

**BEFORE THE PUBLIC UTILITY COMMISSION  
OF OREGON**

**UM 1452**

In the Matter of	)	OPENING SUPPLEMENTAL COMMENTS
	)	OF OREGONIANS FOR RENEWABLE
PUBLIC UTILITY COMMISSION	)	POLICY REGARDING SOLAR PROJECT
OF OREGON	)	INSTALLED COSTS
	)	
Investigation into Pilot Programs to	)	
Demonstrate the Use and	)	
Effectiveness of Volumetric	)	
Incentive Rates for Solar	)	
Photovoltaic Energy Systems	)	

Oregonians for Renewable Energy Policy (“OREP”) submits the following recommendations regarding installed costs for solar PV projects that are to be used in the calculation of VIRs for Oregon's Feed-In Tariff pilot programs:

**1. Using Energy Trust of Oregon (“ETO”) vs. non-ETO data:**

We agree with RNP et al.'s statement in their motion to re-open the record that "To ensure the program's initial VIR reflects the most up-to-date range of installed costs, Staff needs a clear process by which it can receive updated installed-cost data and then provide that data to the Commission".

In OREP et al.'s February 2010 Joint Closing Comments (Page 23) we wrote: “We favor use of a market sector survey method for calculating the initial rates, in which the market price for inputs of a number of cost variables are taken into account, with generators and developers contributing cost information. A spreadsheet with accepted cost of generation factors should be adopted and input values for each cost factor should be determined. These cost input amounts should be reviewed periodically using the same market survey method. At each review, all cost input amounts should be entered into the spreadsheet and the tariff rate re-calculated. This will result in a new tariff rate that continues to closely match the real costs

of generation."

However, we disagree with RNP's belief that "the best process is for the Commission to ask the parties to provide supplemental comments on recent solar installed-cost data, and for Staff to revise its rate table to reflect a wider range of installed costs." Opening the door to cost data submitted by the parties to this rulemaking is problematic, not only because the parties do not represent the entirety of the solar industry in Oregon but unless the parties are all asked to submit the same data, what the parties choose to submit themselves is unlikely to be consistent or comparable.

In order to be useful, data collection must be done in an orderly and scientific manner, such as a carefully constructed and conducted market survey. Otherwise such data is anecdotal at best, likely to be from a skewed sample and of little value as an accurate survey of market conditions. We do not think it is possible for an accurate market survey to be accomplished by April 19th, the final date for reply comments.

For the future, we recommend the Commission engage a reputable market research firm (private for-profit or a public non-profit) to design and conduct scientifically sound market surveys of solar PV installed costs in Oregon. These surveys would gather and analyze solar PV cost data for use in the periodic VIR reviews required by AR538. Such a firm might also be asked to construct the broader surveys of Oregon's solar industry as the FIT pilot progresses, as called for in HB3039, and to prepare the head-to-head comparison of the FIT with Oregon's current tax credit and cash grant incentives. Possibilities based in Oregon include:

Eco Northwest Energy Consulting Division  
<http://www.econw.com/consulting/topics?topic=energy>

Community Service Center within the University of Oregon's Department of Planning, Public Policy and Management <http://cpw.uoregon.edu/index.cfm>.

Until such time as a reliable, objective and scientific process for collecting and analyzing installed cost data from non-ETO projects can be established, we believe it safest to use the installed cost data collected by the Energy Trust of Oregon, with references to broader collections of data by independent organizations.

