BEFORE THE PUBLIC UTILITY COMMISSION
OF OREGON

UM 1673

In the Matter of OREGON PUBLIC UTILITY COMMISSION Staff Questions for Parties on the Solar Incentive Program Report under HB 2893.	Comments of Renewable Northwest Project

I. INTRODUCTION

Renewable Northwest Project ("RNP") appreciates the opportunity to answer Staff Questions for Parties on the Solar Incentive Program Report under HB 2893. RNP welcomes the diverse range of questions set by Staff, covering the entire range of topics in section 4 of HB 2893 as well as other issues that the Oregon Public Utility Commissions ("the Commission") wants to consider in its report. RNP will address questions relating to solar policy goals (questions 1,2), the solar resource value (question 5), distribution of costs and benefits (questions 7–13), forecast PV costs (questions 14–16), and future development of solar energy (question 19).

RNP has not addressed questions related to incentive delivery, because RNP's involvement with Oregon's solar incentive programs has mainly focused on policy adoption and implementation. RNP does note that significant administrative energy was spent setting up, adapting, and extending the Volumetric Incentive Rate ("VIR") pilot program. RNP will be interested in other parties' views of the value of that effort and any challenges associated with having two separate incentive structures.

RNP strongly supports net-metering, which has proven itself to be a powerful, market-based, administratively simple and easy-to-understand tool to encourage the take up of distributed solar generation. Because of this, 43 states require utilities to offer net-metering to their customers. RNP believes that incentivizing and further enabling the penetration of net-metered systems will positively contribute to expansion of distributed solar generation in Oregon.

No matter what policies are pursued to further incent distributed solar generation in Oregon, determining the solar resource value and the balance between costs and benefits will enable diverse stakeholders to come together, have constructive conversations, and develop long-term sustainable solar policies. Determining the true solar resource value is a high priority for RNP and for all parties that joined to the Joint Comments filed concurrently, but such an investigation may take more resources and expertise than the Commission is able to commit. RNP hopes that there is a way to recruit outside expertise so sufficient and appropriate resources can be dedicated to determining the solar resource value in Oregon. In the meantime, RNP will continue to advocate for the development of cost-effective, reliable, and clean distributed energy for the betterment of the Northwest economy and the environment, including further deployment of distributed solar PV.

II. STAFF QUESTIONS

GENERAL QUESTIONS

Q1. **What is the primary goal in promoting solar?**

Distributed solar generation leads to many benefits. Customers that chose to generate power as well as consume it end up requiring less energy from the grid, saving money, generating local jobs and displacing power and greenhouse gas emissions from traditional sources of generation, such as natural gas. The benefits accrue to both participating and non-participating customers. Locally generated energy that is exported from the customer-generator to the distribution system is then consumed locally, reducing the need to transmit power through the high-voltage transmission system and avoiding the power losses that would ensue. Instead of investments in traditional power plants, often out of state, distributed generation supports local manufacturing and installation business, keeping energy dollars clean and local.

Q2. **What is the proper role of the utility in developing solar?**

Utilities should be a positive force in connecting customers to distributed generation options. However, the history of utilities entering the single-customer distributed generation market in other states suggests that actually conducting the solar PV business is best left to companies with dedicated and proven experience in that area, whether it be local solar installers or national companies that provide third-party financing.

For example, Southern California Edison ("SCE")—a utility experienced with utility-scale solar [1]—proposed entering the residential and commercial solar PV market in 2008 with a 250 MW program. In February 2011, SCE petitioned the California Public Utility Commission ("CPUC") to transfer half of its utility-owned distributed generation program to private sector power purchase agreements ("PPAs"), essentially arguing that they were unable to compete with the private sector on costs and service.[2]

RNP believes there is a more direct role for utilities when it comes to the aggregation of customers that wish to take advantage of distributed solar generation, i.e. community solar. While public utility districts, rural cooperatives and municipal utilities in Oregon are free to offer community solar to their customers, investor-owned utilities are stymied by the lack of legislative provision for mechanisms that enable community solar, such as virtual net-metering ("VNM"). VNM is basically one solar PV system, administered or owned by the utility, where the participating customers see a reduction in their bill in proportional to the degree of their participation in the project and the amount of power generated.

