December 18, 2013

Via Electronic Filing and First Class Mail

Oregon Public Utility Commission
Attn: Filing Center
3930 Fairview Industrial Dr. SE
Salem, OR 97302

RE: UM 1673

Filing Center:

The Alliance for Solar Choice encloses Comments for filing in the above-referenced proceeding. As indicated on the attached service list, a copy of this filing is being served to all parties on the service list.

Thank you for your assistance.

Sincerely,

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cc: Service List – UM 1673

BEFORE THE PUBLIC UTILITY COMMISSION

OF OREGON

UM 1673

In the Matter of PUBLIC UTILITY COMMISSION OF OREGON Report to the Legislature on Effectiveness of Incentive Programs for Solar Photovoltaic Energy	COMMENTS OF THE ALLIANCE FOR SOLAR CHOICE

The Alliance for Solar Choice ("TASC") submits these comments in response to the November 21, 2013 Public Utility Commission ("Commission") Staff Questions for Stakeholders to inform the scope and content of the report to the Legislature. TASC's comments below suggest the Commission use a comprehensive set of benefits to fairly and fully determine the resource value of distributed solar generation ("DSG"). TASC also briefly discusses how the location and "brownfield" nature of DSG provides different value than utility-scale solar. TASC believes the Commission's concerns about the relationship between DSG and reliability are premature given that Oregon's penetration levels are relatively low and that existing interconnection procedures are sufficient to ensure reliability. Finally, TASC discusses approaches to ensure the continuation of successful DSG policies at high penetrations.

I. About TASC

TASC advocates for maintaining successful DSG policies throughout the United States. Member companies represent the majority of the nation's rooftop solar market and include SolarCity, Sunrun, Sungevity, Verengo Solar, REC Solar, and Solar Universe. These companies are responsible for tens of thousands of residential, school and commercial solar installations across the country and have brought thousands of jobs and many tens of millions of dollars of investment to the nation's cities and towns.

TASC was formed on the belief that everyone should have the option to benefit from DSG and to realize the financial benefits thereof. The rooftop solar market in Oregon has been driven by the desire of citizens to assert control over their electric bills and to promote economic development through the creation of a robust solar market, which are objectives that TASC fully supports. TASC is committed to vigorously defending and promoting successful DSG policies like retail net metering, which provides a fair credit to residents, businesses, schools, and public agencies in exchange for the benefits their solar systems provide when they export excess energy to the grid.

To support this effort, TASC's member companies have developed extensive experience concerning the assessment of the costs and benefits of DSG and have participated in stakeholder or regulatory proceedings in Arizona, California, Colorado, Massachusetts, Minnesota, Nevada and Washington on issues similar to those the Commission addresses here. As such, TASC is uniquely and intimately familiar with the technological, operational and ratemaking elements of DSG.

II. Responses to Staff's Questions Related to Resource Value

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?

The Commission should consider and calculate all elements necessary to fairly and fully credit the resource value of DSG, which TASC demonstrates below includes a number of elements including avoided CO_2, fuel price volatility, integration, and transmission and distribution costs. The "field" of cost-benefit studies of net metering and DSG has changed and improved greatly in recent years and can provide the Commission insight into the best ways to calculate these values. The most recent studies include:

- California PUC / E3 2009-2010 Net Energy Metering Study.[1]
- California PUC / E3 2010 CSI Study.[2]
- Perez/Hoff, Solar in U.S. – "Too expensive or a Bargain?"(2011).[3]
- Austin Energy Value of Solar, Clean Power Research (CPR), Updated in 2012.[4]
- NYSERDA, Solar in NY, January 2012.[5]
- Value of Solar DG in PA and NJ, CPR, November 2012.[6]
- State of Vermont, January 2013 Net Energy Metering study.[7]
- Crossborder Energy, California Net Energy Metering Study, January 2013.[8]
- Crossborder Energy, Cost-Benefit Study of Solar DG in Arizona Public Service (APS) territory, May 2013.[9]

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1 *Net Energy Metering Cost Effectiveness Evaluation*, E3 Consulting, March 2010. Available at http://www.cpuc.ca.gov/NR/rdonlyres/0F42385A-FDBE-4B76-9AB3-E6AD522DB862/0/nem_combined.pdf.

2 *CSI Cost-Effectiveness Evaluation*, E3 Consulting, April 2011. Available at ftp.cpuc.ca.gov/gopherdata/energy_division/csi/CSI%20Report_Complete_E3_Final.pdf.

