

Introduction

In 2015, the Oregon Legislature passed House Bill (HB) 2941 requiring the Public Utility Commission of Oregon (Commission) to evaluate Oregon programs that incentivize the development and use of solar photovoltaic (PV) energy systems and recommend the most effective, efficient and equitable approach to incentivizing the development and use of solar PV energy systems in this state. HB 2941 specifies that in developing its recommendations, the Commission must consider the following factors:

- the resource value of solar energy;
- how to minimize confusion and transaction costs for persons who participate in programs that incentivize the development and use of solar photovoltaic energy systems;
- the costs borne by persons who do not participate in programs that incentivize the development and use of solar photovoltaic energy systems;
- the commission's study of the effectiveness of programs that incentivize the development and use of solar photovoltaic energy systems prepared pursuant to section 4, chapter 244, Oregon Laws 2013;
- the costs and benefits of each program that incentivizes the development and use of solar photovoltaic energy systems; and
- any other factors deemed relevant by the Commission.

HB 2941 directs the Commission to recommend, for each program evaluated, whether the programs should be discontinued, continued without change, or continued with modifications. The Commission must submit a report with its recommendations to the legislature no later than September 15, 2016.

Context and Other Factors used for Examination

We offer our evaluation of and recommendations about these programs in the context of recent legislation and the current energy landscape.

For more than 30 years, Oregon has provided incentive programs to encourage the development of solar PV systems. These programs, which were enacted in piecemeal fashion at different times with different goals, offer an array of ratepayer- and taxpayer-funded incentives administered by various agencies and a third-party non-profit. While these programs have been in place, competition among power producers has grown;

the number of suppliers has increased; and testing and analytical evaluation of pilot programs, business models, and incentive delivery methods has occurred.

In 2016, the Legislative Assembly adopted sweeping new energy legislation that makes renewable energy the generating resource of choice in Oregon. Most significantly, the legislature doubled the Renewable Portfolio Standard (RPS) targets for the state's two largest utilities. By 2040, these utilities must meet 50 percent of their retail Oregon electric load with renewable resources, including solar. The legislature also enacted other incentives and mandates to spur further renewable energy development, including establishing community-solar programs, creating incentives to support the development of qualifying solar PV systems sized between 2 and 10 megawatts (MW), and mandating community-based, small-scale renewable and biomass combined heat and power projects account for eight percent of total aggregate electrical capacity.

The increased RPS targets and incentives are in addition to Oregon's existing renewable hydropower resources, which currently generate approximately 40 percent of the electricity used in the state.¹ The recent legislation and significant existing hydropower resources will ensure that all Oregonians will use an ever increasing amount of renewable energy as part of their electricity consumption.

Additionally, solar energy is now a well-supported and a relatively robust industry in Oregon. Many of the solar incentive programs were introduced in a paradigm that has since changed. Large-scale solar and wind facilities, once the most expensive energy sources available, are considerably less expensive. In the most recent legislative session, Pacific Power testified to the House Committee on Energy and Environment that solar and wind energy cost the company less on a life-cycle energy basis than energy generated from either coal or natural gas.² The reality that solar, along with wind, has become less expensive is a strong economic incentive in and of itself to solar development, lessening the need for additional financial incentives.

¹ A portion of which qualifies for the RPS including low-impact certified facilities, eligible incremental efficiency gains, and new hydropower built after Jan. 1, 1995.

² Scott Bolton, from PacifiCorp, presented a slide presentation on HB4036 analysis on 2/2/2016 to the House Subcommittee on Energy.