[1] In 2012 SCE reported 433 MW of solar capacity, which is over twenty-times the entire 20 MW carve out for utility scale solar in Oregon. www.sce.com/wps/portal/home/about-us/environment/renewable-power

[2] Southern California Edison Advice Letter 2547-E, "Submission of Contracts for Procurement of Renewable Energy Resulting from Renewables Standard Contracts Program." Filed with the California Public Utilities Commission on January 31, 2011 www.sce.com/NR/sc3/tm2/pdf/2547-E.pdf

In Oregon, Ashland Municipal Electric Utility offers customers the opportunity to participate in its Solar Pioneer II project. This enables Ashland citizens and businesses the opportunity to bring renewable energy into their community in a way that they have more chance of being able to afford, that does not require home installation, and does not require participants to worry about PV panel maintenance.[3] Participating customers "adopt" one of the 363 solar panels that make up the 63 kW system, and receive a credit on their electric bill for the amount of renewable energy "their" panels have generated.

An example of out-of-state investor owned utility program is the "Community Solar Gardens" project that Xcel Energy runs for its customers in Colorado. These projects allow multiple utility customers to purchase or lease interests in PV systems not located on their property, with the power produced by their share of the system offsetting the consumption in their homes and business.[4]

QUESTIONS RELATED TO RESOURCE VALUE [HB 2893 (4)(1)(a)]

Q5. **In UM 1559, the Commission chose not to require utilities to report certain elements of Resource Value, such as avoided CO_2, fuel price volatility, integration, and transmission and distribution costs Should we calculate them now? If so, how should we do so with the data available?**

[3] http://ashland.or.us/Page.asp?NavID=14017

[4] www.coloradocommunitysolar.com/

Docket UM 1559 explored some of the costs and benefits associated with distributed solar, but the investigation was not sufficient to quantify the full solar resource value. The Commission identified several unquantified factors as legitimate components of the solar resource value. Other unquantified factors not considered in UM 1559, like environmental and economic development benefits, could be very relevant to policy makers. While the state may determine that ratepayers should not fund incentives to promote benefits that accrue to the state as a whole, the Commission should undertake the valuable task of quantifying these benefits, so that the value of solar incentive programs can be better understood by state policy makers.

QUESTIONS RELATED TO COSTS AND BENEFITS OF PROGRAMS AND THEIR DSITRIBUTION AMONG RETAIL ELECTRICITY CUSTOMERS [HB 2893 (4)(1)(b)]

Questions 7,8,11,12 require an assumption to be made about the balance between costs and benefits, and how the solar resource value compares to the retail rate. Before the question of cross-subsidization between participating and non-participating customers can be address, the balance between the costs and benefits of distributed solar needs to be determined comprehensively and quantitatively. Until this balance is determined, it is impossible for the Commission, utilities, or other stakeholders to consider questions on the topic of cross-subsidization. Certainly, it would not be appropriate to assume that cross-subsidization exists. Given this, RNP recommend that the Commission do not attempt to consider the

question of cross-subsidization before a more thorough investigation of the solar resource value is complete.

Q9. **Can those benefits be quantified? If so, how? What studies would need to be done and what data would be needed?**

Q10. **What available studies on benefits of SPV (national or from other states) might be applicable to Oregon, and how would the results be adjusted so that the dollar value of the benefits is realistic for Oregon?**

Incentive programs for distributed solar lead to numerous, smaller sources of local generation throughout Oregon. Beyond the clean energy it generates for the host, distributed generation has many benefit that accrue to both participating and non-participating customers: it keeps energy dollars local; it encourages in-state economic development and the creation of jobs; it enhances security and reliability of the electric grid by reducing outages caused by natural disasters; it reduces electric line losses by siting generation where the power is used; it reduces air pollution and greenhouse gas emissions, and; it leads to greater energy independence. These benefits can be quantified, as has been demonstrated in other states.