3 Perez, R., Zweibel, K., Hoff, T., *Solar Power Generation in the US: Too Expensive, or a Bargain?*. Energy Policy 39, 2011. pp. 7290-7297. Available at http://cleanpower.com/wp-content/uploads/Solar-Power-Generation-in-U.S.-too-expensive-or-a-bargain.pdf.

4 Rabago, K., Norris, B., Hoff, T., *Designing Austin Energy's Solar Tariff Using A Distributed PV Calculator.* Clean Power Research & Austin Energy, 2012. Available at http://www.austinenergy.com/About%20Us/Newsroom/Reports/solarGoalsUpdate.pdf.

5 "New York Solar Study: An Analysis of the Benefits and Costs of Increasing Generation from Photovoltaic Devices in New York," New York State Energy Research and Development Authority (NYSERDA), January 2012. Available at http://www.nyserda.ny.gov/Publications/Program-Planning-Status-and-Evaluation-Reports/Solar-Study.aspx.

6 Rabago, K., Norris, B., Hoff, T., *Designing Austin Energy's Solar Tariff Using A Distributed PV Calculator.* Clean Power Research & Austin Energy, 2012. Available at http://www.austinenergy.com/About%20Us/Newsroom/Reports/solarGoalsUpdate.pdf.

7 "Evaluation of Net Metering in Vermont Conducted Pursuant to Act 125 of 2012," Vermont Public Service Department, January 15, 2013. The staff of the Vermont PSC performed an extensive literature search in its January 2013 Evaluation. The report, along with a matrix of other studies it reviewed can be found at http://publicservice.vermont.gov/sites/psd/files/Topics/Renewable_Energy/Net_Metering/Act%20125%20Study%2020130115%20Final.pdf .

8 "Evaluating the Benefits and Costs of Net Energy Metering in California," January 2013, Crossborder Energy. Available at http://votesolar.org/wp-content/uploads/2013/07/Crossborder-Energy-CA-Net-Metering-Cost-Benefit-Jan-2013-final.pdf.

- SAIC, APS Net Energy Metering Study, May 2013.[10]

- Crossborder Energy, Idaho Power testimony, May 2013.[11]

- RMI, Solar Valuation Meta-Study, July 2013.[12]

- IREC and Rábago Energy, LLC, "A Regulator's Guidebook: Calculating the Benefits and Costs of Distributed Solar Generation," October 2013. (Regulator's Guidebook)[13]

- Crossborder Energy, The Benefits and Costs of Solar Generation for Electric Ratepayers in North Carolina, October 2013. [14]

- Crossborder Energy, Benefits and Costs of Solar Distributed Generation for the Public Service Company of Colorado, December 2013. [15]

Careful review of these studies will show significant variation in the methodologies used to evaluate the resources being studied. Good starting points on understanding the differences between these studies are the Rocky Mountain Institute's recent comparative, meta-analysis of the main DG cost-benefit studies completed in the last several years and the detailed literature review that the Vermont Commission assembled in support of its January 2013 net metering

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9 "The Benefits and Costs of Solar Distributed Generation for Arizona Public Service," Crossborder Energy, May 8, 2013. Available at http://www.seia.org/sites/default/files/resources/AZ-Distributed-Generation.pdf.

10 "2013 Updated Solar PV Value Report, Arizona Public Service," by SAIC Energy, Environment and Infrastructure, LLC. Available at http://www.solarfuturearizona.com/2013SolarValueStudy.pdf.

11 "Direct Testimony of R. Thomas Beach" for the Idaho Conservation League, May 10, 2013. Submitted in Case No. IPC-E-12-27. Available at http://www.puc.idaho.gov/fileroom/cases/elec/IPC/IPCE1227/intervenor//IDAHO%20CONSERVATION%20LEAGUE/20130510BEACH%20DIRECT.PDF.

12 "A Review of Solar PV Benefit & Cost Studies," Rocky Mountain Institute, 2013. See http://www.rmi.org/Knowledge-Center/Library/2013-13_eLabDERCostValue.

13 Keyes, Jason B., Rábago, Karl R., Regulator's Guidebook: Calculating the Benefits and Costs of Distributed Solar Generation, Interstate Renewable Energy Council, Inc. and Rábago Energy, LLC, October 2013. Available at http://www.irecusa.org/wp-content/uploads/2013/10/IREC_Rabago_Regulators-Guidebook-to-Assessing-Benefits-and-Costs-of-DSG.pdf.

14 Crossborder Energy, Benefits and Costs of Solar Generation for Ratepayers in North Carolina, October 18 2013. Available at http://energync.org/assets/files/Benefits%20and%20Costs%20of%20Solar%20Generation%20for%20Ratepayers%20in%20North%20Carolina%282%29.pdf.