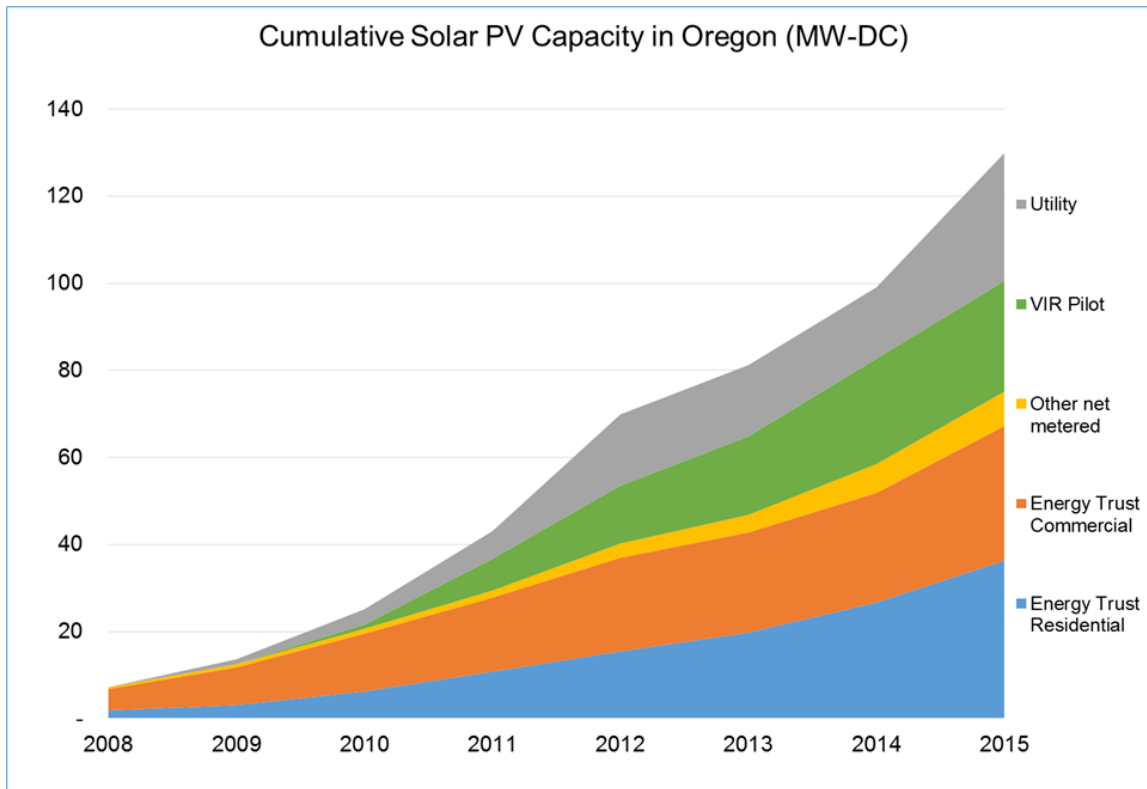


Figure 1: The growth in cumulative solar PV capacity in Oregon since 2008. Source: Energy Trust of Oregon

When several of the incentives in this report were created there was little diversity in our electricity resource mix and solar energy development was limited. Because of this, the solar incentive programs were aimed at covering and reducing the above market costs of solar. Since then, solar energy generation has grown rapidly, with more than 10,000 solar PV systems in the state exceeding 120 MW-dc in installed capacity (Figure 1).

During this growth in electricity resource diversity, the cost of installed solar PV systems has fallen (Figure 2) and this trend is predicted to continue as the solar industry further

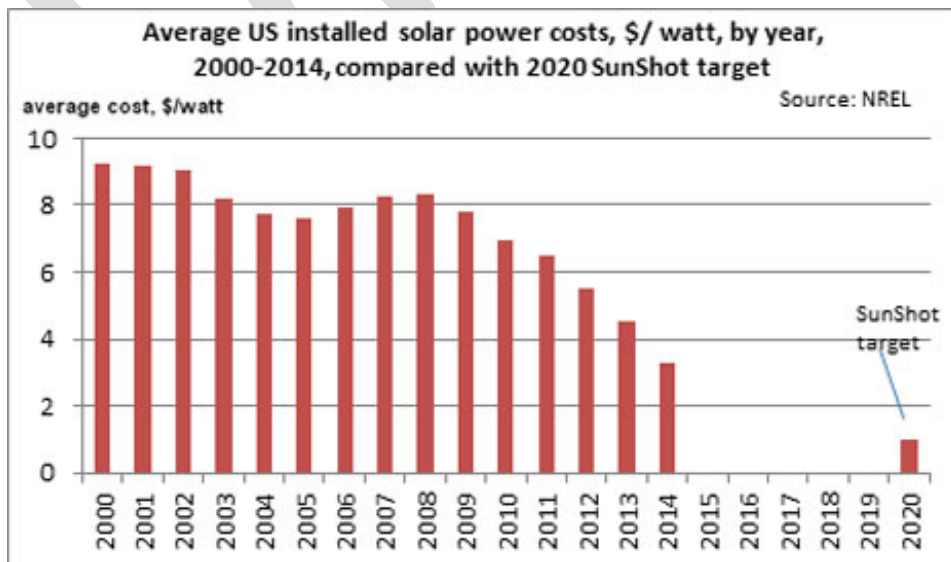


Figure 2: The average solar power costs per year since 2000. Source: the National Renewable Energy Lab.

matures.

