

**BEFORE THE PUBLIC UTILITY COMMISSION
OF OREGON**

UM 1673

In the Matter of

Comments of Obsidian Renewables, LLC

OREGON PUBLIC UTILITY COMMISSION

Comments of Obsidian Renewables on “Draft Report to the Legislative Assembly: Investigation into the Effectiveness of Solar Programs in Oregon”

Obsidian Renewables, LLC respectfully writes in response to the Draft Report to the Legislative Assembly on Solar Programs in Oregon (the “Draft Report”) circulated by staff of the Oregon Public Utilities Commission.

I. General Comments

Obsidian offers some general comments on the Draft Report.

First, the Draft Report is far too critical of the idea of generating electricity with photovoltaic panels. The Draft Report never even tries to explain why so many sensible, well-educated, concerned people here and around the world see a need to move from a fossil fuel past to a renewable energy future. Instead, the Draft Report uses awkwardly misleading “fuzzy math” to insist over and over again that solar energy is expensive for everyone and unfair to those who do not participate. The Draft Report evidences no awareness of the Oregon 10 Year Energy Plan and no understanding of the reason for laws supporting development of renewable energy.

Second, and thankfully, there is enough actual data and hard information on the costs and benefits of solar to overcome the Draft Report’s spin. There is a lot of good news on solar in Oregon for the PUC to report to the Legislative Assembly. We hope the final report includes it.

Third, solar was barely a toddler in 2009 when Oregon increased funding to encourage solar development. The VIR is, by its very nature, a pilot program. Of course it was expensive. Everyone involved in the decision knew it would be more expensive than fossil fuels. But it was designed to be small and to provide experience and knowledge that can, hopefully, be used to design a wiser and more effective path forward.

So what has the PUC learned from the experience to help the legislature design a wiser and more effective solar policy going forward? Those of us involved in the pioneering journey have learned a lot. HB2893 directed the PUC to: “(e) Recommend new programs or program modifications that encourage solar development in a way that is cost effective and protects ratepayers.” Let’s add that section in preparing the final report.

Fourth, it is very difficult to frame a policy discussion around solar generation without some understanding of the resource value of solar. I think the data in the Draft Report provides a basis to suggest a “proxy value” for now, to be updated at some point in the future when more information is available. We discuss this in more depth in our detailed comments that follow.

II. Detailed Comments on the Draft Report

The Draft Report requires many changes to become a useful, knowledgeable and objective report. We would like the Legislative Assembly to receive a complete and accurate report and the following comments are offered toward that end.

A. Chapter II.

The discussion in Chapter II, “Solar Development in Oregon” should include cost information in the section “Solar Capacity Standard” on page 9. We suggest:

“Solar electricity costs have come down significantly from the first projects developed under the Solar Capacity Standard. The first larger scale projects had a cost in the range of \$150/MWh, even with an Oregon Business Energy Tax Credit subsidy. PUC staff is aware of recent larger scale (5MW) solar being offered in the sunny part of Oregon at \$90/MWh or less on a long term power purchase agreement with no BETC.”

Also in Chapter II, we suggest the section “Qualifying Facilities under the federal Public Utility Regulatory Policy Act” be supplemented with mention of the more than 100 MW of solar PURPA projects proposed for PacifiCorp territory. I also suggest the Draft Report note that recent action by the utilities to reduce the rates paid to qualified facilities and to significantly extend the “sufficiency period” during which QF rates are not available will likely reduce the recent rise in QF development efforts.

Also in Chapter II, we suggest the section “Feed-In Tariff – Volumetric Incentive Rate (VIR) Pilot Program” be supplemented to include detailed information on the experience with larger (up to 500 kW) projects developed under that program.

The larger scale VIR pilot was an extremely effective program that most clearly demonstrates how the cost of solar installed in Oregon has declined dramatically.

Set forth below is a chart on how the program has assisted in lowering the costs of solar for everyone.