15 Crossborder Energy, Benefits and Costs of Solar Distributed Generation for the Public Service Company of Colorado, updated December 2, 2013. Available at http://www.oursolarrights.org/files/5513/8662/3174/Crossborder_Study_of_the_Benefits_of_Distributed_Solar_Generation_for_PSCo.pdf.

study.[16] In addition, the Interstate Renewable Energy Council and Rábago Energy, LLC recently published a guide to assessing the costs and benefits of DSG.[17] In this guide, the authors present a standardized approach to assessing the various benefits and costs of DSG with an explanation of how best to calculate each.

Review of the studies enumerated above will also show that each study employed a different set of costs and benefits. However, the Regulator's Guidebook provides a thorough review of the common inputs used in each study and guidance on how each should be measured. Because identification of costs and benefits is such an important aspect of understanding the value provided by DSG, it is vital that the Commission clearly define each benefit and cost. As a starting point for discussion on the methods used to value DSG, TASC recommends the Commission consider the costs and benefits identified in the tables below:

Costs	**Definition**[18]
Bill Credits or Energy Payments	The bill credits, payments or monetary value of kWh credits at the retail rate the utility provides to solar customers as compensation for energy exported to the grid.
Administrative Costs	Any utility-incurred costs that exceed the comparable metering and billing costs for regular utility customers.

16 "A Review of Solar PV Benefit & Cost Studies," Rocky Mountain Institute, 2013. Available at http://www.rmi.org/Knowledge-Center/Library/2013-13_eLabDERCostValue.
"Literature review summary for Vermont Act 125 evaluation of net metering," September 17, 2012, Vermont Public Service Department. See http://publicservice.vermont.gov/sites/psd/files/Topics/Renewable_Energy/Net_Metering/NM%20Lit%20Review%20011513.pdf.

17 Keyes, Jason B., Rábago, Karl R., Regulator's Guidebook: Calculating the Benefits and Costs of Distributed Solar Generation, Interstate Renewable Energy Council, Inc. and Rábago Energy, LLC, October 2013. Available at http://www.irecusa.org/wp-content/uploads/2013/10/IREC_Rabago_Regulators-Guidebook-to-Assessing-Benefits-and-Costs-of-DSG.pdf.

18 The definition TASC provides in these tables have been taken from a variety of cost-benefit studies related to net metering and customer-sited DG.

Costs	Definition[18]
Ancillary Services and Grid Support	Ancillary services and grid support enable the reliable operation of a grid hosting customer-sited DG. The value of ancillary services and grid support can be either a net cost or a net benefit when compared with the costs that would otherwise be incurred without customer-sited DG. Therefore, these services are included in both the Costs Table and the Benefits Table. Such services include reactive supply, voltage control, frequency regulation, energy imbalance, operating reserves and scheduling/forecasting.

Benefits	Definition
Avoided Energy Costs	The cost of energy that would have otherwise been generated to meet customer needs.
Avoided Energy Losses	The value of the additional energy generated by central plants that would otherwise be lost due to inherent inefficiencies in delivering energy to the customer via the transmission and distribution system.
Avoided Capacity Costs for Generation	The cost and amount of generation capacity that can be deferred or avoided due to customer-sited DG.
Ancillary Services and Grid Support	Ancillary services and grid support enable the reliable operation of a grid hosting customer-sited DG. The value of ancillary services and grid support can be either a net cost or a net benefit when compared with the costs that would otherwise be incurred without customer-sited DG. Therefore, these services are included in both the Costs Table and the Benefits Table. Such services include reactive supply, voltage control, frequency regulation, energy imbalance, operating reserves and scheduling/forecasting.
Avoided and Deferred Capacity Costs for T&D	The value of the avoided or deferred T&D infrastructure investments due to customer-sited DG.
Environmental Benefits	The saving realized from reduced air emission control or allowance costs, including those related to carbon, criteria air pollutants and reduced water use.

Benefits	Definition
Avoided Renewables Costs	When customer-sited generation reduces onsite load, a utility does not have to procure as much renewable generation capacity to meet renewable portfolio standards. This reduction in procurement obligations results in cost savings.
Fuel Price Hedge	The avoided costs a utility would otherwise incur to guarantee energy fuel costs are fixed.
Societal Benefits	Please see the next table.

