BEFORE THE PUBLIC UTILITY COMMISSION

OF OREGON

UM 1716

In the Matter of	)
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PUBLIC UTILITY COMMISSION OF OREGON,	)
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Investigation to Determine the Resource Value of Solar	)
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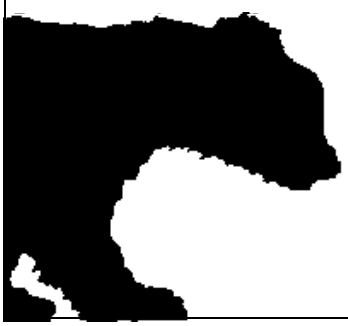
COMMENTS OF THE

CITIZENS' UTILITY BOARD OF OREGON



July 20, 2015

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OF OREGON

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Introduction

CUB appreciates the opportunity to participate in the discussion of a solar resource value (SRV). In the past few months, CUB has attended workshops aimed at fleshing out the potential components of the resource value of solar. In the July 2014 Solar Report to the Legislature, the Commission pledged to open this docket:

> "The Public Utility Commission will open a formal proceeding to determine the resource value of solar and the extent of cost-shifting, if any, from net metering. As part of this docket, the Commission will evaluate the reliability and operational impacts of increasing levels of solar generation."[1]

In its comments, CUB will address the scoping documents OPUC Staff has provided and will clarify its own perspective of what elements should be considered in the SRV.

[1] Oregon Public Utility Commission (OPUC). (July 2014). Investigation into the Effectiveness of Solar Programs in Oregon. Retrieved from http://www.puc.state.or.us/electric_gas/Solar%20Report%202014.pdf.

Developing a resource of solar value is a necessary goal

While there is a growing body of literature of qualitative and theoretical analysis on solar resource value, actual data is limited. Most available literature is preliminary and qualitative, and given Oregon's circumstances, it is very possible that Oregon will be in a distinct position as contrasted to other states. Current studies have approached the concept of solar resource value from a variety of angles, and "resource value" has taken on different meanings.[2] In this docket, Staff has chosen to outline the benefits of solar in determining a solar resource value, such as avoided energy costs, avoided capacity additions, reduced transmission line losses, avoided transmission/distribution investments, and fuel price hedging, among others.

CUB believes that defining a methodology for determining the resource value of a solar system is necessary in order to more fully understand its value. In the OPUC's report to the legislature, Staff defined the SRV as the following:

1. The resource value of solar refers to the value of the benefits solar generation brings to the utility system and electricity ratepayers in general. It does not include potential social benefits such as improved environmental quality.
2. The resource value of solar includes such factors as avoided energy costs, avoided capacity additions, reduced transmission line losses, avoided transmission and distribution investments and many other factors. [3]

These definitions are broad, but through a number of workshops, stakeholders fleshed out the components according to their respective perspectives. Staff compiled the following list of elements, and in its comments, CUB will provide its view as to which of these it feels should be included.

[2] See pages 33-42 of Shenot, J. (October 2013). Customer-Sited PV: Framing the Discussion of a Value of Solar Tariff. *Regulatory Assistance Project*. Retrieved from: http://www.raponline.org/document/download/id/6872.
[3] Oregon Public Utility Commission (OPUC). (July 2014). Investigation into the Effectiveness of Solar Programs in Oregon. Retrieved from http://www.puc.state.or.us/electric_gas/Solar%20Report%202014.pdf.

CUB will preface its view by stating that though there are some elements that it feels may not need to be immediately included in the SRV, this does not mean that the elements should not be explored at a later date or that CUB does not view the elements to hold larger significance. For example, CUB acknowledges that there may be benefits and costs outside the utility system, like federal tax credits (a cost to taxpayers) or improved environmental and health (a benefit to society). However, CUB also feels that the focus of the SRV should be on more immediate and tangible value to utility systems being served by solar resources.

The complete list of components Staff and stakeholders introduced in the scoping docket are as follows. Items highlighted in bold are elements CUB believes should be included in the SRV. Items not in bold are elements CUB is indifferent to, does not feel need to be included *at this time,* or should be excluded. CUB will focus on items of inclusion in its comments and will clarify its perspective on items of exclusion/indifference where necessary:

- **Avoided Energy Impacts**
- **Avoided Capacity Additions**
- **Line Losses**
- **Avoided Transmission and Distribution**
- **Environment: Compliance Impacts**
  - **Carbon—Current**
  - **Carbon—Future**
  - **NOx/SOx/Particulates—Current**
  - **NOx/SOx/Particulates—Future**
  - **Other—Current (e.g. MATS - Mercury Air Toxics)**
- **Security: Reliability, Resiliency, and Disaster Recovery**
- **Financial: Fuel Price Hedge (Adjustable mechanism)**
- **Utility: Interconnection Impacts**
- **Compliance Value: Reduced RPS procurement due to reduced utility sales**
- **Utility: Integration Impacts**
- **Utility: Administration Impacts**
- Utility: Impacts Production (IRP Process)
- Rate Impacts: Net Metering Credits
- Environment: Externalities
  - Carbon—Social Impacts
  - Carbon—Ocean Warming and Acidification
  - NOx/SOx/Particulates—Societal Impacts
  - Avoided water usage—For Thermal Power Production