The Minnesota Department of Commerce Division of Energy Resources ("Minnesota Commerce") is currently undertaking a value of solar study, the results of which will be submitted to the Minnesota Public Utility Commission for review by January 31,

2014. Minnesota Commerce was joined by the energy consultancy Clean Power Research ("CPR") to explore the framework of methodologies used in a typical study into the value of solar. CPR identified the following solar value components that are typically considered, many of which stem from avoided energy costs, but some of which are unique to distributed generation:[5]

- Avoided fuel costs—from displacing traditional fossil fuel plant generation.
- Avoided traditional power plant operations and maintenance costs.
- Avoided generation capacity cost—by reducing the amount of generation required to meet peak load.
- Avoided reserve capacity cost—by reducing the amount of generation required to meet planning margins and ensure reliability.
- Avoided transmission capacity cost—locally generated distributed energy reduces the need to make use of the transmission system, as well as avoiding line losses.
- Avoided distribution capacity cost—power produced and consumed on-site means less use is made of the distribution grid.
- Avoided environmental cost—if the utility gets to keep the Renewable Energy Credit by the distributed solar.
- Fuel price guarantee—displacing fossil fuels such as natural gas means reduces the amount utilities need to spend on hedging against changes in the natural gas price.

[5] "Table of Value Components Identified in the Oct.1 CPR/Commerce Presentation", Minnesota Department of Commerce Division of Energy Resource
http://mn.gov/commerce/energy/images/VOST-Questions-responses-100813.pdf

- Credit for local manufacturing and/or assembly—as distributed solar generation is inherently local, there is an increase in local tax revenue tied to solar jobs.
- Credit for high value distribution locations—distributed generation can have more value to the system in certain locations on the grid than others, and this can be incentivized accordingly.
- Voltage control—future inverter designs will enable distributed solar to contribute to voltage stability on the grid.
- Market price reduction—as distributed solar generation leads to a reduction in power demand, in perfect markets this would lead to a reduction in the cost of wholesale power.
- Disaster recovery—modern inverters present the possibility of distributed generation assisting the grid in times of stress, helping maintain the grid and avoiding cascading power cuts. Distributed generation's contribution to disaster recovery will be even more significant as energy storage solutions become more common.

Firms that have worked through these methodological exercises in other states could tackle the quantification challenge in Oregon efficiently.

Q 13. **At what level of penetration does the impact on utility revenue become a significant factor?**

The California Public Utility Commission ("CPUC") contracted with the consultancy Energy and Environment Economics ("E3") to provide an evaluation of the costs and benefits of their net energy metering ("NEM") program in California. The final report, "California Net Energy Metering—Ratepayer Impacts Evaluation" was published in October 2013.

In their most extreme forecasted penetration level, E3 modeled the impact of "Full NEM Subscription", which amounts to five percent of aggregate customer peak demand (for investor-owned utilities), as defined by CPUC decision D. 12-05-036.[6] In this decision, the CPUC clarified that—in California—"aggregate customer peak demand" means the sum of individual customer's non-coincident peak demand. For a given year, the total non-coincident peak demands for all customers in each IOU's service territory is defined as the sum of each customer's maximum demand in that year. For each IOU, the value represents the maximum demand for the service territory that would occur if all customers use their maximum load at the same time.[7]

In Oregon, ORS 757.300 states that the cumulative generative capacity of net-metered systems may not be limited to less than one-half of one percent of a utility's, cooperatives's or districts historic single-hour peak load. Both the actual

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[6] "Legislative Subcommittee Recommendation, AB NEM", CPUC June 4, 2012 www.cpuc.ca.gov/NR/rdonlyres/F73D09CD-B4F2-4672-809B-285316B75CC9/0/582964v1AB_2514_LEG_MEMO_11239_6712_HIGHLIGHTED_CHANGES.pdf

[7] "Estimation of Total Non-Coincident Peak Demands", CPUC NEM Cap Calculation Workshop, Jun3 25 2012 www.cpuc.ca.gov/NR/rdonlyres/C89C6BF8-9A37-4DF8-BF2E-2A9C8FDD1B8D/0/CPUC_NEM_Workshop_062512C.PPTX

percentage and the metric in California have a higher absolute value than in Oregon, as the sum of all customers maximum load at any time is greater than what would be a typical historic peak load.

