EV rate levels the playing field for a competitive market in public charging by having all competitors in the same service territory see the same electric rate.*

A separate EV rate assures that all EVSP's face identical prices for their power purchases from the serving utility. This assures that the serving utility will not be able to serve its own public charging stations or those of an affiliate at some otherwise negotiated rate. Prohibiting such actions now will send a signal to prospective EVSP's that the Commission encourages the development of a competitive market in public EV charging. The competitive market is needed to ensure that utilities do not acquire market power in public EV charging. And, if the Commission does allow utilities to recover some public EV charging investments, a separate mandatory EV rate allows the Commission to assign those investments to the EV customer class rather than to other classes.

At the June 2010 UM 1461 public workshop, Ecotality stated that entrants in the public charging market need certainty about what electric rates they face. A separate and uniform EV rate provides that certainty and allows EVSP's to plan their business.

With a separate and uniform EV rate for public charging, all public EV charging customers would from the outset face rates based on marginal costs. Without a separate mandatory EV rate, EV owners who use public charging may assume they will remain on standard rates. Staff expects that most public charging will likely occur during daytime hours, when the marginal cost of the power is higher.

Impact of Demand Charges on Fleet and Public Charging:
EV charging on a whole house rate among commercial and industrial customers could raise demand charges. In testimony before the Washington Utility and Transportation Commission (WUTC), Ecotality raised a concern that adding EV load to a business's other loads could increase demand charges. This would unduly distort the electric rates for the host business and deter some businesses from hosting a public charging station at all. This could affect third party marketers' business plans, contrary to recommended Goal #1 of supporting an open and competitive market in public charging.

An additional advantage to the separate mandatory EV rate is that it provides the utility and the commission with complete data on charging amounts and times.[21]This information is useful for planning the development of charging infrastructure if EV adoption increases. The federally funded Ecotality pilot will provide some of this type of data, but only for a small set (900 EV's) of early adopters.

[21] Data on charging patterns could be collected by the EVSE or by on-board circuitry. But that data is not available to the utility unless the EV owner agrees to share it.

Is a separate EV rate "premature"?

At the September 9, 2010 workshop, some parties argued that it is too soon to create a separate rate class. But if a separate EV rate is not in place during the early adoption phase, it will only get harder over time to require appropriate cost-based EV rates. This will be especially problematic for public charging stations that were developed under the assumption of standard (flat) rates. Creating the separate EV rate now will give independent EVSP's clear information that they can use in their business plan. Fleet owners and residential customers will also make more informed buying decisions if they know what rate structure they face at the outset. For these reasons, if a separate rate is desirable, then it is preferable to start now.

Even if EV market penetration is too low to produce system benefits at the outset, this is the time to begin to establish the behavioral change that is needed to acquire any system benefits from off peak charging a decade from now. The converse is true for those who choose day time charging- they would see an accurate price signals for that choice.

Submetering Issues

In its Bench Request, the Commission noted that "several parties questioned whether separate metering or sub-metering could be effectively implemented." Two challenges to separate metering or submetering are the installation cost for the equipment and the associated billing costs.

For residential charging, the difficulty of installing and inspecting the EVSE has been called a barrier to EV adoption. Installation of the EVSE is outside the Commission's jurisdiction, but at the September 9, 2010 workshop ODOE raised a similar concern over submetering. ODOE described actions by the Building Codes Division (BCD) to streamline the inspection of EVSE installations (BCD's "minor label program"). ODOE stated that requiring a separate meter could negate BCD's efforts. Staff supports BCD's efforts and has met with BCD to discuss ways to implement EV-specific TOU rates without adversely affecting BCD's minor label program.

The BCD minor label program applies to residential customers only.[22] For fleets, a separate EV rate with submetering would not impact the minor label program.

Option of "Customer Choice"

In Washington and California, EVSP's such as Ecotality and Coulomb have promoted "customer choice". Residential and commercial customers could choose a separate EV rate with submetering versus placing the entire premise on the utilities' currently offered TOU rate. This approach would ease the concerns raised by ODOE at the September 2010 workshop because customers would make their own choice. In California, Southern California Edison and the EVSE Provider Coalition were in agreement in support of giving customers this choice of rate.