    - Avoided water usage—For Natural Gas Hydraulic Fracturing
    - Avoided pollution—Associated with Hydraulic Fracturing
    - Other—Future
- Ancillary Services and Grid Support
- Financial: Market Price Response
- Social: Economic Development
- Health and Other Societal Benefits-
- Avoided Natural Gas Pipeline Impacts
- Behind-the-Meter Production During Billing Month
- Incentive Impacts (e.g. Utility Rebates)
- Resource Need
- Rate Impacts: Lost Utility Revenue
- DSM Alternative Impacts
- Tax credits (State and Federal)
- Operational Impacts
- Capital Risk

In addition, stakeholders introduced "perspectives to keep in mind":

- **Type of Technology**
- **Solar PV Scale**
- Perspectives
    - **Utility**
    - **Customer**
    - **Non Participating Customer**
    - Society
- **Levelized costs over 25 years**
- **Duration and Frequency of Reassessment of Values and Methodology**

Below are CUB's preferred elements to include in the SRV.

Avoided Energy Impacts

CUB takes this to mean avoided alternative energy procurement. Energy produced within the system avoids the need to purchase power elsewhere. All solar would include avoided fuel cost, avoided cost of purchasing power from wholesale markets, and avoided cost of price volatility risk. Avoided costs associated with customer-owned energy include avoided fuel costs, avoided O&M costs, and utility-built solar avoids other utility investments in energy procurement but at the cost of investing in solar.

Arguably, customer-owned solar has the potential to add a higher resource value as the utility will avoid the cost of procuring energy.[4]

Avoided Capacity additions

Investing in solar energy creates a supply resource, which avoids the need for an alternative resource. Solar is predictable in the daytime, so as it contributes to capacity, it will avoid the need for alternative capacity. In addition, customer-owned rooftop solar reduces the daytime load the utility needs to serve, allowing the utility to avoid additional capacity investment and expenses. As such, CUB feels that this element should be included in SRV.

(Avoided) Line Losses

Annual line losses from generators to meters average about 6%-11%,[5] but CUB couples its preference of including line losses in the SRV with the notion that utility-scale solar *outside* of a company's service territory will not necessarily yield avoided line losses. If a solar facility is built far away, line losses will inevitably still occur. In contrast, when solar capacity is installed within a company's service territory, it is more likely to avoid line losses, thereby increasing the solar resource value. Furthermore, when customers install solar energy, this reduces the need for utilities to install generating reserves and peak reserves in order to meet load. It is similar to energy efficiency in the sense that it achieves reductions in load and avoids transmission line losses associated with power generated far away. It is CUB's opinion that avoided line losses are a tangible and quantifiable value that should be included in the solar resource value calculation.

Avoided Transmission and Distribution Investment

CUB again couples its preference to include this element with the idea that avoided T&D investment is maximized within a utility's service territory. In one estimation, cost per kW for transmission capacity

[4] Note that the distinction between consumer-owned and utility-owned solar was not made in this docket.
[5] Lazar, J., Baldwin, X. (2011). Valuing the contribution of energy efficiency to avoided marginal line losses and reserve requirements. Regulatory Assistance Project. Retrieved from: http://www.raponline.org/document/download/id/4537.

investment is valued at $200-$1000 and $100-$500 per kW for distribution capacity investment.[6] The farther away from the end user, the higher the investment in T&D, and the higher the avoided cost when installing solar capacity closer to the end user. In addition, a utility might be able to maximize benefits by strategically placing solar capacity within its service territory. Though CUB is not necessarily recommending this level of granularity in the SRV analysis, it is worthwhile to point out that solar resource value may be impacted by the utility's approach.

Environment (Current carbon, Future carbon, Current NOx/SOx/Particulates, Future NOx/SOx/Particulates, Current "other," i.e. (MATS))

As far as the benefits of solar are concerned, CUB believes that the benefits highlighted by Staff incorporate many of those outlined by previous literature, but CUB is proposes that environmental benefits be explicitly included in the present docket. It is CUB's belief that with 111(d) regulation, in addition to pollution control regulation in place by the EPA, environmental benefits must be included in the solar resource value to avoid its underestimation. In addition, the Commission's own order in UM 1559 said that "avoided CO2 components are legitimate components of the resource value."[7] That order was issued prior to the proposed 111(d) rules, and the EPA's action raises the importance of environmental benefits within the determination of solar resource value.