Table 1—Net Cost of NEM Generation Exports in California in 2020 (Millions $2012/year)[8]

	2012 Snapshot	Full CSI Subscription	Full NEM Subscription
Residential	$61	$85	$291
Non-Residential	$18	$41	$79
Total	$79	$126	$370
% of Revenue Requirement	0.23%	0.36%	1.06%

Table 1 shows that even with full NEM subscription in 2020—which as shown above is far larger than Oregon's penetration now or in the near future—the cost of exports from net-metering is only 1.06% of the utilities' annual revenue requirement. Even if Oregon and California had identical power systems and were to achieve the same level of distributed solar penetration, the revenue impact in Oregon would be even lower as Oregon's rates are far lower in comparison to California's.

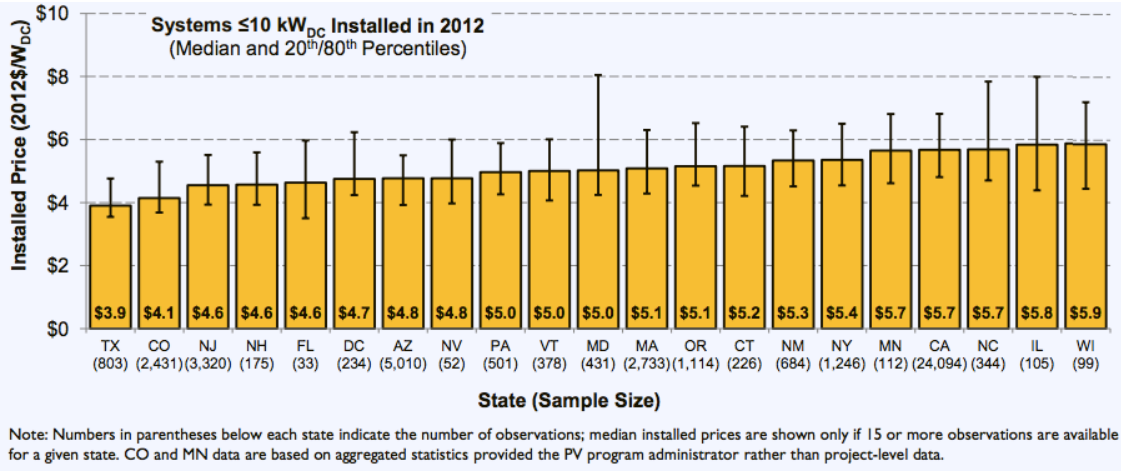
QUESTIONS ABOUT FORECAST COSTS ASSOCIATED WITH SOLAR PHOTOVOLTAIC SYSTEMS IN OREGON [HB 2893 (4)(1)(c)]

[8] "California Net Energy Metering-Ratepayer Impacts Evaluation", October 2013, p 67 www.cpuc.ca.gov/NR/rdonlyres/75573B69-D5C8-45D3-BE22-3074EAB16D87/0/NEMReport.pdf

Q 14. **What are sources of forecasts of solar panel prices? How big is the range of estimates?**

As can be seen in Figure 1, across the nation, the median installed price of solar PV differs by roughly $2.0/W between the lowest- and highest-priced states. California, a relative high-cost state, pulls the overall sample median upwards. Oregon's median installation cost in 2012 was approximately between $4.3/W and $6.3/W with a median of $5.1/W.

Figure 1—Variation in Installed Price by State, Residential and Small Commercial (<10 kW) PV in 2012[9]



Note: Numbers in parentheses below each state indicate the number of observations; median installed prices are shown only if 15 or more observations are available for a given state. CO and MN data are based on aggregated statistics provided the PV program administrator rather than project-level data.