## **2. Selecting Which ETO data to use.**

We believe VIRs for the initial FIT pilot launch should be based on historical ETO cost data that:

- Exists historically, and is not projected data.
- Is derived from complete quarters only, rather than from a partial quarter
- Is from ETO projects separated out by the four solar insolation zones described in Staff's February Closing Comments.
- Is from the 50th percentile of data rather than the 25th percentile. We are concerned that using data from the 25th percentile, as in Staff's February Closing Comments, will result in a VIR that is non-economic for 75 percent of those who might want to invest in solar PV. Using accurate and up-to-date cost data also decreases the risk of setting the rate too high, the justification for choosing the 25th percentile given in Staff's February Closing Comments (page 24).
- Excludes Solarize Portland cost data from the calculation of VIRs for individual residential projects <10 kW. To Include Solarize PDX data in the calculation of VIRs for individual residential projects will result in a VIR that makes those projects unaffordable outside of a bulk purchase arrangement.
- Collected from the most recent four quarters (prior 12 months) of ETO installed cost data. Staff's proposed rule calls for VIR reviews every six months. Basing VIR calculations on data from the prior 12 months would mean that at each review date, the new data set would add cost data from the most recent six months and delete data from the oldest six months (the first six months of the prior 12-month data set). For example, the initial VIR (which will take effect by July 1, 2010) would be calculated on data from the last three quarters of 2009 plus the first quarter of 2010. At the first scheduled review in December 2010, the VIR would be calculated on data from the last quarter of 2009 plus the first three quarters of 2010 and so on.

Recent ETO cost data show that installed costs for solar PV have both decreased and increased. In the 10-100 kW and >100 kW sizes, installed costs have risen and fallen

during the last four quarters. Such factors as a weak economy can cause a temporary supply glut and supply chain bottlenecks can cause temporary supply shortages.

Many feel that the recent downward trend in Oregon’s installed cost per watt is of temporary duration caused by a current oversupply in solar panels, temporary Chinese subsidies for their solar manufacturing industry and the current economic recession. This environment has caused a cutthroat environment where installers are low-balling bids in order to stay in business. When the current trends rebound, we are likely to see an increase in installed costs per watt in Oregon.

Over time, using cost data from a longer time period rather than a single quarter, would help soften the impact on rates from any sharp fluctuations in price that might occur in a given quarter, while still reflecting the longer term trends in costs.

In summary, we recommend that the Commission calculate the initial and subsequent VIRs for projects <10 kW using the 50th percentile of historical ETO installed cost data from projects separated by solar zones and from non-Solarize Portland projects completed in the most recent four quarters.

### **3. Recent Installed Cost Data Comparisons**

The most recent data OREP has received from the Energy Trust is set forth below in Table 1.

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## Table 1

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This data is problematic in that it includes only partial information for the first quarter of 2010. As noted, we believe it is best to use data from complete quarters. The data show only the average cost per watt, rather than the range of installed costs. We will assume that, given the shorter time period, there is less of a range in costs than in the collected 2008-2009 figures used by Staff and that the average figures reported are relatively close to the 50<sup>th</sup> percentile.

In addition, the data does not separate installed costs into the four geographic rate classes used by Staff in its Final Comments. In the 2008-2009 data used by Staff in its VIR calculations, installed costs varied by geographic area. For example, in the 0-10 kW size category, 25<sup>th</sup> percentile costs per watt ranged from \$6.99/watt in zone 4 to \$7.92/watt in rate class 1. (See Table 2.)

In order to set VIR rates for each rate class, installed cost data should be separated into the four rate classes, as labor and permitting costs appear to be higher in some zones than others. Survey data that does not include this information would not be as accurate and comprehensive as the historical data used by Staff in its February 2010 calculations. It is worth noting that Table 1's "Paid" costs for the 10-100 kW and >100 kW categories have

fluctuated and “Received” costs in the >100 kW have increased. These variations illustrate the peril inherent in using one quarter’s data and small sample sizes.

As we understand Staff’s calculations in its February 2010 Closing Comments, the Step 8 model run used installed cost data from the 25<sup>th</sup> percentile, zero risk premium, a total solar resource fraction of 90% and a panel degradation factor of .094% per year. Staff’s resulting installed costs and recommended VIRs are set forth in Table 2 below.