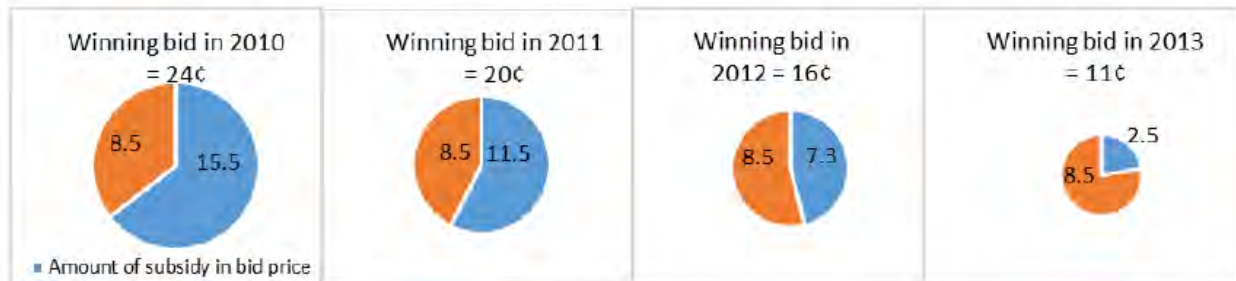
Because of our familiarity with it, we are going to focus on the larger system size (500 kW) auction process in Pacific Power territory. Below are the lowest bids in each of the four bid dates.

July 2010 – Large		April 2011 – Large		April 2012 – Large		April 2013 - Large	
Nameplate Capacity kW	Bid Winning Price	Nameplate Capacity kW	Bid Winning Price	Nameplate Capacity kW	Bid Winning Price	Nameplate Capacity kW	Bid Winning Price
500.00	\$0.2397	300.00	\$0.2000	500.00	\$0.1575	500.00	\$0.1095

The Feed-in-Tariff program has effectively and successfully created a very small but competitive marketplace that has been instrumental in driving down the cost of the larger solar projects in the pilot program. The winning bid has significantly dropped in each of the four allocation rounds in which the program was in effect. From the first auction to the last, the winning bid has dropped by 54 percent. Obsidian has participated in that competitive marketplace each year. The reasons the bids came down so much include experience, dropping prices of equipment (not just solar panels), improvements in panel technology, and the creation of a competitive market for solar.

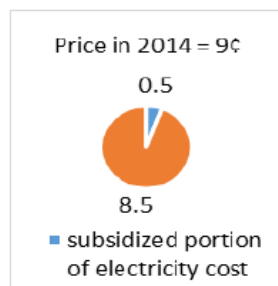
For a 500 kW project, considered the smallest utility-scale project, Oregon’s PacifiCorp VIR experience has been a decline in subsidy costs as follows:

The pie represents the total cost of electricity. A 24¢ pie circle is larger than an 11¢ pie circle. The orange part of the pie represents a solar energy value equal to an assumed energy value of 8.5¢. The blue portion of the pie represents the extra charge to ratepayers of the total cost of electricity.



Under this portion of the VIR program the ratepayer subsidy required for market-based competitive bid transactions fell from 15.5 cents/kWh to 2.5 cents/kWh, an 84 percent decline! Talk about success!¹

Larger scale solar can be built in the sunny part of the state for \$90 per megawatt hour or less, delivered at the point of interconnection, with an annual escalator of 2-3 percent. For a 10 MW project in 2014 in the sunny part of the state, the required subsidy has shrunk to less than a penny per kilowatt hour.