As Oregon utilities grapple with 111(d) and Regional Haze, it is clear that environmental costs are real costs that impact customers. While those costs may be small today, they will grow as the country (and the state) confronts climate change. Over the life of a solar resource, the environmental costs of electric production will likely increase. Production of power from a solar resource avoids these current and future environmental costs associated with burning fossil fuels. In order to determine the resource value of solar, stakeholders should identify the environmental benefits associated with avoiding fossil fuels. In addition, solar investment necessarily means

[6] *Ibid*.
[7] Order No. 12-396. (October 18, 2012). Retrieved from http://apps.puc.state.or.us/orders/2012ords/12-396.pdf.

that a decision not to install natural gas capacity has been made. The avoidance of using natural gas adds an additional environmental benefit that may prove to be of value with future carbon regulation.

Further attention can be given to solar energy's environmental value if we consider the Boardman-style analysis PGE did in 2010 that resulted in the decision to close the plant early. The decision was made to close the plant because the analysis showed that very real system costs and benefits were at stake; in other words, there was a value to closing the plant. Thus, Oregon already has an example of a situation of avoided costs of environmental upgrades, avoided fuel costs, and other expenses. For this reason, current environmental upgrades should be considered in the solar resource value.

Security: Reliability, Resiliency, and Disaster Recovery

CUB takes this to mean the stability associated with distributed generation (i.e., DG versus relying on long-distance generation subject to disaster far from the end-user/service territory). While this may not be available as an immediate solar resource value, as penetration increases, distributed generation could add significant value to the system in terms of resiliency and stability.

Financial: Fuel Price Hedge

CUB views this as the avoided cost associated with exposure to natural gas hedging due to volatile gas prices. Because sunlight is free and arguably more predictable than gas, CUB feels it is useful to include avoided cost associated with hedging losses.

Utility Interconnection Impacts

In keeping with the theme of utilities installing generation capacity within their service territory, CUB views that SRV will be affected as a result of the avoided cost of not having to interconnect a larger

resource or one that is far away.[8]

Compliance Value: Reduced RPS procurement due to reduced utility sales

When customers install solar capacity, the result is less energy demand from the utility. As a result, this reduces sales and indirectly reduces the RPS compliance burden, and the outcome then is avoided costs. This should be added to the solar resource value, but CUB stresses that the RPS primarily exists within the case of renewable power procured by the customer that results in lower energy demand.

Utility: Integration Impacts

Similar to other elements that are impacted by locale, investing in solar nearer to a utility's service territory will include an avoided cost value. CUB also recognizes that this may be a cost that other customers will bear, particularly considering the need to manage relatively quick shifts in load as a result of decreasing solar production, but at current Oregon penetration levels, it seems to CUB that this will likely result in a positive impact on SRV.

Utility: Administration Impacts

Currently, administrative costs for solar are relatively high because existing procedures require a level of manual recordkeeping that is inefficient. Presumably, better administrative systems would make the management of solar resources more efficient and produce less of an administrative burden. As the utility replaces billing systems and as the utility billing system is designed to include demand response along with distributed generation, the cost of this will decline.

Utility: Impacts Production (IRP Process)

Idaho Power introduced this concept in the docket as the levelized cost of production over the lifetime as it pertains to an assumed annual capacity factor in $/MWh. CUB agrees that planning for solar resource

[8] CUB also recognizes that there may be additional costs to interconnecting solar resources, but in keeping with the spirit of this docket, CUB will choose to focus on the benefits.

additions will impact the integrated resource plan process but views that it is redundant to include this in the SRV as these resource benefits are already intrinsically included through other elements.[9]

Rate Impacts – Net Metering Credits

This, as defined by Staff, covers the difference between the retail rate credit for excess solar generation and the avoided cost rate. This relates to the cost of solar to the system acquired under one particular acquisition model (net metering), rather than the value solar brings to the system. As a result, this would have rate impacts and as such should be included in topics of discussion moving forward, but CUB does not feel that it needs to be included as part of SRV calculations.

Environment: Compliance Impacts - Other Elements:

A number of other elements were introduced by several stakeholders, but because of a number of uncertainties, CUB does not agree that they should be included in the solar resource value as situations *currently stand*. However, these "other elements" are worthy of consideration to the degree that at some point in the future, the solar market may shift, the regulatory climate will change, and penetration levels will adjust. For these reasons, the following elements may contain resource value at some point in the future, but at the moment, CUB does not feel that it is imperative to include them as part of the analysis:

- Environment - Externalities:
  - Carbon—Ocean Warming and Acidification
  - Avoided water usage—For Thermal Power Production
  - Avoided water usage—For Natural Gas Hydraulic Fracturing
  - Avoided pollution—Associated with Hydraulic Fracturing
  - Other - Future
- Financial: Market Price response, which CUB views as the reduction in electricity price as a result of reduction in demand
- Operational Impacts, which CUB views as forecasting, scheduling, dispatch/redispatch resulting from availability of solar
- Capital Risk, which CUB views as the decreased risk of capital access and cost due to system impacts of solar

[9] Expectations about customer-installed capacity may affect resource planning depending on anticipated participation.