[22] Email from Andrea Fogue of BCD to Adam Bless of OPUC staff.

Given the choice of a separate EV rate with submetering versus a whole house TOU rate, informed EV owners might choose the whole house rate. Many EV owners who charge off-peak could see a lower overall bill by switching from a flat rate to a TOU rate for the whole house, even if they make no other changes in their electricity use.[23]

EVs, like many conventional cars, often take time between purchase and delivery. Informed customers who choose the separate rate could arrange for EVSE and submeter installation while waiting for delivery. For some EV customers with short commutes, charging temporarily at Level 1 (110 volts) might be an option, since no separate rate for charging at that level is proposed.

Staff acknowledges that a TOU rate for the entire premise would retain the benefits from promoting off peak charging. If a mandatory separate EV rate is problematic, then giving customers a choice between a separate EV rate and a whole- house TOU rate could be a reasonable option.

In all, staff identifies five different EV rate policies for Commission consideration:

1. The status quo, with voluntary whole premise TOU rates and no EV rate
2. Mandatory whole-house TOU rates for customers whose utility currently has a TOU rate, with status quo for EV customers with no currently offered TOU rate
3. Mandatory separately metered TOU-EV rates for all customers
4. A choice of separately metered EV rates versus whole premise TOU rates for all EV customers, or
5. Allowing only residential EV customers the choice, with all non-residential EV customers on a mandatory separately metered EV rate.

In all cases, the separate EV rate would be a TOU rate meeting the design guidelines in staff's Opening Comments from August 2010. The whole premise TOU rate is assumed to be the one currently offered by the utility, although it could be reopened in the future.

An analysis of the pros and cons of each approach is provided in the Attachment A of these comments.

A Possible Long Range Solution - the EVSE as an "embedded submeter" As noted above, a concern with the separate mandatory EV rate is the cost and time requirement for separate metering. Staff and BCD have discussed a long term solution, using circuitry already in the EVSE to collect billing determinants. Staff contacted EVSE companies Ecotality, General Electric, Clipper Creek and Coulomb. All responded that their EVSE's already measure kWh and time of use. All confirmed that embedded metering capability can be certified to meet the accuracy, precision and quality control standards that utilities require of conventional meters. BCD, while not a party to this investigation, has told staff

[23] This statement is based on the online bill calculator on PGE's website. A customer who (i)Uses 1000 kWh/month for regular household loads and an additional 250 kWh/month for EV charging and (ii)charges off peak but makes no other changes in electricity use would save about $15/month on PGE's TOU rate. This is the "typical" customer assumed in PGE's TOU web page.

that if the EVSE is capable of transmitting billing determinants using the same wireless technology that utilities use to gather billing data from Advanced Metering, then that would preserve their streamlining effort. Coulomb is already with working with Southern California Edison to explore embedded submetering.

Staff recognizes that embedded metering would break from the traditional utility-owned meter. But if EV's are the first smart appliance, then EV metering approaches may be the first of several different metering approaches under Smart Grid. If so, then a new approach to EV submetering could offer useful lessons for Smart Grid in general.

Using the EVSE as the submeter appears to offer a way to get the advantages of a separate EV class without the cost and installation issues of a submeter. Using the EVSE as a submeter does raise issues new to this investigation. These issues include:

i. The boundaries between ownership and responsibility by the utility and the customer would change. The Commission would need rulemaking to consider the EVSE as a third party owned submeter.
ii. For a third party owned submeter, the Commission would have to determine responsibility for testing, calibration, security and resolution of billing disputes.
iii. Utilities and EVSE makers would have to agree on quality assurance protocols to assure the precision, accuracy, and testability required.
iv. Commission rules at OAR 860-038-0360 and 860-023-0010(1) and (2) could be interpreted as requiring that the utility own all meters. However, staff's counsel advises that, under OAR 860-023-0010(2) the Commission has reserved the discretion to allow an entity other than the utility to own the meter. Pursuant to OAR 860-023-0010(1), the Commission could suggest that a device other than a traditional meter may be used to measure energy usage. A private EVSE could qualify as such a device. But rulemaking may be the best method to explore this issue.