**Table 2**

<b>Rate Class</b>	<b>&lt;10 kW Cost</b>	<b>&lt;10 VIR</b>	<b>10-100kW Cost</b>	<b>10-100 kW VIR</b>
1	\$ 7.92	0.75	\$ 6.16	0.55
2	\$ 7.38	0.65	\$ 6.45	0.55
3	\$ 7.56	0.60	\$ 6.91	0.55
4	\$ 6.99	0.55	\$ 8.06	0.55

Table 3 sets forth the ETO “Paid” and “Received” installed costs for 2009, Q4 (the last full quarter’s data) and OREP’s calculations of the resulting VIRs using Staff’s methodology.

**Table 3**

	<b>&lt;10 kW Installed Paid 2009, Q4 Cost/Wat w/o Sola</b>	<b>&lt; 10 kW Cost/Wat w/ VIR</b>	<b>&lt;10 kW Installed Paid 2009, Q4 Cost/Wat w/ Sola</b>	<b>&lt;10 kW Cost/Wat w/ VIR</b>	<b>10-100 k Installed Paid 2009, Q4 Cost/Wa</b>	<b>10-100 k Cost/Wa w/ VIR</b>	<b>&gt;100 kW Installed Paid 2009, Q4 Cost/Wa</b>	<b>&gt;100 kW Cost/Wa w/ VIR</b>
<b>Zone 1</b>	\$ 8.00	\$ 0.77	\$ 7.77	\$ 0.75	\$ 7.43	\$ 0.62	\$ 6.78	\$ 0.54
<b>Zone 2</b>	\$ 8.00	\$ 0.71	\$ 7.77	\$ 0.69	\$ 7.43	\$ 0.57	\$ 6.78	\$ 0.50
<b>Zone 3</b>	\$ 8.00	\$ 0.65	\$ 7.77	\$ 0.64	\$ 7.43	\$ 0.52	\$ 6.78	\$ 0.46
<b>Zone 4</b>	\$ 8.00	\$ 0.61	\$ 7.77	\$ 0.59	\$ 7.43	\$ 0.48	\$ 6.78	\$ 0.42
	<b>&lt;10 kW Installed Received 2009, Q4 Cost/Wat w/o Sola</b>	<b>&lt;10 kW Cost/Wat w/ VIR</b>	<b>&lt;10 kW Installed Received 2009, Q4 Cost/Wat w/ Sola</b>	<b>&lt;10 kW Cost/Wat w/ VIR</b>	<b>10-100 k Installed Received 2009, Q4 Cost/Wa</b>	<b>10-100 k Cost/Wa w/ VIR</b>	<b>&gt;100 kW Installed Received 2009, Q4 Cost/Wa</b>	<b>&gt;100 kW Cost/Wa w/ VIR</b>
<b>Zone 1</b>	\$ 7.44	\$ 0.72	\$ 7.34	\$ 0.72	\$ 6.95	\$ 0.58	\$ 7.11	\$ 0.5
<b>Zone 2</b>	\$ 7.44	\$ 0.66	\$ 7.34	\$ 0.66	\$ 6.95	\$ 0.53	\$ 7.11	\$ 0.5
<b>Zone 3</b>	\$ 7.44	\$ 0.61	\$ 7.34	\$ 0.61	\$ 6.95	\$ 0.49	\$ 7.11	\$ 0.4
<b>Zone 4</b>	\$ 7.44	\$ 0.57	\$ 7.34	\$ 0.56	\$ 6.95	\$ 0.45	\$ 7.11	\$ 0.4

Comparing the recent ETO data indicates that “Paid” installed costs for 0-10 kW w/o Solarize have decreased 4% from 2009, Q4 to 2010, Q1, while “Received” installed costs for the same category and time periods have decreased 3.76%. The 2009, Q4 “Paid” figure is actually higher than the \$7.92 figure used by Staff. Using the 2009, Q4 figures results in very little change in the VIRs for the 0-10 kW category in all four rate classes, three cents/kWh in rate class 1 being the largest change.