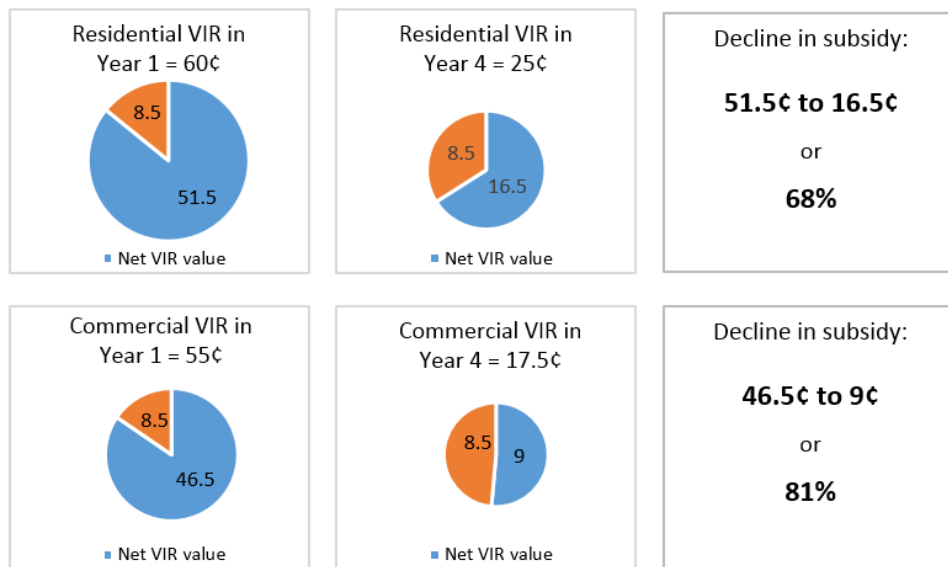
¹ We used 8.5 cents as a typical energy rate over the 15 year VIR period. If we use a resource value of solar of 11 cents or more, the ratepayer subsidy declines 100 percent! If you use a resource value of 6.7 cents, the subsidy falls from 17.3 cents to 4.3 cents, a 76 percent decline. So no matter how you fiddle with the assumed value of solar, this is a huge reduction in ratepayer cost. How can we do even better? The final report should address the question.

Many reasons have contributed to driving down solar costs. Oregon’s experience with solar has made an enormous contribution to solar cost reductions. For example, Obsidian’s budget for legal fees for new projects has dropped more than 90 percent compared to the first project. For further example, projects come together faster and much more smoothly now. The total costs and fees charged by developers (a significant portion of the “soft costs” of a project) have dropped about 75 percent. Finally, contingency budgets to guard against the unknown have been slashed by half or more. All these savings are due to competition and on-the-ground experience. Oregon now has a well-trained and more experienced labor force, particularly among members of the IBEW. These savings are properly credited to Oregon’s solar programs, not to falling panel prices. More on this in a couple of pages.

To further Oregon’s policy objective of driving down the costs of solar, Oregon should continue to nurture an environment where solar can continue and even thrive, provided the industry continues to drive down costs.

Also in Chapter II, section “Feed-In Tariff – VIR Pilot Program,” I think it is important to note that the difference between the cost of the VIR and the underlying cost of electricity has fallen by about 70 percent over the life of the VIR pilot, and that the costs of the VIR program are heavily impacted by the very high VIR rates in early years.

How do we calculate 70 percent? Any calculation of the VIR has to be the gross VIR minus the cost of the electricity. After all, the utilities only pay the cost difference not the gross VIR². Year 1 compared to year 4 in the sunny part of the state:



² The Draft Report calculates the VIR cost without the price of electricity.

We suggest the final report state:

“The VIR Pilot Program as administered by the PUC required substantially greater payments per kilowatt hour in the early years than the final year. By the final year of the VIR, the utility payment in excess of the retail rate of electricity had fallen by more than 70 percent.”

The final report should go on to say what we learned and how we can do better. That is what the Legislative Assembly asked for.

B. Chapter IV.

Chapter IV of the Draft Report, “Solar PV Cost Trends and Projections” is generally inaccurate and misleading to the reader. The first cost data should be clearly labeled with a header “Residential and Commercial.” Residential and commercial systems are not Obsidian’s market, so we leave it for others to comment whether the costs are accurate as presented and whether the Draft Report should exclude the federal investment tax credit, the Oregon RETC, and the ETO payment when calculating “true costs.” It would be useful to readers of the report to learn what “best practices” systems cost.

The single paragraph on the costs of Utility Scale systems is entirely inadequate.

The PUC has observed solar power purchase agreements entered into in Oregon under the VIR at 10.95 cents/kilowatt hour for a 500 kW system (flat for 15 years) and less than 9 cents/kilowatt hour for a 5 MW system with a 2 percent per annum escalator. We at Obsidian assert that solar can be built in Oregon east of the mountains from Boardman to Lakeview, from Bend to Ontario, for less than 10 cents/kilowatt hour under a 20 year power purchase agreement. There is no reason the PUC staff does not know this and the Draft Report’s use of “the utilities estimate” of 14.8 cents/kilowatt hour is troubling. The PUC staff need to have expertise apart from what the utilities tell them.