These issues are too detailed to complete in the timeframe of docket UM 1461. Staff recommends that the Commission consider a follow up investigation specifically focused on EVSE- embedded submetering.[24]

Summary – staff response to Commission Question 3a
In summary, staff continues to recommend the creation of a separate, uniform rate class for all EV charging, with TOU rates. If the Commission is opposed to a separate mandatory EV customer class, it may consider an opt-in EV customer class with a uniform TOU rate schedule for residential, fleet and public charging. EV customers who do not choose the separate EV rate would be placed on the whole premise TOU rate offered by their utility. Finally, staff recommends a follow up investigation into the engineering and possible legal details of using the EVSE as a submeter.

[24] The vehicle itself also has components that could measure billing determinants.

E. Question 3b: consider alternatives other than mandatory TOU rates that could be used 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.

Staff sees four main approaches to encourage off peak charging:

i. Rate Incentives[25]
ii. Direct utility control over charging speed ("smart charging")
iii. Education
iv. Leveraging the capability of advanced metering and home area networks so customers actively manage all electricity use including EV charging.[26]

Staff believes the best approach is a combination of all four. Rate incentives may shift EV charging to off peak, but not at the right times. In neighborhoods with several EV's, having everyone begin charging during the first hour of the off peak period could still stress local transformers. Approaches (ii), (iii) and (iv) would address this concern.

However, smart charging will require major investments in information technology. In its November 2009 report, the Electrification Coalition stated:

> "Utilities will need to upgrade their information technology (IT) infrastructure so that they and other market participants (such as electric market retailers or EV network operators) can manage the vehicle charging process as well as to facilitate billing for electricity used in vehicle charging. Whereas charging vehicles during off-peak hours is a potential boon to utilities, the capability to utilize existing spare capacity can only work with IT infrastructure that allows the utility (or other market participants) to turn vehicle chargers on and off in order to help shape the system's load. Not only do utilities not want everyone to plug in their GEV ["Grid Electric Vehicle"] during peak hours, they also will need to ensure that the vehicles do not all begin charging at the same time."

At the public workshop on August 6, 2010, staff heard little support from stakeholders for smart charging in the near term.[27] In their opening comments, the utilities described smart charging as premature. CUB also cautioned that mandatory smart charging might deter some people from buying an EV.

Staff has followed proceedings in other states. California, Arizona and Michigan have pilot programs featuring TOU rates and submetering. To our knowledge, none have a smart charging pilot.

[25] This could either be a reduced off peak rate, or an incentive payment for off peak charging
[26] This would require the Commission to direct utilities to deploy smart grid more quickly than is currently proposed in docket UM 1460.
[27] NWEC did voice support for direct control based on renewable energy content rather than peak load.

The consistent message from stakeholders was that EV adoption will happen slowly enough to avoid adverse grid impacts until probably 2020, even at the local distribution level. This is why staff, in its opening comments, did not propose smart charging right away. Instead, staff proposed that utilities assess the cost to implement smart charging, and report back to the Commission.

Staff is concerned that the opportunity to implement a well designed smart charging program may be missed if nothing is done until grid impacts are apparent. The Electrification Coalition report quoted above describes in detail the information technology needed. In its opening comments, PGE stressed the complexity of implementing smart charging. Metering and communications infrastructure will not be in place without prior planning. Utilities will need to get the technical details right on the first try. And, the Commission will need to determine how to fairly allocate the costs. In this case, a decision to begin research and planning promptly would be consistent with Goal #1 (keeping options open) of this docket.

For these reasons, staff continues to recommend that the Commission direct utilities to begin planning and scoping for smart charging. This effort would include research and development and would include a reporting requirement.

The four approaches described here are not mutually exclusive and do not compete with each other. Even if the technology is too immature for smart grid techniques, the Commission could try rate incentives in the near term. It will take time to get the rate design right, and early adopters could provide a useful testing ground.

Consistency with Staff Proposals in UM 1460 (Smart Grid) In December 2010, staff issued proposed guidelines for Smart Grid planning under UM 1460. Those proposed guidelines would require utilities to report on plans to implement smart grid technologies in a set of specific areas. The proposed guidelines include requirements to explain the business case for proposed smart grid programs, including demand response. Smart charging is just one form of demand response. Lessons learned could apply to other forms of demand response that smart grid would enable.