At the same time, the Oregon Department of Energy (ODOE), which houses a significant number of the state-run energy incentive programs, is undergoing a programmatic review by the Legislature and the Governor's Office. The Governor's findings, issued at the end of June, recommended allowing the current incentive programs to sunset at the end of 2017.³ The Joint ODOE Oversight Committee will report its recommendations on or around Nov. 1, 2016.

These conditions lead us to five additional factors considered during our review of state's solar incentive programs. First, we offer no recommendations on the programs recently adopted or revised by the 2016 Legislative Assembly. These programs include the RPS and Community Solar (SB 1547), and the Business Oregon Incentive Program (HB 4037). There is not adequate data to develop an analysis around the effectiveness, efficiency, and equity of these programs.

Second, the broad scope of our evaluation of solar incentives is narrowed by the recognition that renewable energy has a strong presence in Oregon and will soon be the state's primary generating resource. Increased RPS mandates combined with the region's significant hydropower supply will ensure that renewable energy plays a dominant role in powering the homes and businesses of all Oregonians—regardless of what additional incentives are offered to promote solar energy. This increase in resource diversity as part of our electricity resource mix further reduces the need to provide financial incentives.

Third, in determining the future landscape of solar incentives, we must recognize the relative maturity of the solar energy business. Many of the incentives discussed in this report were created at a time when there was little solar energy development and solar PV systems were among the most expensive forms of generation. That is no longer the case today, as the installation of solar arrays continue to grow and costs of solar PV systems continue to fall. Solar incentives should adapt and evolve with this changing landscape.

Fourth, in considering the state's incentive programs we divided them into two groups: those funded by the ratepayers of regulated utilities and those funded more broadly by state taxpayers. This distinction is important because programs funded by the ratepayers of regulated utilities are not available to all Oregonians; they are limited in their reach to customers of regulated utilities. By contrast, taxpayer-funded programs

³ http://media.oregonlive.com/politics_impact/other/ODOE%20Oversight.pdf

can be made available to all Oregonians, regardless of their energy provider. Ratepayer-funded incentive programs are regulated by the Commission, while taxpayer-funded programs are administered by a variety of state agencies or local jurisdictions.

Fifth, in light of the programmatic review of ODOE and its incentive programs, the Commission offers no recommendations on the specific design of state incentives to boost solar PV installations.

In drafting our recommendations, we considered the factors outlined in HB 2941 and the five factors identified above to develop the following principles:

- Ratepayers should not subsidize solar PV installations where there are no above-market costs. Owners of solar PV projects should receive compensation that reflects the value of solar to the utility systems and utility ratepayers, including the environmental value of solar generation that helps meet any state and federal carbon emission mandates.
- Subsidies and incentives aimed at social and economic development benefits—such as jobs, health and environmental quality—should be funded by state taxpayers rather than a narrow class of utility ratepayers.

Oregon's incentive programs

Oregon began promoting the use of alternative energy in the late 1970s and the 1980s through the Small-Scale Energy Loan program, the Business Energy Tax Credit (BETC), and the Residential Energy Tax Credit (RETC). In 1999, the State required utilities to offer net energy metering to customer-generators. The legislature also passed SB 1149, which among other things imposed a public purpose charge on all retail customer bills to fund energy savings, renewable energy, and low-income programs benefitting the utility system and its ratepayers. A percentage of the revenues collected through the public purpose charge are dedicated to incenting the development of renewable resources. In 2007, the State adopted a renewable portfolio standard which required Oregon utilities serve certain percentages of their retail load with electricity generated by eligible renewable sources, including solar photovoltaic (PV) and solar thermal systems.