Societal Benefits	Definition
Health Benefits	The reduction in societal costs from health risks, including reduced morbidity and mortality, related to air pollution from fossil-fuel production, transportation, and generation.
Energy Market Impacts	Customer-sited DG reduces the demand for fuel to power central station generators and for wholesale power in the wholesale electricity market. Reduced demands in these markets lowers prices across the entire market served, providing benefits for the general body of consumers who use these markets.
Security and Resiliency of the Electric Grid	The savings realized from (1) the reduction in outages from reduced congestion along the T&D network, (2) the minimization of large-scale outages resulting from a more diverse and dispersed electricity supply, and (3) back-up power provided by customer-sited DG.
Avoided Environmental and Safety Costs	The reduction in costs related to fewer land use impacts because customer-sited DG is installed in the already-built environment; the savings realized from avoided accidents, pollution and economic loss associated with the extraction, transportation, distribution, and processing of fossil fuels; and the reduced compliance costs related to a decrease in the extraction, transportation, distribution and proceeding of fossil fuels.
Effects on Economic Activity and Employment	The value from the increase in jobs and local economic development related to customer-sited DG and the resulting increase in welfare and economic productivity of children and working adults from the above health benefits.

Societal Benefits	Definition
Visibility Benefits	The increased recreation value and economic activity associated with improved visibility due to emissions reductions from power generation.[19]

Consideration and proper valuation of these benefits will ensure the Commission fully and fairly calculates the resource value of DSG.

How does the resource value of distributed solar compare with utility scale solar? To make this comparison, what factors do we take into account, and what data would be needed?

The location of DSG near load on the distribution system and the frequent siting of DSG in "brownfield" sites can provide value beyond that provided by utility scale solar. Using the definitions provided above, distributed solar provides a number of benefits that utility-scale solar either does not provide or provides to a lesser extent, including the following:

- Avoided Energy Losses
- Avoided and Deferred Capacity Costs for T&D
- Security and Resiliency of the Electric Grid
- Avoided Environmental and Safety Costs

As discussed above, the Regulator's Guidebook provides a review of some of the common inputs used to calculate these factors.

Moreover, in many cases, the benefits of DSG to non-participating ratepayers can outweigh the costs. In these cases, and because the capital investments in DSG are made by ratepayers who choose to install solar, DSG can be more cost effective for non-participating ratepayers than utility-scale or utility-owned solar, both of can result in capital costs that must be included in rates.

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[19] This impact has long been quantified in traditional environmental impact analyses. *See, e.g.,* "The Benefits and Costs of the Clean Air Act from 1990 to 2020", Office of Air and Radiation, U.S. Environmental Protection Agency, p. 18 (March 2011).

III. Responses to Staff's Questions related to Costs and Benefits of Programs and their Distribution among retail electricity customers

How are the benefits of incentive programs distributed among non-participating retail customers?

In the previous section, TASC lists all of the benefits non-participating ratepayers can realize from DSG. A number of the studies TASC discusses above demonstrate how these benefits are distributed among non-participating in the form of reduced costs of service. In California, for example, solar provides $96 million in net benefits to non-participating ratepayers each year. In Colorado, solar provides $13.6 million in net benefits. Therefore, non-participating ratepayers realize financial benefits when participating ratepayers choose to invest in solar.

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

The studies TASC identifies above discuss how these benefits can be quantified and what studies and data would be required to do so.

Do VIR and Net Metering participants pay their full share of the fixed costs of maintaining the grid? How are fixed costs recovered, and how should they be recovered?

A comprehensive study of the costs and benefits of DSG in Oregon will demonstrate the extent to which DSG reduces fixed costs of maintaining the grid. In many cases, as demonstrated in a number of the studies TASC lists above, DSG reduces the fixed costs of service for non-participating ratepayers. At the same time, very few VIR and net metering participants eliminate their electricity bills entirely which means that they continue to pay for the electricity service they receive. If there is a concern on the part of utilities about the recovery of fixed costs then TASC encourages the PUC to look into a more holistic rate design that can be implemented as technology continues to evolve and get adopted by ratepayers.

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

TASC does not believe the relationship between the penetration of DSG and utility revenue is a zero sum game. As discussed in the next section, there are a number of opportunities for utilities to invest in grid modernization infrastructure as the penetration of DSG increases and as other technologies are adopted that may challenge traditional utility business models. Moreover, Oregon's penetration levels are relatively modest compared to other high penetrations states, and the Public Utility Commission may not need to fully address this issue until well into the future.

IV. Responses to Staff's Questions About the Future Development of Solar Energy

At what penetration does solar generation affect local distribution reliability?

TASC appreciates the Commission's interest in understanding the effects of DSG on local distribution reliability. However, there is no threshold level of solar penetration beyond which reliability will be affected. This is because interconnection procedures are designed to ensure that, even at high penetrations of DSG, each facility will be interconnected to the distribution system in a manner that ensures safety, reliability and power quality will be maintained on the grid. Thus, reliability is addressed when a project is interconnected.