At present, the advanced meters installed in the Oregon utilities' AMI programs cannot distinguish between EV loads and other loads. Future advanced meters may have this ability. If so, utilities could leverage their AMI programs to directly control EV charging and keep track of EV charging kWh consumption using the same advanced metering and home area network technology already under consideration.

Staff recommends that plans to develop smart charging be one of the options that the utilities include in their smart grid plan pursuant to UM 1460. This would avoid duplicative work for utilities and OPUC, and would assure that Commission decisions on dockets UM 1460 and 1461 are consistent. It provides adequate planning for direct EV charging control, since the proposed Smart Grid guidelines require an initial plan within six months with two year updates. It would properly treat EV charging not in isolation

but as one of several different "smart appliances" with the potential for demand response. This approach has the added advantage of an acknowledgement path.

F. Question 3c: should any approach used to encourage off-peak charging be initially implemented as a pilot program?

Staff does not believe it is necessary to conduct a pilot program for a separate EV rate schedule with TOU rates. The Ecotality program will have a total enrollment of 900 cars, which is a manageable number. If the Commission chooses to create a special EV rate, once the submetering and cost allocation issues are decided, there is no reason for a pilot program. All projections by ODOT, ODOE and the Electrification Coalition suggest that the pace of EV adoption will be gradual enough for utilities and public utility commissions to learn from experience. Also, pilots are already underway in other states. San Diego Gas and Electric alone has three experimental EV rates, all with submetering. The Ecotality program itself is essentially a pilot in six test markets with Idaho National Lab analyzing the data and publishing results in a public document. The Commission could learn from those pilots before conducting one in Oregon.

Staff also does not believe customer education efforts require a pilot program. Education and outreach will be more effective if they reach the largest practical number of people. There is little cost savings in limiting outreach efforts to a subset of customers.

However, smart charging would be a more advanced step that utilities in other states are not implementing yet. Staff is not aware of smart EV charging pilot programs in other states[28]. For this reason, and because smart charging is more technically challenging than other approaches, staff recommends that utility programs to control EV charging speed as a form of demand response be first tried as a pilot program.

G. Question 3d: comment on the role of customer education with regard to EV charging during the off-peak.

Customer education is essential but education alone is not sufficient.

Education is essential because rate incentives alone will produce less load shifting than the same incentives with aggressive public outreach. Some educated EV owners may choose to charge off peak even with little price incentive. Some EV owners may assume that the peak occurs in mid-afternoon, but charging in early evening (6:00 to 8:00 pm) could create peaking problems for local distribution transformers in residential areas. Education is needed to supplement rate design.

The point of purchase is a logical opportunity to educate. A car is a major purchase, and buyers will expect information. The decision to buy an EV offers an opportunity to educate customers about the reasons for shifting load to off peak periods. As noted above,

[28] There are pilot programs underway for smart appliances other than EV's. For example, BPA is conducting a pilot program with direct control over water heaters in Washington. These may provide some lessons learned for EV's, but not enough to successfully implement EV smart charging on the first try.

residential customers so far have been slow to opt in to TOU rates. This may be due, in part, to a lack of awareness. The point of purchase could be an opportunity for utilities to educate customers about TOU rates for the entire premise.

Some educated customers might choose a TOU rate for their entire house or business. Staff's response to question 3(a) above shows how a residential customer who charges an EV off peak could see a reduced monthly bill on a whole house TOU rate without making any other changes to their consumption habits.

Education is necessary even if there are rate incentives. For example, EV owners need to understand why, in a neighborhood with several EV's, everyone should not start charging their vehicle as soon as the off-peak rate takes effect. Only with education will customers understand the reasons to wait until late at night (10:00 pm or later) to begin charging. Customers also need help learning to program their EVs or EVSEs to accomplish this.

However, education alone is not sufficient. Demand response pilot programs in Illinois and Washington DC suggest that customer do respond to a price signal. The combination of education and price signals will produce more load shifting than education alone.

Staff does not recommend specific regulatory action regarding education and or outreach. Other state agencies are actively involved in education and outreach, particularly ODOT and ODOE. By Executive Order, the governor created a Transportation Electrification Executive Council (TEEC) and directed it to make recommendations by October 2011. The OPUC, ODOT, ODOE and Ecotality are standing members. The TEEC identified education and outreach as a key area for its recommendations. Working through this committee and providing input to its education recommendations is more effective and more efficient than taking separate regulatory action.