However, for the 10-100 kW category, the 2009, Q4 “Received” cost figures reported by ETO result in a VIR decrease of 6 cents a kWh in zone 3 and 10 cents/kWh in zone 4.

The cost of solar modules has come down during the last 2 years. Whether this downward trend will continue and for how long is uncertain. Other fixed costs, which include all of the costs that go into running a healthy business, equal approximately 43% - 53% of the entire installed cost. These costs trend upward over the long term. Labor costs have been

depressed and this has contributed to the downward trend. However, with the new statewide solar code, permitting and engineering costs for solar PV systems will likely increase. The industry needs stability in order to be sustainable. We recommend a longer view than a quarter-by-quarter snapshot and reaction.

#### **4. Perspective Beyond Oregon**

RNP's motion seeks to have staff review a wider range of installed costs in the process of setting rates. For perspective, we set forth references to the incentive program in Washington State, the April 2010 Solar Electricity Global Benchmark Prices Indices of Solarbuzz and the "Designing an Effective Feed-in Tariff for Greater Los Angeles" report of the Los Angeles Business Council Study and the UCLA Luskin Center for Innovation School of Public Affairs.

##### **4.1 Washington Renewable Energy Production Incentives:**

[http://www.dsireusa.org/incentives/incentive.cfm?Incentive\\_Code=WA27F&re=1&ee=1](http://www.dsireusa.org/incentives/incentive.cfm?Incentive_Code=WA27F&re=1&ee=1)

Washington State offers a production-based incentive for electricity production by solar photovoltaic systems. The incentives apply to power generated as of July 1, 2005, and remain in effect through June 30, 2020.

The incentive amount paid to private producers starts at a base rate of \$0.15/ kilowatt-hour (kWh) and is adjusted by multiplying the incentive by the following factors:

- For electricity produced using solar modules manufactured in Washington state: 2.4
- For electricity produced using a solar generator equipped with an inverter manufactured in Washington state: 1.2

These adjustments are additive, yielding a maximum rate of \$0.54/ kWh for systems using both solar modules and inverters manufactured in WA.



The base rate for community projects (defined as solar energy systems up to 75 kilowatts that are owned by local entities and placed on local government property or owned by utilities and funded voluntarily by utility ratepayers) is double the private rate, leading to rates ranging from \$0.30/kWh for systems built with out-of-state components to \$1.08/kWh for systems using both solar modules and inverters manufactured in WA. (Note that the Rulemaking for the Community Projects incentive is still in progress.)

Note that these production rate incentives are in addition to net metering. That is to say, producers are paid on the actual production of the solar panels regardless of the fact that the energy produced may be entirely used by the producer's home or business for free. The effective payment to the producer is thus equal to the incentive plus the avoided cost of purchasing the energy. This adds between 4 and 8 cents to the rate depending on the location and amount of energy purchased.

Ownership of the renewable-energy credits (RECs) associated with generation remains with the customer-generator and does not transfer to the state or utility. The Northwest Solar Cooperative will purchase these RECs at a price of \$0.02/kWh.

Other utility based incentives and loans are available in Washington State and are not excluded by the production incentive rate. For example, Clallam County PUD, Richland Energy Services, Snohomish County PUD, and Franklin County PUD all offer a rebate of \$500 per kilowatt (kW-DC) of installed capacity. Klickitat County PUD offers \$400 per kilowatt (kW-DC) of installed capacity. Clark, Franklin, Klickitat, Port Angeles, and Snohomish PUDs offer loan programs for purchase of solar PV with interest rates ranging

from 2.9% to 5.25%. There are limits on the system sizes for these additional incentives and loans.

Finally, Washington producers have access to federal incentives and grants. Anecdotal evidence indicates inverters manufactured in Washington have not been available, solar modules manufactured in Washington are limited and that the Washington incentive program has not experienced widespread participation.

