June 30, 2016

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Via Electronic Mail

Public Utility Commission of Oregon
Attn: Filing Center
PUC.FilingCenter@state.or.us

Re: In the Matter of PUBLIC UTILITY COMMISSION OF OREGON, Investigation to Determine the Resource Value of Solar
Docket No. UM 1716

Dear Filing Center:

The Response Testimony of Michael O'Brien on behalf of Renewable Northwest, the Oregon Solar Energy Industries Association, the NW Energy Coalition, and Northwest Sustainable Energy for Economic is enclosed for filing in the above-referenced docket.

Thank you for your assistance, and please do not hesitate to contact our office if you have any questions.

Sincerely,

/s/ Silvia Tanner
Silvia Tanner
Staff Counsel
Renewable Northwest

BEFORE THE PUBLIC UTILITY COMMISSION OF OREGON

UM 1716

In the Matter of PUBLIC UTILITY COMMISSION OF OREGON, Investigation to Determine the Resource Value of Solar.	Response Testimony of Michael O'Brien on behalf of Renewable Northwest, the Oregon Solar Energy Industries Association, the NW Energy Coalition, and Northwest Sustainable Energy for Economic Development.

INTRODUCTION

Q. Please state your name, occupation and business address.

A. Michael O'Brien, Senior Policy Analyst at Renewable Northwest. My business address is 421 SW 6th Avenue, Suite 1125, Portland, OR 97204.

Q. On whose behalf are you testifying?

A. This testimony is on behalf of Renewable Northwest, the Oregon Solar Energy Industries Association, the NW Energy Coalition, and Northwest Sustainable Energy for Economic Development.

Q. Mr. O'Brien, please describe your educational background and work experience.

A. I hold a Ph.D. in Physics from the University of Birmingham, in the United Kingdom, which included an MSc in the Physics and Technology of Nuclear Reactors. I also hold a BSc(Hons) in Physics from the University of Birmingham. After post-doctoral research with the United Kingdom Atomic Energy Authority, I completed an MPhil in Technology Policy at the University of Cambridge. Following Cambridge I worked for the UK Parliamentary Office of Science and Technology as Energy Advisor, and then for the House of Commons Energy and Climate Change Select Committee as Committee Specialist. I have been working at Renewable Northwest since I moved to the United States in June 2012.

Q. What is the purpose of your response testimony?

A. We appreciate the opportunity to testify to the Oregon Public Utility Commission ("the Commission") in response to Staff's Direct Testimony of

Cindy Dolezel (Exhibit 100–101) and Arne Olson (Exhibit 200–201), filed June 1, 2016. Staff's Direct Testimony addressed a methodology for calculating the resource value of solar ("RVOS") in Oregon, based on the Commission's direction that it should include only elements "that could directly impact the cost of service to utility customers".[1] Staff contracted with Energy and Environmental Economics, Inc ("E3") to develop the methodological framework, with Arne Olson, E3 partner, presenting testimony. We congratulate Staff and E3 on all their hard work, and on their efforts towards developing a RVOS methodology for Oregon.

Q. What issues does your response testimony address?

A. This testimony addresses the following issues: the benefits of increased granularity in the RVOS; the value of considering resiliency benefits; the need to consider ancillary service benefits separately from integration costs; how to ensure the RVOS remains up-to-date; how a reduction in utility revenue does not imply a cross-subsidization; the need for care when comparing utility scale solar and distributed solar; and the need for transparency around administration costs.

Q. Is there a key theme to your response testimony?

A: The benefits of determining the optimal location of distributed solar can be seen throughout this testimony. Identification of these locations in a distribution-level planning process could ensure that solar systems provide the maximum value to the system. The need for this type of planning can also

[1] OPUC Order No. 15-296 at 2

be seen in docket UM 1751, 'Implementing an Energy Storage Program Guidelines',[2] as well as in rulemaking AR 599, 'EV Program Application'.[3] As an example, the California Public Utility Commission requires utilities to develop Distribution Resource Plans ("DRPs") in addition to Integrated Resource Plans ("IRPs").[4] We recommend that the Commission explore the benefit of Oregon utilities developing such DRPs.