The next section, “Trends in Solar PV Costs in Oregon” at pages 13 (bottom) to 16 (top) only covers residential and commercial and should be clearly labeled. The Draft Report should then include a discussion of the costs of utility scale solar in Oregon along the lines set out below.

In our experience, the current wholesale price (i.e. large quantity purchases) of top tier multicrystalline solar photovoltaic panels is about 68 – 72 cents per watt of dc capacity. Prices had fallen to 63 cents per watt or less, but they have come up in the last couple of months. General contractor (“EPC”) pricing for single-axis ground mount on a well-suited site is about another \$1.10 or less. Land use approvals, studies, legal, financing costs, land, interconnection costs and developer charges and fees (the “soft costs”) bring the total costs on a 10 MW project to about \$2.30 per watt dc capacity, or less. These costs all represent a huge reduction compared to the costs four years ago, or even 18 months ago.

Installation Costs of Utility Generation

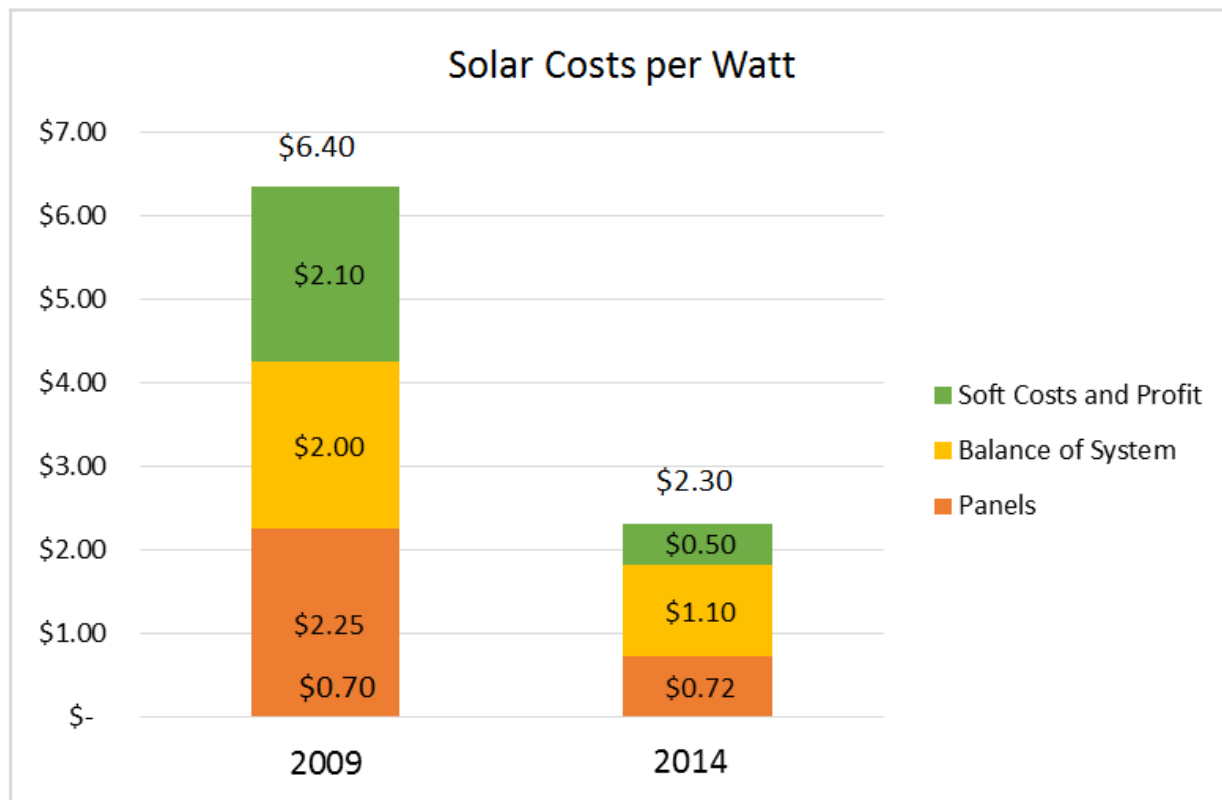


Figure 7 on page 16 of the Draft Report, while copied from utility integrated resource plans, is not accurate. You can see immediately above that cost per watt for larger scale tracking is \$2.30 per watt, not \$3.00 per watt. The difference is large.