#### **4.2 Solarbuzz.com**

##### **Solar Electricity Global Benchmark Price Indices April 2010 Survey Results.**

<http://www.solarbuzz.com/SolarIndices.htm>

While this link provides no Oregon-specific information, it provides tools which may provide global perspective. Their data indicate that solar module costs have on average decreased by 15 cents/watt, or 3.4% in the past six months, and by 51 cents/watt or 10.7% in the past twelve months. The six-month decrease is similar to the 3.76-4.0 percentage change from the ETO 2009, Q4 to 2010, Q1 figures discussed at p.6 - p.7 above.

#### **4.3 UCLA Luskin Center for Innovation, School of Public Affairs/Los Angeles Business Council Study “Designing an Effective Feed-in Tariff for Greater Los Angeles”**

[Designing an Effective Feed-In Tariff for Greater Los Angeles](#)

This study, released in April 2010, reviews Feed-in Tariff designs and lessons learned in Germany, Spain, Ontario, Gainesville, Vermont and Sacramento. At page v of the Executive Summary, the authors conclude: “Some programs have been very successful in generating renewable energy and creating green jobs while others have not. Those places that have successful programs have set their tariffs based on the actual cost of installing and operating solar plus a reasonable rate of return.” They note that “[i]n December 2009,

installed cost indexes ranged from \$4.63 per watt for a large industrial system to \$8.44 per watt for a small residential system.<sup>10</sup>,

The report is well worth reading for its perspectives on net-metering, tax incentives and renewable portfolio standards.

Most significantly for Oregon, the report notes how the initial tariffs in Germany and Ontario were inadequate to stimulate deployment of solar PV projects and had to be increased dramatically in order to become effective. At page 21, in discussing the results of Ontario's revisions to its original program ("RESOP") which had a single, undifferentiated solar tariff of .40 USD, the authors conclude: "The difference between the RESOP and the REFiT program (which raised the FiT to .76 USD for solar projects under 10 kW) highlights how important it is to address the concerns of smaller owners if widespread participation is a program goal."

In their conclusions, at page 47 the authors say: "A tariff that covers the producer's costs and provides a reasonable rate of return is essential for inducing widespread solar participation in a FiT. . . In Europe, FiTs did not experience significant solar participation until cost-based tariffs were implemented. Under the near-term market conditions, neither California nor Los Angeles will experience widespread solar participation with value-based tariffs."

At page 44, the authors write: "The are two important perspectives from which administrators must estimate participation. **First, administrators must evaluate the**

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<sup>10</sup> Solarbuzz.com, "Solar Electricity Benchmark Price Indices," Accessed on December 12, 2009, Available at <http://www.solarbuzz.com/Moduleprices.htm>.

**attractiveness of the program for the solar owner’s perspective.** (emphasis added) A cash flow model built to industry standards is the most effective way to accomplish this. This technique must be applied to each market segment.”

## **Conclusion**

Oregon’s PUC should use accurate, reliable installed cost data in setting its volumetric incentive rates. In doing so, however, it should not overlook the experience of administrators and scholars elsewhere, which teaches that the VIRs must be attractive to solar owners by covering the producer’s costs and providing a reasonable return on investment. To set rates which are inadequate to do so is to fly in the face of experience and invite failure of the pilot programs.

DATED this 9th day of APRIL 2010.

OREGONIANS FOR RENEWABLE ENERGY POLICY

*/s/Mark E. Pengilly*

**CERTIFICATE OF SERVICE**

I certify that I have caused to be served the foregoing OREGONIANS FOR RENEWABLE ENERGY POLICY'S OPENING SUPPLEMENTAL COMMENTS REGARDING SOLAR PROJECT INSTALLED COSTS (AMENDED), PUC Docket No. UM 1452, by electronic mail to the PUC Service list as of this date.

Dated this 12th day of April, 2010.

/s/ Mark E. Pengilly