Q. How many solar resource values are necessary in Oregon?

A: We would like to ensure that the methodology created by E3 is eventually used to develop an appropriate range of solar resource values. This range of values should capture more than the solar profile or insolation of a particular geographic location. This range should also capture the locational benefits of avoided energy costs, avoided capacity, line losses, avoided transmission and distribution, security, integration impacts, and ancillary services and grid support that are unique to a particular position on the grid.

Staff recommended that each utility use the E3 methodological framework to develop "*an* actual distributed solar RVOS for each utility" (emphasis added).[5] However, E3 notes that their methodology could potentially capture both insolation and energy benefits that vary with both time and location, stating that their "industry leading approach…utilizes a granular locational-

[2] UM 1751 http://apps.puc.state.or.us/edockets/docket.asp?DocketID=19733
[3] AR 599 http://apps.puc.state.or.us/edockets/docket.asp?DocketID=20129
[4] www.cpuc.ca.gov/General.aspx?id=5071
[5] Staff/100 Dolezel/8 line 18

and time-differentiated approach to accurately capture the value that solar provides".[6]

We acknowledge E3's statement that "there are tradeoffs of workability and simplicity for calculating the RVOS for more or less locations and types." Nevertheless, we believe there is room to explore these tradeoffs. Low granularity in the RVOS would lead to a lost opportunity to enable the market to focus interest on areas where value could be optimized and appropriately compensated. Consequently, we recommend that the tradeoffs in RVOS granularity should be explored as part of Staff's suggested "investigation to define solar generation profiles and differentiate these profiles by geographic zones".[7]

Q. Should the RVOS methodology be able to calculate the potential security, reliability and resiliency benefits of solar?

A. Yes, the RVOS methodology should be able to calculate the potential security, reliability and resiliency benefits of solar. E3's "Condensed List of Oregon RVOS Elements" defines the value "Security, Reliability, Resiliency" as the "potential capability of solar, when deployed in combination with other technologies, to provide backup energy or microgrid islanding capabilities during a loss of service from the utility".[8] Given the significant potential value of resiliency to utility ratepayers, we are concerned that E3 has "not

[6] Staff/200 Olson/4 lines 12–14
[7] Staff/100 Dolezel/8 lines 19–21
[8] Staff/200 Olson/23 row 11

incorporated any quantification of these potential benefits into the RVOS model."[9]

For example, generating resources that are located close to demand can reduce transmission and distribution congestion and can minimize the probability of outages through a dispersal of diverse generation. The increased penetration of solar, and of distributed generation in general, could lead to a significant increase in system resiliency and stability. Looking into the near future, the colocation of electricity storage and modern inverters with solar offers the possibility of increasing the solar resource value in various categories. As well as enabling solar systems to better respond to demand, storage combined with solar has a future role in emergency preparedness and natural disaster readiness. Solar could provide power to customers safely during a power outage, whether that is a private residence, hospital, school emergency shelter or other public building.

While discussing the potential barriers to deferral of transmission and distribution investments, E3 describes demand-side resources such as rooftop solar—and energy efficiency—as "more risky or less reliable" than conventional system assets such as conductors or transformers because of "uncertainty about customer usage patterns".[10] While this may currently be true to some extent, advanced metering infrastructure and direct

[9] Staff/200 Olson/26 lines 1–2
[10] Staff/200 Olson 11 lines 5–15

performance data from modern inverters and power electronics are increasing the amount of information on the generation profile of rooftop solar resources. Such information about rooftop solar usage patterns could enable the deferral of transmission and distribution investments to be more fully realized.

While acknowledging that the "Security, Reliability, Resiliency" element could potentially have value for utility ratepayers, E3 adds that this would "depend on solar being deployed in a microgrid." Mr. Olson from E3 then states that "these applications are quite expensive, and [he is] not aware of any such applications in Oregon at this time".[11] However, we believe there is a strong case for this element to be re-included. Firstly, even if there were no such applications in Oregon at this time, exploring the hypothetical value that could be generated would be extremely valuable from a market, policy and regulatory perspective. Secondly, the Commission is already exploring the value of resiliency in docket UM 1751.[12] Finally, the value of ancillary and support services from distributed solar is not at all limited to microgrid applications. While compensating for such services depends on enhancing or adding tariffs and rate designs to compensate for the value provided by advanced inverters and other system elements, the additional value is already available at the substation and feeder level. As well as exploring the

[11] Staff/200 Olson/25 lines 22–26, Olson/26 line 1
[12] UM 1751 http://apps.puc.state.or.us/edockets/docket.asp?DocketID=19733

value of resiliency, there is clearly an opportunity for synergy between UM 1716 and UM 1751 by including this element in the methodology.