One regulatory issue regarding education is whether to allow utilities to recover education costs. The Commission has traditionally not allowed "marketing" costs to be recovered. However, all ratepayers benefit if EV customers are educated about EV charging decisions and their potential impact (adverse or beneficial) on the grid. The long term benefits of this education could be greater than the cost of customer outreach. In this case, it may be fair to allow the utility to recover some education costs. Education includes information about load factors, reasons to charge off peak, use of information technology to monitor and manage electricity use, and how to make informed choices between rate options. Image enhancement or branding messages are marketing. In considering how to treat the expenses of utility outreach activities, staff recommends that the Commission continue to make the traditional distinction between education and marketing.

H. <u>Commissioners' Question 4: Comment regarding the reasons to either adopt or reject Staff's proposed IRP guideline for flexible resource planning</u>

Staff believes its proposed IRP guideline is appropriate for the same reasons that it proposed a smart grid plan in UM 1460. Reports by national EV promotion organizations

such as the Electrification Coalition and, in Oregon, the governor's Alternative Fuels Working Group provide detailed arguments supporting the potential for EV's to provide flexible resources. These reports also describe the technical challenges. It is appropriate to track the potential for EV's to provide flexible capacity well in advance of any real investments.

Flexibility is an increasingly important consideration in the integration of higher percentages of variable renewable generation resources. Data and analytical capabilities related to supply, demand and pricing of flexibility, both on the generation and demand sides, are essential to thoughtful planning and economic operation of a power system characterized by a growing penetration of variable resources. EVs, as the first "smart appliance", represent an opportunity to capture the power of demand response flexibility as a compliment to other flexibility strategies coming from generation and storage technologies.

Staff is not assuming EVs will be ready as a flexible capacity source in the short term. At the first TEEC meeting, for example, Ecotality and PGE pointed out that carmakers will not warrant EV batteries for repeated cycling, and EVSEs currently are not designed for two way power flow. Early uses of EVs for flexible capacity might consist only of regulating EV charging, with no backwards flow of power or battery cycling. Staff acknowledges the technical challenges of using EV's as a source of flexible capacity. This is why staff proposed a planning requirement well in advance of any investments in technology.

I. <u>Commissioners' Question 5: What, if anything, should be required in terms of planning or reporting by utilities? How should the Commission and interested parties be kept informed on progress and lessons learned in the implementation of EV charging?</u>

Staff supports including EV issues in IRP's and proposed smart-grid plans. Staff does not see a need for new reporting requirements focusing separately on EV's beyond what is now proposed for IRPs in this docket and for Smart Grid in UM 1460. In workshops and comments, utilities made the point that they can manage the EV charging load similar to other loads. As noted above, EVs and EVSEs are the first "smart" appliances, and staff has already recommended that utilities report on research and planning into smart charging in the periodic Smart Grid Plan described in investigation UM 1460. Also, staff has already recommended that utilities include, in the IRP, consideration of EVs as a flexible resource.

The TEEC described above will also result in a progress report to the Governor regarding EV adoption. This will include a review of reports by Idaho National Laboratory (INL) that are part of the USDOE funded Ecotality project. These reports will include information on EV adoption, charging station use and EV owners' charging habits.

Staff believes the proposed IRP guideline, the smart grid plan described in the UM 1460, the TEEC report described above and the INL report provide the appropriate level of

information for the next several years. If the Commission adopts staff's proposed IRP guideline, then information on EV charging patterns will be part of the IRP. Staff and other parties can then file data requests as needed. The Commission will also need specific information not found in other reports if utilities request cost recovery for public charging infrastructure or EV related IT infrastructure. Data requests in the IRP or rate case process are more likely to yield more precise information at the right time and might be more useful than a separate EV report designed in advance.

J. Commissioner Question 6: The Commission encourages parties to propose new guidelines with full explanations regarding the need for, benefits of and considerations of the proposed guidelines.