Further, Oregon's penetration levels are rather modest. In Hawaii, over 20% of circuits have reached solar penetration levels equal to 15% of peak load.[20] Other high penetration states include California, with 495 megawatts (MW) of net metered systems installed in 2012[21] for a cumulative total of 1863 MW,[22] and Arizona, with 135 MW of net metered systems installed in

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[20] Interstate Renewable Energy Council, *Integrated Distribution Planning*, p. 4 (May 2013) ("IDP Paper"). Available at http://www.irecusa.org/wp-content/uploads/2013/05/Integrated-Distribution-Planning-May-2013.pdf.

[21] *See* Sherwood, L., *U.S. Solar Market Trends 2012*, July 2013, Interstate Renewable Energy Council at pg. 20. Available at http://www.irecusa.org/wp-content/uploads/2013/10/Solar-Rpt_Oct2013_FINAL.pdf.

[22] *See* Installed MW tracker at http://gosolarcalifornia.org.

2012.[23] In contrast, the installation of DSG in Oregon is at much lower levels with 5.8 MW of net metered DG installed during 2012.[24] TASC believes that at these relatively low levels of penetration, the Commission's concern appears premature.

What initiatives are in place to prepare for greater solar penetration, and what initiatives might be considered?

As solar penetration increases, there may be a limit to the effectiveness of interconnection procedures that do not proactively study the distribution system before interconnection applications are received. As the deployment of DSG rises, the use of detailed interconnection studies for each application can deplete utility resources as interconnection queues outpace the utility's ability to process requests. Even in states like Oregon where review screens allow for the expedited interconnection of projects, detailed studies can overwhelm utility resources, cause project delays, and, in some cases, impose prohibitive costs.[25]

A recent paper co-authored by the Interstate Renewable Energy Council and Sandia National Laboratories proposes an approach to proactive planning for growth in DSG called Integrated Distribution Planning (IDP). IDP is drawn from a variety of efforts being contemplated or implemented in utilities across the United States. These efforts look to proactively plan for DSG growth and anticipate distribution system upgrades that may be necessary to accommodate that growth.[26] IDP determines the ability of existing distribution circuits to host DSG in advance of interconnection applications, allowing utilities to continue to

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23 *See* Sherwood, L., *U.S. Solar Market Trends 2012*, July 2013, Interstate Renewable Energy Council at pg. 20.

24 *See id.* at 21.

25 *See, e.g.,* Hawaiian Electric Company Rule 14H, Appendix III § 4(d) (allowing the Hawaiian Electric Company to contract with outside consultants in order to conduct an Interconnection Requirements Study).

26 IDP Paper at 6-10.

use expedited procedures in the face of high penetrations and consider the deployment of advanced grid modernization technology, such as storage, when high penetrations are reached.[27]

While still in a conceptual phase, the State of Hawaii has begun to implement a form of IDP called the Proactive Approach.[28] Moreover, California recently passed Assembly Bill 327, which requires the State's utilities to submit distribution resources plans to identify optimal locations for the deployment of DG and identify the distribution infrastructure needed to allow such penetrations.[29] As penetrations in Oregon grow, the Commission may want to consider proactive planning for DSG growth.

V. Conclusion

TASC appreciate the opportunity to comment on these issues and looks forward to discussing them further with stakeholders.

Respectfully submitted,

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December 18, 2013

27 *Id.* at 10.
28 *Id.* at 9-10.
29 California Public Utilities Code § 769(b) (Deering's 2013).

UM 1673 – CERTIFICATE OF SERVICE

I hereby certify that I have this day caused the Comments of the Alliance for Solar Choice to be served by electronic mail to those parties whose email addresses appear on the attached service list, and by First Class Mail, postage prepaid and properly addressed, to those parties on the service list who have not waived paper service from Docket No. UM 1673.

DATED this 18th day of December, 2013.

Tim Lindl
The Alliance for Solar Choice

Summary Report

UM 1673 PUC LEGISLATIVE REPORT TO COMPLY WITH HB 2893 SOLAR INCENTIVES

Category: Miscellaneous

In the Matter of
PUBLIC UTILITY COMMISSION OF OREGON,
Report to the Legislature on Effectiveness of Incentive Programs for Solar Photovoltaic Energy.

Docket opened by HB 2893. Copy and paste link below into...

Filing Date: 9/23/2013

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Summary Report

UM 1673 PUC LEGISLATIVE REPORT TO COMPLY WITH HB 2893 SOLAR INCENTIVES

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