In 2009, the Oregon Legislature required the Commission to implement Volumetric Incentive Rate Pilot programs for PacifiCorp, Portland General Electric, and Idaho Power. These pilots were designed to test the use and effectiveness of incentive electricity rates as an inducement to develop solar PV systems. The legislature also

established the Solar Capacity Standard requiring PGE, PacifiCorp, and Idaho Power Company to acquire a combined total of 20 MW of capacity from solar PV systems between 500 kilowatts (kW) and five megawatts in size by 2020.

The legislature created the Renewable Energy Development (RED) Grant program in 2010 and in 2011 established a sunset date for BETC program. As discussed in 2016, the legislature doubled the RPS and directed the Oregon Business Development Department (“Business Oregon”) to implement a new incentive program available only for solar generation.

Programs Reviewed

In our review, the Commission identified the following programs that incentivize solar, whether through a must-purchase requirement, mandate or financial incentive, in Oregon:⁴

Current Programs:

1. Solar Net Energy Metering
2. Residential Energy Tax Credit (RETC)
3. Renewable Energy Development Grant (RED)
4. Small-Scale Energy Loan (SELP)
5. Renewable Portfolio Standards (RPS)
6. Public Utilities Regulatory Policy Act (PURPA)
7. Energy Trust of Oregon Solar Program (Energy Trust)
8. Rural Renewable Energy Development Zone (RRED)
9. Property Tax Exemption for Alternative Energy Systems
10. Fee In Lieu Of Property Tax

Programs Not Yet Implemented:

11. Resource Value of Solar Investigation (RVOS)
12. Community Solar
13. Solar Incentive Program

Programs Expired or Expiring:

14. Business Energy Tax Credit (BETC)
15. Volumetric Incentive Rate Pilot (VIR)

⁴ Further description of each renewable incentive programs adopted between 1978 and 2016 can be found in Appendix A.

Several of the programs initially identified by the Commission underwent changes during the 2016 Legislative Session, are currently undergoing programmatic reviews, or are ongoing “must-purchase” federal or state requirements. This reduced the number of programs reviewed by the Commission in several ways.

First, the Commission does not provide recommendations on new or amended programs where no data is available. This eliminated our inclusion of an analysis of the Resource Value of Solar, Community Solar, the new Renewable Portfolio Standard, or the newly adopted Solar Incentive Program (HB 4037). Second, the Commission does not provide a specific recommendation on programs currently undergoing review by the Legislature and Governor’s Office. These include: the Small-Scale Energy Loan, RED, and RETC. Rather our review was limited to the recommendations on the benefits taxpayer funded programs can provide. Third, we did not include federal programs since the Commission and Legislature have no authority to make changes on the structure of these programs. This eliminated the Public Utilities Regulatory Policy Act from our review. Finally, the Commission makes no recommendations on programs that have already expired with the understanding that the Legislature found it appropriate to allow these programs to expire. This eliminated our review of BETC and VIR.

For our review and recommendations this left: solar Net Energy Metering (NEM), the Energy Trust of Oregon Solar Program and taxpayer funded programs generally (including RETC, SELP, RED, RRED, property tax exemptions for alternative energy systems, and the in lieu of property tax exemptions).

Combining Incentive Programs

Several of the reviewed incentive programs can be combined to fund different aspects of a project and working together, they bring down the total cost of installing solar. For example, a residential customer could receive the Federal solar investment tax credit, the RETC, an Energy Trust incentive, and enroll as a net-metering customer of their utility (Figure 3).

Analyzing the effectiveness and efficiency of each of these individual incentives is difficult. There is no quantitative way to determine which program had the greatest impact or was the reason a project occurred. Therefore, it would be difficult, if not impossible, to attribute specific amounts of energy or capacity developed to a specific incentive which can be combined with other programs.