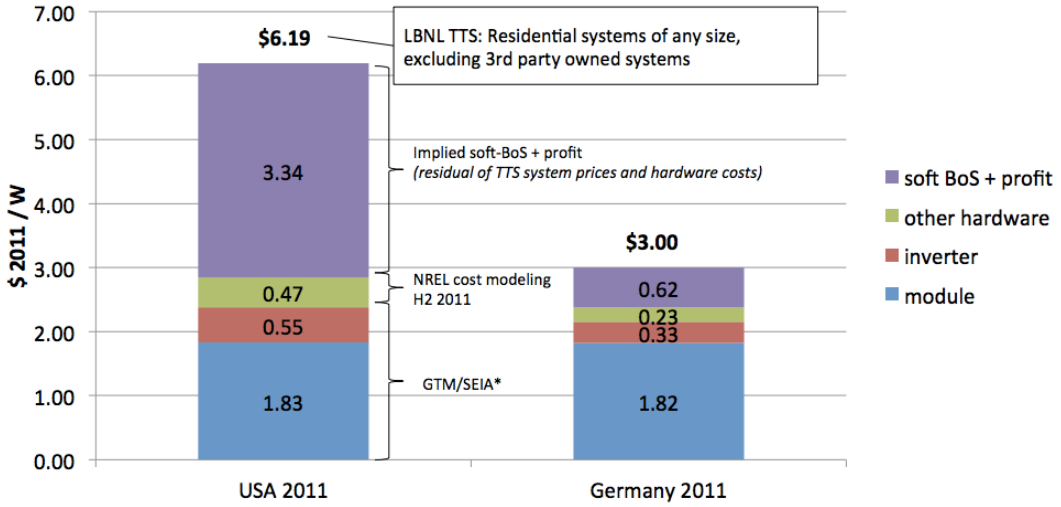
Q 15. **How much of SPV system costs are soft costs (interconnection, permitting, code compliance, other)?**

Analysis from the Lawrence Berkley National Laboratory compared the total installation costs for residential PV systems in Germany and the U.S., and found that

[9] "Why are Residential PV Prices in Germany so Much Lower than in the United States?", LBNL, Feb 2013 http://emp.lbl.gov/sites/all/files/german-us-pv-price-ppt.pdf

while soft-costs account for $0.62/W in Germany, they count for $3.34/W in the U.S. (see Figure 2). In Germany, soft costs (which include installer profit) account for approximately 20% of total installation costs, while in U.S. they account for over 50%.

Figure 2—Soft Costs for Residential PV in the U.S. and Germany[10]



Part of the difference between Oregon and the U.S. is the increased volume of solar PV installed in Germany. One of the most efficient mechanisms of reducing soft costs is to increase the volume of solar installed. Increasing volume has the effect of decreasing the labor and marketing costs per unit installed, and encourages the stream-lining of the permitting and incentive-application processes. However, such an increase in volume would be dependent on the stability of the incentive

[10] "Why are Residential PV Prices in Germany so Much Lower than in the United States?", LBNL, Feb 2013 http://emp.lbl.gov/sites/all/files/german-us-pv-price-ppt.pdf

mechanism, and it is only through a sustained volume over time that businesses can realize a sustained reduction in soft costs.

Q 16. **What initiatives are underway to lower soft costs? Is the trend in soft costs going down at the same pace as panel costs? Do soft costs create a "floor"?**

A large proportion of the solar installation cost is "soft costs", which includes labor, customer acquisition (marketing) and paperwork. While the hard costs (equipment) are largely determined by global markets outside of state control, the soft costs are an artifact of the local business and regulatory environment and are a factor over which the state has influence. Analysis of soft-costs and identification of ways to reduce them are being undertaken at both the national and the local level.

The Lawrence Berkley National Laboratory concluded that reducing the soft-costs associated with solar PV installation in the United States would require policies that lead to the the following:[11]

- A large and durable market size.
- A concentrated market that minimizes fragmentation.
- A simple, transparent, certain incentive structure.
- Simple interconnection, permitting, and inspection requirements.
- Regular incentive declines to drive and follow cost reduction.