Figure 8 on page 17 is even more inaccurate than Figure 7. Wind power has not been priced well above \$100/MW hour for some time. But despite having demonstrated with actual projects that solar in larger scale is available today for less than \$90/MW hour under a long-term power purchase agreement, the Draft report concludes that 10 MW central station solar costs \$150/MW hour or more! Absolutely not true. Not true in Oregon, California, Arizona, Colorado, Minnesota or anywhere else a researcher may look. Figure 8 is presented as fact without attribution, but readers of PUC filings will recognize the substance of it from PGE’s 2013 draft IRP. Accepted and used without critical thinking, apparently. If you correct the solar stack to \$90/MWh, solar becomes the second least cost resource in the chart!

Part of the reason the cost numbers in Figure 8 are so misleading has to do with tax credits. While the numbers look like cost numbers and are reported to be cost numbers, they are actually increased from actual costs to “add back” the economic benefit of the solar federal investment tax credit.

The Draft Report, without proper disclosure or explanation, makes the important conclusion that federal tax subsidies available to solar should be ignored in comparison to other resources. Three

big problems with this: First, the costs that always matter to the PUC are actual costs to ratepayers, not general costs to society. This method of presentation is abnormal. Second, the purpose of a renewable energy program is not to buy electrons, it is to acquire the many, many benefits that come from starting and fostering a renewable energy program. Third, Draft Report Figure 8 only adds back subsidies for wind and solar. The Oregon PUC staff apparently have concluded that there are no coal subsidies, no oil and gas subsidies and no nuclear subsidies. We ask the PUC to reconsider its position on isolating solar subsidies and excluding them from the cost comparison.³

The next section of the Draft Report, “Projections for Solar PV Costs” is deficient in three ways. First, the line graph in Figure 9 states 2013 costs are \$5 per watt, but the Draft Report at page 14 more correctly states that residential systems in Oregon cost \$4 per watt, but that sounds high to us. The difference is 20 percent and material. Second, the Draft Report is using average costs. If we want to understand how to drive down the cost of solar, we need to examine best practices. Third, there is no discussion about utility scale costs or projections for utility scale costs going forward.

There are extensive and consistent research and opinion reports easily available on a web search that forecast steady declines in the costs of utility scale solar. This research should be conducted and included in the final report. Solar in Oregon can reach \$70/MWh at the point of interconnection in a couple of years, and even less going forward.

C. Chapter V.

Regarding Chapter V, “Resource Value of Solar”, Obsidian agrees with the Joint Comments of Renewable Northwest Project, Citizens Utility Board, etc. submitted in this docket last December on this point. It is not possible to accurately talk about the cost of a solar program to ratepayers unless you know the benefit of a solar program to ratepayers. The Draft Report in Table 5.1 on page 20 effectively hints at a Resource Value of Solar of 6.7 cents/kilowatt hour, without attributing any benefit for (a) avoided transmission and distribution, (b) fuel hedge, (c) environmental benefits or (d) capacity benefits. Based on the studies reviewed in the Draft Report, and giving greater weight to Minnesota and the National Renewable Energy Laboratories studies, the four elements of value set to zero in Table 5.1 can be fairly valued at 5-8 cents/kilowatt hour, bringing the total Resource Value of Solar to 12 cents.⁴ This is well within the range of other credible studies. The Draft Report would be more useful if it reported on solar resource values

³ When we first saw PGE’s draft IRP chart adding back federal tax subsidies to inflate solar and wind costs, we thought PGE opened the door for the PUC to sponsor open and candid evaluation of the social costs (and benefits) of subsidies available to all the energy choices. All special tax rules, all other government subsidies, all environmental costs and subsidies. Let’s have a robust evaluation!