Q. Should "Ancillary Service" benefits be bundled with "Integration Impacts"?

A: No. We take issue with E3's bundling of "Integration Impacts" and "Ancillary Services" into "Integration and Ancillary Services". E3 defined ""Integration and Ancillary Services" as follows:

> "The *increased* costs associated with integrating solar PV into the electrical system. These costs include additional spinning reserve and ancillary service requirements to facilitate the variability and intermittency of solar PV production, as a well as any change in ancillary service procurement due to reduction in metered load"(emphasis added). [13]

A negative value or cost is clearly associated with "Ancillary Services", as can be seen again in the equation to calculate the RVOS that includes a negative value for the element "$Integration_h$" (which contains ancillary services).[14] This understanding of ancillary services as a cost, rather than as a benefit, does not seem to comport with the definition discussed by stakeholders during the initial part of Phase 1, Investigation 1, of UM 1716.

In comments submitted to the Commission on July 20, 2015, Renewable Northwest, Environment Oregon, and the Oregon Solar Energy Industries

[13] Staff/200 Olson/22 row 6
[14] Staff/200 Olson 26 lines 7–8

Association offered the following definition for "Ancillary Services and Grid Support":

> "Ancillary services and grid support represent a broad array of services that can help system operators maintain a reliable grid with sufficient power quality. The impact of solar will be based on the penetration level. As solar penetration is expected to increase, it would behoove this docket to investigate the extent of this value and how it can be maximized".[15]

The ancillary services element was meant to capture the value of ancillary services—for example, frequency response, voltage support or peak shaving—that could be provided by solar, especially when combined with other technologies such as modern inverters or storage. Similar to the above discussion on "Security, Reliability, Resiliency", the quantification of such a value could be used to focus the market, policy and regulation on optimizing the RVOS. We recommend that the "Ancillary Services" element be unbundled from "Integration" and considered as a separate, potential *value* to ratepayers.

Q. How often should the RVOS be recalculated?

A: We hope that updates to the RVOS calculation are undertaken to ensure the value is forward looking. Staff envisions that the RVOS will be recalculated

[15] UM 1716, Comments/Response of Renewable NW, Environment Oregon, and OSEIA, 7/20/2015 http://apps.puc.state.or.us/edockets/edocs.asp?FileType=HAC&FileName=um1716hac164937.pdf&DocketID=19362&numSequence=44

every two years using the methodology adopted by the Commission in order to "keep the RVOS current with market trends and to be consistent with the IRP [Integrated Resource Plan] process and schedule".[16] We understand the desire to be consistent with existing processes and schedules, but are concerned that aligning the RVOS with the IRP process could result in a backward looking RVOS that would be unable to respond to changes in market penetration or to the needs of the grid at a particular time and location. Therefore, we recommend that the Commission explore the most appropriate way to 'set' and 'update' the RVOS in the investigation into geographic solar generation profiles proposed by Staff.[17]

Q. What do you think about how Staff's Testimony (Staff/200) addressed the questions of cross-subsidization and cost-shifting?

A: The extent of cost shifting (if any) is under consideration in Investigation 2 of UM 1716. Investigation 2 was postponed in a ruling issued on January 15, 2016 until after the completion of the RVOS methodology in Phase 1, Investigation 1.[18] Given this postponement, we were concerned to read the following assertion from E3:

> "Moreover, whereas participating solar generators experience a *benefit* in the form of reduced utility bills, this reduction in utility revenue is a *cost* to non-participating customers whose

[16] Staff/100 Dolezel/9 lines 5–6
[17] Staff/100 Dolezel/8 lines 19–20
[18] UM 1716, Ruling, January 15, 2016
http://edocs.puc.state.or.us/efdocs/HDA/um1716hda154413.pdf

rates must increase to ensure the utility continues to recover its revenue requirement " (emphasis in original).[19]