[11] "Why are Residential PV Prices in Germany so Much Lower than in the United States?", LBNL, Feb 2013 http://emp.lbl.gov/sites/all/files/german-us-pv-price-ppt.pdf

More locally, in Oregon and Washington, the Northwest Solar Communities is a coalition of jurisdictions, utilities industry partners and citizens groups working together to make rooftop solar electricity more cost effective. In 2013, Northwest Solar Communities obtained funding under the second round of the U.S. Department of Energy Sunshot Solar Challenge. In Oregon, the NW Solar Communities work will be facilitated by Solar Oregon[12] and the Oregon Department of Energy. One of their priorities is to "standardize the installation of solar electric systems by addressing four action areas: Permitting, Interconnection, Financing and Planning", i.e. through addressing and reducing soft costs.[13]

QUESTIONS ABOUT FUTURE DEVELOPMENT OF SOLAR

Q 19. **At what penetration does solar generation affect local distribution reliability**?

The Small Generator Interconnection Procedures ("SGIP") were adopted by the Federal Energy Regulatory Commission in 2005, and apply to distributed energy resources up to 20 megawatts in capacity that fall under federal jurisdiction. The interconnection procedures that were developed were also intended to be a model rule for consideration by state public utility commissions.

[12] http://solaroregon.org/

[13] http://nwsolarcommunities.org/about/

Most state interconnection procedures allow for expedited interconnection without additional technical studies if the proposed interconnection passes a series of technical screens. In 1999, before FERC set the SGIP, the California Public Utilities Commission established a 15% capacity threshold to identify situations where the amount of distributed generation capacity on a line section exceeds 15% of the line section's annual peak load. This 15% threshold was subsequently adopted by FERC for the SGIP. Penetrations above this threshold trigger the need for supplemental studies.

Given the rapid growth and widespread deployment of solar PV system embedded in distribution grids across the country, the National Renewable Energy Laboratory ("NREL") undertook a review of the SGIP in order to ensure they were as streamlined as possible so as to avoid unnecessary studies, costs and delays.[14] NREL observed that there are many circuits across the United States and Europe with PV penetration levels well above 15% where system performance, safety, and reliability have not been materially affected, suggesting the existing 15% screen is indeed conservative.

For comparison, Pacific Power's most recent report informed the Commission that the utility's installed capacity of net metered systems equaled 142 percent of its

[14] Updating Interconnection Screens for PV system Integration, U.S. Department of Energy, National Renewable Energy Agency, 2012 energy.sandia.gov/wp/wp-content/gallery/uploads/Updating_Interconnection_PV_Systems_Integration.pdf

one-half of one percent soft cap, or 0.71 percent penetration.[15] Portland General Electric reported that in 2012 that one-half of one percent of the utility's historic system peak equates to 20.4 MW, and they have installed approximately MW, equating to a penetration of net-metered systems of just under 0.6 percent.[16]

III. CONCLUSION

RNP is very grateful for the opportunity to answer Staff questions, and looks forward to working with all parties and stakeholders on polices through which Oregon can cost effectively incentivize the increased penetration of distributed solar PV systems. Towards this end, RNP believes that it is necessary for an expert, outside consultant to assist the Commission in a broad-based determination of the solar resource value in Oregon. A robust solar resource value determination and process will provide a strong rational foundation for the development of good solar policy in Oregon.

RESPECTFULLY SUBMITTED this 18th day of December, 2013.

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[15] "Pacific Power's 2012 Net Metering Report for Oregon", OPUC, March 13, 2013 http://edocs.puc.state.or.us/efdocs/HAQ/re39haq81839.pdf

[16] "PGE Division 39 Net Metering Report', OPUC, April 1, 2013 http://edocs.puc.state.or.us/efdocs/HAQ/re45haq112429.pdf

CERTIFICATE OF SERVICE

I HEREBY CERTIFY that I served the foregoing COMMENTS OF RENEWABLE NORTHWEST PROJECT upon the following parties on the service list for UM 1673, via electronic mail, on December 18, 2013:

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