In responding to this bench request, staff has modified some of its previous recommendations regarding submetering, cost recovery for EV related investments, rate request evaluation criteria, and reporting. Staff believes these modified recommendations are responsive to the Commission's bench request and also to the opening comments by other parties.

Dated at Salem, Oregon this 10th day of February, 2011

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ATTACHMENT A – ALTERNATE RATE POLICIES FOR EV CHARGING

Staff identifies five basic EV charging rate alternatives for Commission consideration:

1. The status quo: voluntary whole-house TOU rates and no separate EV rate
2. Mandatory whole-house TOU rates for EV customers whose utility currently has a TOU rate, with status quo for EV customers with no currently offered TOU rate
3. Mandatory separately metered EV rates for all EV customers
4. A choice of separately metered EV rates versus whole premise TOU rates for all EV customers, or
5. Allowing only residential EV customers the choice, with all non-residential EV customers on a mandatory separately metered EV rate.

In all cases, the separate EV rate would be a TOU rate designed as described in the proposed guidelines attached to Staff's August 28, 2010 Opening Comments. The whole house or whole premise rate would be the one that the utility currently offers its customers, although that rate could be redesigned in the future if appropriate.

EVs are the first smart appliance, but Staff is *not* proposing that a separate EV rate become the forerunner of end use rates for all smart appliances. EV users have a unique ability to choose when to recharge the battery. No other end use has this level of flexibility. As a result EV charging will have a high TOU price elasticity, which is not necessarily the case for other appliances. Of course, if eventually whole house TOU rates become widely accepted as Smart Grid develops, then EVs could again be treated similar to all other appliances for rate purposes.

Comparison of different options

Option #1 is the simplest. However, applying current (flat) rates to EV charging will impose unnecessary costs on other customers if it is not properly incented to charge in the off peak hours. The existing rates and options would give limited and inconsistent price signals for EV charging. Level 2 (220 volt) charging can draw up to 6 kW, which is larger than most home appliances and similar to a central air conditioner. A cluster of several such chargers in one neighborhood would benefit sooner from a price signal that promotes off-peak charging. Given the valid reasons to promote off-peak charging, and the unique flexibility for this end use, staff does not recommend any option that would result in EV charging on a flat rate.

The optional whole-facility TOU rates are only available to residential and small commercial customers. The existing difference between on-peak off-peak prices for large customers is much smaller than the existing small customer optional TOU rates. None of these rate structures were designed to provide fair and efficient price signals for EV users. Because the price signals for large and small customers to charge their EVs are quite different, at least one of the signals is wrong.

The optional TOU rates for small customers were designed by the Portfolio Option Committee to meet the requirement of a market-based rate option under OAR 860-038-0220(4). The rates are designed to provide fair cost recovery for existing customers without EV charging. They are not designed to provide fair and efficient rates for EV charging.

Even if the optional TOU rates had the correct rate design, voluntary opt-in seems inappropriate. Even with a significant education campaign many EV owners will remain on the standard schedule. Small customers who do not opt into whole-facility TOU rates will likely impose unnecessary costs on themselves and other customers.

The status quo is more problematic for large non-residential EV charging. Public charging stations and fleet EV charging are likely to have more costly load patterns than existing loads. Public EV charging stations will likely see the greatest use between 4 and 6 PM, the time of highest demand in the summer. If the status quo is not sustainable, later Commissions will need to address the costs of on-peak EV charging.

Public charging on current non-residential rates will affect existing demand charges for large non-residential customers. The effect is likely to be large and inappropriate.

Potential owners of EV fleets and of public charging stations will make investments based on the results of this docket. If the Commission Order is to maintain the status quo, they will have to make investment decisions on that basis. They will be adversely affected if a subsequent Commission adopts cost-based TOU rates that raise the cost of doing business. If the Commission ever wants to approve a TOU rate for public charging, doing so now would provide third party public charging provides the regulatory certainty that they need to plan their business.

Option #2 places all EV customers onto a whole-house TOU rate, provided such a rate is currently offered. This could be either the existing voluntary TOU rate or a new rate designed at some time in the future. Some residential customers could see increased overall electric bills if their non-EV loads occur primarily on-peak and cannot conveniently be shifted in time. For those customers, option #2 may be a disincentive to EV adoption.