⁴ The Draft Report notes a “typical” value for avoided transmission and distribution of 1-2.5 cents, hedge against fuel price volatility of 1 cent, environmental benefits of 2 cents and avoided generating capacity of 1-2.5 cents. See Tables 5.2 and 5.3. This is a range of 5-8 cents. Our suggestion to use these elements of value in addition to the 6.7 cents set forth in Table 5.1 easily supports a proxy Resource Value of Solar equal to 12 cents. The Commission has found by Order that some of these items are “legitimate components of resource value of SPV.” Order No. 12-396; In the Matter of the Public Utility Commission or Oregon Investigation into the Appropriate Calculation of Resource Value for Solar Photovoltaic Systems, Docket No. UM 1559.

with central tendency (e.g. value range of the middle 50 percent of the reports) rather than quoting reports that lack credibility and reach extreme results.

Obsidian expects the Commission will not find a Resource Value of Solar in its final report. We wish otherwise. We suggest the Commission instead propose a proxy resource value for solar that is within the range set by the studies, with emphasis on the more credible studies. The proxy value, we suggest, should be about 12 cents with environmental benefits and about 10 cents without environmental benefits. Further explain to the Legislative Assembly why the Commission believes environmental benefits of renewable energy are “Not Applicable” (in the words of the Draft Report, Table 5.1), and suggest it is a policy matter for the Legislature to determine how environmental benefits should be considered.

The data from the utilities is not much different. PGE, PacifiCorp and Idaho Power all reported Solar Resource Values between 5.9 and 6.7 cents per kilowatt-hour, excluding in their calculations avoided transmission and distribution, fuel price hedging, capacity and environmental benefits. Adding the “typical” values for these excluded items to the utilities own numbers will get to the suggested proxy value of 12 cents per kilowatt-hour.

D. Chapter VI

Draft Report Chapter VI, “Evaluation of Solar Programs”, should be deleted. HB2893 did not ask for such an evaluation to be included in the report, and the evaluation in Chapter VI is more policy argument than careful research.

Table 6.1 (page 26) purports to list the Levelized Energy Cost in Cents/kWh for projects built under different programs (ETO, BETC, VIR, etc.). Levelized cost to ratepayers? No. Levelized cost to customers receiving the solar power? No. Levelized cost to any person or entity? No. It’s the levelized cost to society as interpreted by the PUC staff. In calculating these unusual exaggerated levelized costs, all solar incentives and tax credits are added, not subtracted, to get total costs. Table 6.1 says, in effect, that everything spent on solar is spent only to obtain electrons and wow, is that expensive. The Draft Report effectively concludes that no portion of the federal and state incentives granted to renewable power are for any of the following:

Encouraging a promising technology to grow and become more cost competitive;

Environmental benefits;

Health benefits;

Job creation experience with new energy technologies;

Hedge against increases in natural gas prices;

Concern for coal and gas harvesting practices;

Climate change;

Encouraging electric systems to be more distributed;

Economic development; or

Rural investment.

State and federal renewable energy legislation make it clear that the purpose of programs supporting renewable energy are those set forth above, not to acquire electrons. Instead, the Draft Report should acknowledge that the state and federal subsidies have been effective in realizing these benefits. Since 2009, utility scale solar has moved 80 percent of the way to grid parity.⁵

The Draft Report's unique and exaggerated levelized costs are also calculated incorrectly. These levelized costs not only ignore all tax credits and incentives, all environmental benefits and any REC value, they also ignore all property taxes, insurance, and operations and maintenance expenses.

Table 6.2 is even more misleading. It purports to give the "true impact of the program to ratepayers" (page 27, footnote 26). Table 6.2 says the "true impact" to ratepayers of the Feed-in-Tariff Pilot program in 2013 was 31 cents/kWh on a levelized basis. We know the last round of the solar VIR was 16-17.5 cents for medium and 23-49 cents for residential, flat for 15 years. After deducting the cost of electricity, the average cost of the VIR to ratepayers should be 15 cents or less. The 31 cent number is obviously wrong. The Draft Report is again adding back federal tax incentives to actual cost and concluding renewable energy has no benefit and environmental damage has no cost.

E. Chapter VII.

Our final point is on the Draft Report's conclusion that Oregon's solar programs cause cost shifts or cross subsidies. First, the Draft Report continues to be skewed in its conclusions about why the incentives were put in place. And while the incentives are realized by the solar participant, they are used to cover the cost of solar power. They are not profit or a windfall, they are a cost subsidy.