"Perspectives" to Consider

In addition to demarcating *specific elements* to include in calculating the SRV, stakeholders maintained that acknowledgment of varying perspectives is also important in establishing a framework for solar resource value. In general, CUB believes that solar resource value should be restricted to *system benefits*. This means that while CUB recognizes that there are social costs that go into resource value (i.e., state residential tax credits) in addition to social benefits (e.g., health benefits), these should not be included in the solar resource value because they are not directly captured by the utility system. As far as the resource value of solar is concerned, perspectives CUB believes should be included in this docket (as highlighted by Staff) are those of the utility, participating customers, and non-participating customers.

Discussions throughout the docket also included the following "perspectives":

- Type of Technology
- Solar PV Scale
- Levelized costs over 25 years
- Duration and Frequency of Reassessment of Values and Methodology

CUB agrees that these are all appropriate to include as a "background framework" when doing SRV analysis. Type of technology will have impacts on production of solar energy - more efficient systems produce more, though they may also cost more (i.e., a fixed-tilt system vs. a tracking system). The scale of the solar projects will also have an impact on benefits. As CUB has previously stated in its comments, utility-built systems will potentially provide a different solar resource value than customer-owned solar systems, which tend to be smaller in scale. Useful life must also be taken into consideration. A longer-lasting system will produce more, and CUB expects that as solar technology improves, this number will increase, thereby increasing the solar resource value. Finally, CUB expects the market to change with expiring tax credits and/or technology improvements. To ignore this is to ignore reality. See the next section for additional information.

Additional Notes:

- Staff specified that this docket is meant to consider the resource value of solar regardless of installer. However, customer-owned solar results in costs the utility—and ultimately other customers—does not bear while the same benefits of a non-customer-owned system are still delivered to the system. While it is inevitable that some cost-shifting might eventually occur, at low penetration levels like in Oregon's system, it does not make sense to talk about cross-subsidization and penalizing customers who choose to bear costs of production that ultimately benefit the utility system. Thus, CUB views that the solar resource value will change depending on whether a resource is customer-owned or not. If the utility is bearing the cost of production, those assets will ultimately be born by all customers. If the customer bears the cost of production, those costs are borne by the customer alone. In this way, the customer adds solar resource value to the system, and this should be considered moving forward. CUB recommends using a "marker" of some sort that distinguishes between customer-owned and utility-sourced solar.
- Solar energy in Oregon would be significantly cost-prohibitive without current incentives such as the VIR program, the federal tax credit, the state residential energy tax credit (RETC), ETO rebates, net metering programs, lower interest rates, even lower interest rates for solar financing, and third-party installers who take advantage of residential tax credits and incentives.[10] These all contribute to developing a solar market and general demand for solar PV. The federal energy tax credit, currently responsible for a 30% reduction in total costs to a residential installer, is set to expire in 2016. It is unknown what kind of impact this will have on demand for solar installation. In addition, the Oregon RETC is currently set to expire in 2018. The expiration of these incentives should be considered when designing the resource value for solar. While these do not impact the SRV itself, it will impact what the market looks like and will have repercussions on the extent of installation. In addition, because the penetration level is currently less than 1%, an increase in Oregon solar cost of installation (due to

[10] Hanhan, N. (March 2015). Greening the Grid: The Cost-Effectiveness of Residential Solar Programs in Oregon. (Master's thesis). Retrieved from http://ir.library.oregonstate.edu/xmlui/bitstream/handle/1957/55643/HanhanNadineR2015.pdf?sequence=1.

expired incentives) may reduce that percentage even further. Oregon also enjoys cheaper electric power than other parts of the country and houses an Energy Trust that implements aggressive energy efficiency programs that bring down costs to ratepayers, so Oregon is in a special position that will make it distinct from other states. As such, the discussion surrounding solar resource value will be unique and possibly utility-specific. However, whether on a utility-specific basis or not, we need to ensure that the resource value is *replicable and able to be updated as needed over time*. We need to establish the resource value with enough rigor that it can be adjusted in response to changing conditions but still accurately reflect the value that solar provides to a utility system in any given period of time.

Conclusion

CUB is excited to participate in Oregon's SRV process. Stakeholders created an exhaustive list of elements to be included, and CUB has presented its perspective about what it believes should be included in the solar resource value of solar. In general, avoided costs to the system are the primary component, and wherever it is reasonable to capture these, they should be included.

Respectfully submitted,

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