The Commission makes the following observations on the impact of combining

Figure 3: Allowed Program Combinations

	Net Metering (NM)	Energy Trust of Oregon Incentives (ETO Solar)	Oregon Residential Energy Tax Credit (RETC)	Renewable Energy Development (RED) Grant
Net Metering (NM)		Yes	Yes	Yes
Energy Trust of Oregon Incentives (ETO Solar)	Yes		Yes	Yes
Oregon Residential Energy Tax Credit (RETC)	Yes	Yes		No
Renewable Energy Development Grant (RED)	Yes	Yes	Yes	
All are eligible for federal Investment Tax Credit				

incentives. First, these programs are from mixed funding sources, that is both taxpayers and ratepayers contribute to projects to make them happen. Second, while the impact

of combining incentives may make more projects occur, there is no way to determine the individual impact of each program; this is most prevalent in the overlap between the Energy Trust solar program, NEM and RETC. Due to different data tracking systems, individual projects cannot be cross-referenced to understand the effect of an individual incentive has on the project. Third, we may be providing funds to projects that would have been completed with use of one program, but because these programs can be combined a project could be over-compensated. Because of this the Commission can only draw general conclusions about the effectiveness and efficiency of individual programs, not specific analysis.

Program Analysis

As mentioned, a significant portion of these programs have either expired, been eliminated or undergone significant changes during the 2016 Legislative Session. Below, we offer our recommendations and findings on the identified remaining programs which meet the criteria developed by the Commission. These programs include: solar net-metering, the use of the Energy Trust Solar Program, and taxpayer funded incentives generally.

In our findings, we examine current programs and describe how existing programs are structured, the impact of these programs on solar generation in Oregon, whether non-participating customers are paying a portion of those costs, and other relevant factors identified to the Commission.

Findings and Recommendations

Ratepayer Programs

Ratepayer funds are those that are provided by the states' utility customers. They can be assessed through energy rates or as an added charge on a customer's bill. Use of these funds is limited to only the customers of utilities participating in the relevant programs. This also means that not all Oregonians can receive the benefits of participating in ratepayer funded programs. In the case of solar NEM, customers of consumer owned utilities can also participate; however, the Commission's authority extends only to the state's investor owned utilities. Our recommendations are made with these conditions in mind.

The Commission identified the following ratepayer funded programs that should be reviewed for their effectiveness, efficiency and equity: solar NEM and the public purpose charge. The Commission has included information about the volumetric incentive rate, the RPS, and the solar capacity standard in the Appendixes.

Solar Net Energy Metering

The solar NEM program has promoted the installation of solar PV in Oregon with nearly 10,000 projects installed in PacifiCorp, Idaho Power and PGE service territory. Projects enrolled in solar NEM within these territories account for more than 80,000 kW of installed capacity, reducing the amount of capacity that must be otherwise acquired by the utility. These projects likely also received additional funding from state, Energy Trust and federal programs. These numbers represent the total capacity of the projects and not the proportional share funded by NEM.

Year	PacifiCorp		PGE		Idaho Power		Total	
	Number of Systems	kW	Number of Systems	kW	Number of Systems	kW	Number of Systems	kW
To 2008	602	2,605	128	3,341	2	11	732	5,957
2009	250	1,612	269	4,019	1	2	520	5,633
2010	519	5,483	744	5,141	1	13	1,264	10,637
2011	611	5,187	780	4,673	1	100	1,392	9,960
2012	782	5,201	794	5,207	2	19	1,578	10,427
2013	565	8,531	516	4,069	2	13	1,083	12,613
2014	548	7,702	849	4,814	4	208	1,401	12,724
2015	592	5,229	1,270	9,979	9	178	1,871	15,385
Total 2002-15	4,469	41,550	5,350	41,243	22	544	9,841	83,337

Figure 4: The number and size of solar net energy metering facilities installed by Oregon utility.

Program Overview

Solar net energy metering has been available to Oregon customers of consumer- and investor-owned electric utilities since 1999. It allows a customer to offset energy use with solar energy generated on-site. The customer enters into an agreement with the utility to interconnect solar generation to the grid. At times when solar generation exceeds usage, the customer's meter runs "backwards." If the customer's solar generation exceeds their household use for the entire billing month, the customer receives a kilowatt hour (kWh) credit that they can apply to their electric bill in future months. In March of every year, the excess kWh carried over from previous months are credited to utility low-income programs. Residential systems are "capped" at 25 kW in size, and commercial systems are capped at 2 MW. A properly sized net energy metering installation can offset the volumetric (per kWh) charges on the customer's electric bill completely. Net metering programs are administered by the utilities.