It should be apparent that everyone benefits from Oregon's solar success. Ever lower solar prices make solar more and more affordable for everyone. Oregonians value the environmental benefits of renewable energy whether the panels are in their yard or somewhere nearby.

And Oregonians are very concerned that energy policy makers not adhere blindly to the status quo of fossil fuel. Oregonians widely support incentives to encourage renewable energy. The Draft Report quotes testimony from PGE about its solar customers. We suggest the Draft Report should instead quote from PGE's customer survey included in its IRP filing about their eagerness for more renewable energy and their willingness to pay for it.

The question of recovery of utility fixed costs at page 38 of the Draft Report raises a difficult question that has not been well explored in Oregon and is hardly in shape for delivery to the Legislative Assembly. The PUC may wish to examine this question under a process where we don't face a severe time crunch. We suggest the discussion be removed from the Draft Report and noted for further consideration.

⁵ In 2009, larger solar in Oregon was about \$175/MWh. Today it is \$90/MWh or less. Grid parity is about \$70/MWh.

Next, we would like to turn to the subject of cost shift and whether there is a solar subsidy. We were surprised and disappointed the Draft Report repeatedly asserts without critical analysis that ratepayers who install solar panels to generate a portion of their electric needs are subsidized by ratepayers who do not. Frankly, there is not sufficient time for the complex issue to be adequately addressed before the final report is done. Even the Draft Report agrees that any such impact if it even exists, today, very small. There is no urgency in trying to establish whether there is and the magnitude of the cost shift.

It is important to emphasize this is a residential issue. Commercial, industrial and agricultural tariffs already charge for non-energy utility services on basis served from energy use.

A similar argument used to be made about conservation and energy efficiency that people who insulated their dwellings would thereafter purchase less electricity and “hurt” the other ratepayers. We got past that when we better understood the dynamic nature of the utility system and the benefits to be derived to the entire system and all of its ratepayers from reduced energy use.

Relative energy use in households changes all the time. Houses are expanded. Kids are born, grow up, move out and then move in again. A heat pump replaces a natural gas furnace. An air conditioner is added to a house for the first time. A swimming pool is installed. A plug-in vehicle is purchased. In each case a cost shift similar to the installation of solar panels occurs. If neighbors subsidize solar panels, then those neighbors are subsidized by the person who installs air conditioning or purchases a plug in vehicle.

And isn't the cost shift substantially covered by environmental benefits?

This “cost shift” question does not apply to the larger commercial and utility projects, so we are not going to drill down farther on this issue. But this was a pilot program and of course the initial costs of Oregon solar pioneering were high. What are your suggestions for promoting solar energy in a manner that is fair and efficient? After all, the PUC determines residential rate structure.

III. Technical Comments

Finally, some more minor editorial suggestions for the Draft Report:

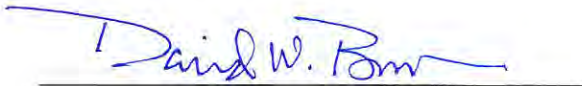
1. The last line on page 3 should be amended to read:
“to follow the sun as it travels, providing greater solar generation throughout the day, particularly in the summer.”
2. The second-line on page 7 should be amended to read: “Nearly all net metering participants in Oregon investor owned utility service territory received rebates from the ETO or participated in the VIR pilot program (where ETO rebates were not permitted).”
3. At the end of the second paragraph on page 9, add: “A sixth project with 5MW of capacity has been announced.”

4. The first line of the fourth paragraph on page 10 should be amended to read: “The incentive rate for residential systems...” And again in the third line: “Incentive rate for residential systems do now...”
5. Reference: page 14. In our experience, we do not consider supply chain costs or labor costs to be “soft costs”. We view the “hard costs” as panels plus balance of system, which is pretty much the EPC price.

Thank you for your consideration of our comments.

Respectfully,

Obsidian Renewables, LLC

A handwritten signature in blue ink that reads "David W. Brown". The signature is written in a cursive style and is positioned above a horizontal line.

David W. Brown

CERTIFICATE OF SERVICE

I hereby certify that I caused to be served the foregoing Comments of Obsidian Renewables LLC via electronic mail and, where paper service is not waived, via postage-paid first class mail upon the following parties of record:

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