Option #2 solves the metering concerns associated with a separate EV rate. But it does not fix the problem that current TOU rates for large commercial customers has an insufficient differential between on-peak and off-peak rates. Other options better address this concern.

Option #3 would require that all EV charging be on uniform EV tariff. This option could provide a fair and efficient price signal for a highly elastic end use. A single TOU rate applied to all EV charging could provide fair rate recovery with appropriate incentives between on-premises charging and public charging and between on-peak and off-peak charging. For public charging providers, option #3 would ensure that all entrants in an open public charging market will see the same electric rate. Their business will succeed

or fail based on other aspects of their business plan, without the Commission's rate policies affecting which business model succeeds. Customers would see the same electric rates wherever they charge (within the same service territory) This is consistent with Goal #1 of this investigation as suggested in Staff's opening comments.

Option #3 does require a submeter for homes, businesses and public charging locations. Staff has proposed a follow-up investigation into using the EVSE as a submeter ("embedded metering") as a solution to the cost and other work associated with submetering. Staff also acknowledges the initial implementation costs, including back office costs, of establishing a separate rate. These costs appeared to be the major concern raised in opening comments in August 2010 and at the workshop of September 2010.

Option #4 (all customers choose between a separate EV rate and an available whole premise TOU rate) if would resolve the problems associated with a second meter for any customer that chooses the whole-premise TOU rate. For non-residential EV customers the cost of a second meter is likely to be small compared to other costs. It is unlikely the cost or installation of a second meter will significantly deter EV adoption for non-residential customers. Commercial customers might choose the separate EV rate if their business makes it impossible to shift other non EV loads.

Allowing a choice of a whole-facility TOU rate for non-residential EV owners will likely shift costs to other customers. If customers can choose, they will choose the tariff that gives them the lowest bill. This leads to less cost recovery than expected.

Option #5 could also lead to cost shifting, but the amount of money at stake per customer and the sophistication of residential customers is less than for non-residential customers. Even if utilities own and pay for a second meter, homeowners would still be responsible for the purchase and installation of a second meter base. The cost of the second meter base could be greater than the cost of the meter itself. Also, the Building Codes Division has developed the "minor label" program to streamline inspection of residential EVSEs. A second meter based would negate the streamlining efforts of the minor label program. This could mean the EV is delivered before the second meter can be installed. In such cases an interim arrangement would be needed. The minor label program, however, applies only to residential installations. Thus, Option #5 could be attractive for residential customers without the cost shifting concerns associated with

<u>Staff Recommendation</u>

Staff does not recommend option #1, the status quo. That option would put nearly all EV charging on the standard rates applicable to the house or place of business.

Staff also does not recommend option #2, putting all EVSE owners on a whole house or whole premise TOU rate. That option would be a deterrent for some homeowners and for businesses that cannot shift other loads. And, it places some commercial EV owners on rates that do not truly reflect the cost of service.

In its Opening Comments, staff proposed Option #3, the mandatory separate EV rate for all charging, public and private. Staff continues to support this option but recognizes the concerns raised by other parties. Staff does continue to support the creation of a separate EV rate, even if it is not mandatory for everyone.

Options #4 and #5 provide the choice of a whole-house TOU rate or separately metered TOU rate for EV charging. Staff supports either option. Option #4 gives retains the benefits of promoting off peak charging. It is consistent with the goal to ensure a level playing field for third party public charging providers. It gives a choice to all prospective EV owners, and for that reason is most consistent with state goals to remove barriers to EV adoption.

Option #5 provides the choice to residential customers and places commercial EV customers on the mandatory EV rate. Staff supports option #5 because it likely provides the strongest incentives for households, business fleet owners and customers of public charging stations to buy and appropriately charge their EVs. This recommendation carries an implicit recommendation that the cost of implementing the separate EV rate, particularly the back office cost, be paid for by all customer classes.

CERTIFICATE OF SERVICE

UM 1461

I certify that I have this day served the foregoing document upon all parties of record in this proceeding by delivering a copy in person or by mailing a copy properly addressed with first class postage prepaid, or by electronic mail pursuant to OAR 860-001-0180, to the following parties or attorneys of parties.

Dated this 10th day of February, 2011 at Salem, Oregon.

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UM 1461
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