For the ratepayers of Oregon's regulated utilities, NEM has been a well utilized program exceeding the cap set by the Legislature. Under ORS 757.300(6), the obligation to provide NEM may be limited by the Commission once cumulative generating capacity of NEM facilities reaches one half of one percent of a utility's historic single-hour peak-load. As of the end of 2015, PGE NEM customers account for 1.05% and PacifiCorp NEM customers account for 1.36% of their respective historic single-hour peak-load.⁵

As the popularity of solar NEM grows, the current model for the solar NEM program may become unsustainable given the potential for cost shifting when the value of solar energy is less than or more than the utility's retail rate. NEM customers pay the utility's volumetric rates only for the *incremental* amount of energy they consume above the amount the customer generates.

Cost Allocation

Residential rates are designed to recover much of the utilities' fixed costs for generation, transmission, and distribution infrastructure through volumetric rates. Customers that offset a portion of their monthly usage by producing their own energy end up purchasing less energy from the utility and therefore pay less of the utilities' fixed costs directly.⁶ This increases volumetric rates for all customers; however, the loss of the fixed costs could correspond to the value to the utility system that the solar system provides. However, the value that these solar projects provide to the utility system has yet to be quantified.

⁵ Data is from Reports (RE) filed by PGE and PacifiCorp to Oregon Public Utility Commission as RE 39 and RE 45.

⁶ It is possible that if the value of the solar energy exceeds the utility's retail rate, the cost shift may be reversed, from non-NEM customers to NEM customers.

Under the “resource value of solar” (RVOS) study the Commission is conducting an investigation to determine the methodology the Commission should use to determine RVOS.⁷ The methodology will provide means to value solar generation, whether it is from a solar farm or rooftop array, taking into account elements such as the distribution, transmission and generation costs the utilities would avoid by purchasing the solar generation.

Recommendations

To address the potential for cost shifts in the NEM Program, the Commission recommends a “Solar Metering Program” that values energy generated by a customer and used to offset the electricity delivered to the customer using the location and utility specific RVOS. Rather than netting generation against consumption and applying the netted value to the utility’s volumetric rates, as is currently done as in the NEM program, a crediting value of the generation energy would occur on the customer’s bill. A solar metering customer would be charged the volumetric retail rate for energy delivered to the customer. However, the customer would be allowed to offset the charges with the value of the energy the customer generates.

Figure 5 uses fictional rates to illustrate the different programs. It shows a typical residential home with no solar, with traditional net energy metering, and two possible RVOS rates, \$.08/kWh and \$.10/kWh. Depending on the calculated RVOS customers may or may not see a change in their monthly bill. However, the use of RVOS will ensure that unquantified cost-shifting does not occur to non-participating customers, while participating customers will receive a financial benefit for the value their solar system provides to the utility system.

⁷ Docket No. UM 1716

Similar to current NEM any excess credit would be rolled over to the next billing period. To the extent any excess credit remains at the end of a 12-month billing period, the credit would be donated to the utility's low-income assistance program.

		<u>Case 1</u>	<u>Case 2</u>	<u>Case 3</u>	<u>Case 4</u>
		<i>Net</i>		<i>Solar</i>	<i>Solar</i>
		<i>No Solar</i>	<i>Metering</i>	<i>Metering,</i>	<i>Metering</i>
				<i>RVOS 1</i>	<i>RVOS 2</i>
On site consumption	kWh	1,100	1,100	1,100	1,100
Solar generation	kWh	0	600	600	600
Net energy supplied	kWh	1,100	500	--	--
Utility Charges					
Customer Charge	\$10/month	\$ 10	\$ 10	\$ 10	\$ 10
Variable Energy Charge	\$0.03/kWh	\$ 33	\$ 15	\$ 33	\$ 33
Fixed cost energy charge	\$0.02/kWh	\$ 22	\$ 10	\$ 22	\$ 22
Delivery charge	\$0.04/kWh	\$ 44	\$ 20	\$ 44	\$ 44
Utility Credit					
RVOS credit 1	\$0.08/kWh	--	--	\$ 48	--
RVOS credit 2	\$0.10/kWh	--	--	--	\$ 60
Utility Bill to Customer		\$ 109	\$ 55	\$ 61	\$ 49
<i>Net Metering Cost-Shift at Different Example RVOS Rates</i>					
1. If RVOS = RVOS 1, \$0.08/kWh		\$ 6			
2. If RVOS = RVOS 2, \$0.10/kWh		\$ (6)			

The Commission proposes that all existing NEM customers be allowed to continue with traditional net energy metering, and those new NEM customers with solar generation be required to use Solar Metering. However, if existing NEM customers make modifications to the site or the installed panels that increase the solar output of the entire array, then the net metering customer would convert to a Solar Metering Program. Included as part of this change, the customer will be compensated for the location specific value their solar installation provides to the utility system.