This sentence conflates two separate issues. The key clauses in this paragraph are "reduction in utility revenue is a *cost* to non-participating customers whose rates must increase" and "to ensure the utility continues to recover revenue requirement". The former clause focuses on rate impacts, which seems premature given that UM 1716 Investigation #1 is still in progress and that a rate impact would only be the outcome of a rate-case. While it is true that a reduction in electricity consumption leads to a reduction in revenue for a utility, a case can be made that cost shifts occur whenever there is a reduction in load. Reductions in load happen for many reasons, including energy efficiency, heating source choices, and occupancy changes. Nevertheless, Oregon utilities do not currently collect extra revenues from customers who reduce their load due to energy efficiency investments. Hence, it is inappropriate to use changes in revenue as a proxy for cost-shifting.

Throughout the early part of Phase 1 of Investigation #1, there was an understanding amongst stakeholders that the extent of cost-shifting, if any and in either direction, was to be determined by the balance between the costs and benefits. It was not the stakeholders' understanding that the basis of the cost-shift was the utility's right to collect a certain amount of revenue.

[19] Staff/200 Olson/18 lines 15–18

We recommend that the Commission encourage Staff to refrain from judgments over the magnitude and direction of cost shifting until the completion of Investigation # 2.

Q. Should the RVOS methodology be used to decide whether utility scale solar is more cost effective than rooftop solar?

A: We are concerned by E3's decision to "include functionality to calculate the RVOS using both a conventional [fossil] and a utility solar avoided cost proxy".[20] E3 argues that this was necessary given the rapidly declining costs of solar, a trend which we acknowledge.[21] E3 states that such a comparison between distributed and utility solar could be plausible in the future when "the cost to the utility of serving load with conventional generating resources (either gas-fired resources or market purchases) may exceed the cost to the utility of acquiring a like amount of solar energy at utility scale", i.e. when the avoided marginal resource is solar.[22] We look forward to such a day; however, we are concerned that E3's methodology could be used to attempt to make the case that utility scale solar is somehow 'better' than distributed rooftop solar. In reality, they are two different types of resources with different sets of values and costs, as acknowledged by E3.[23] We recommend that the Commission take careful note of what conclusions stakeholders draw using the RVOS methodology when setting utility scale solar as the avoided cost proxy.

[20] Staff/200 Olson/39 lines12–17
[21] Staff/200 Olson/39 lines 3–5
[22] Staff/200 Olson/37 lines 1–4
[23] Staff/200 Olson/35 lines 15–21 and Olson/36 lines 1–2.

Q. Is there sufficient transparency in the methodology with regard to administrative costs?

A: We agree that utilities should be allowed to recover reasonable administrative costs in situations where the administrative cost associated with behind-the-meter generation exceeds the comparable metering and billing costs for regular utility customers. E3 describes the "Administration" cost element as representing "the cost of interconnecting solar generators and any ongoing administrative costs such as billing."[24] We recommend that the elements of "interconnection" and "administration" be parsed out so that stakeholders can determine what "administration" includes.

Q. Please give your concluding remarks.

A: Firstly, the methodology developed by E3 could enable the RVOS to be determined based on a solar system's geographic location (to account for insolation) as well as its physical position on the grid. This would enable regulation, policy and the market to focus on ways to maximize the RVOS. We recommend that the tradeoffs of calculating the RVOS for more or less locations be explored as part of Staff's suggested investigation into defining solar generation profiles. Secondly, the potential resiliency benefits and ancillary services that could be provided by solar should be captured in the RVOS. Enabling the RVOS model to calculate such benefits would be a step towards realizing them.

[24] Staff/200 Olson/33 row 7

Both of these conclusions point towards the benefits of incorporating the locational values of distributed generation into the planning process. As an example, the California Public Utility Commission requires utilities to develop so-called Distribution Resource Plans in addition to Integrated Resource Plans. We recommend that the Commission consider exploring the ratepayer benefits of utilities developing such distribution-level plans.

Q. Does this conclude your testimony?

A. Once again we acknowledge Staff's hard work and efforts. We look forward to eventually working with utilities and other stakeholders as the RVOS model is populated with data in order to calculate solar resource values. This concludes our testimony.