The Commission anticipates that it will adopt a methodology for determining RVOS later in 2016 and expects that by early 2017, a separate RVOS will be established for each

investor-owned utility. Implementation of the Solar Metering Program would follow thereafter.

Energy Trust of Oregon Solar Incentive Program

Energy Trust incentives have been used to increase the capacity of solar PV in the state. Since 2002, using ratepayer funds Energy Trust has funded more than 9,000 solar PV projects investing more than \$87 million to increase installed capacity by more than 83,000 kW. These projects likely also received additional funding from state and federal programs. These numbers represent the total capacity of the projects and not the proportional share funded by the public purpose charge.

Year	Number of Projects	Capacity Installed kW	Annual Energy kWh	Total Installed Cost	One-Time Incentive
2002	1	22	21,500	\$ 267,000	\$ 167,000
2003	76	315	353,228	\$ 2,035,050	\$ 917,865
2004	119	539	665,244	\$ 3,303,913	\$ 1,498,064
2005	95	351	416,576	\$ 2,319,232	\$ 917,720
2006	141	590	685,486	\$ 4,628,210	\$ 1,022,429
2007	220	1,094	1,210,216	\$ 9,389,182	\$ 1,929,047
2008	255	3,915	4,122,661	\$ 31,884,936	\$ 5,415,626
2009	481	6,095	6,190,416	\$ 44,307,115	\$ 8,293,774
2010	1,205	9,780	10,440,234	\$ 64,520,465	\$ 12,855,988
2011	1,331	11,112	11,540,975	\$ 69,109,492	\$ 14,221,714
2012	1,244	19,186	26,168,608	\$ 93,702,699	\$ 17,383,141
2013	881	5,806	5,717,209	\$ 27,120,915	\$ 4,219,049
2014	1,292	9,065	9,145,152	\$ 39,453,174	\$ 6,965,474
2015	1,802	15,378	15,252,452	\$ 60,111,724	\$ 11,441,810
Residential Total	8,179	36,308	35,976,347	\$ 194,887,363	\$ 39,978,962
Commercial Total	949	30,558	31,608,300	\$ 176,509,359	\$ 33,296,317
Utility Total	15	16,382	24,345,311	\$ 80,756,387	\$ 13,973,424
Total 2002-15	9,143	83,247	91,929,957	\$ 452,153,109	\$ 87,248,703

Figure 6: Energy Trust of Oregon Solar Incentives from 2002-2015. Source: Energy Trust of Oregon

Program Overview

Energy Trust has administered the solar incentive program for PGE and PacifiCorp customers since 2002. Per SB 1149, public purpose charge funds for renewable

energy projects must be allocated toward the above-market costs of new renewable energy resources.⁸ Accordingly, Energy Trust has developed its solar incentive program to fund a portion of the above-market cost of solar projects. Under the solar program, Energy Trust has also developed programs aimed at reducing solar soft costs and its Trade Ally program which is a network of solar professionals who are approved to install projects which receive an Energy Trust incentive.

Oregon Administrative Rule defines above-market cost for new renewable energy resources as, "...the portion of the net present value cost of producing power (including fixed and operating costs, delivery, overhead, and profit) from a new renewable energy resource that exceeds the market value of an equivalent quantity and distribution (across peak and off-peak periods and seasonality) of power from a non-differentiated source, with the same term of contract."⁹

Energy Trust adjusts the rebates periodically to reflect decreases in the total installation costs and any changes to state or federal tax credits. Through its adjustment process Energy Trust determines the above-market cost for an average project assuming all incentives available are captured. Then Energy Trust calculates the appropriate incentive for its standard offering. Custom incentive offerings are calculated on an individual basis. As part of this calculation Energy Trust considers the net present value of all acceptable project costs and revenues; and a range of appropriate returns on investment for the project developer.

Cost Allocation

As a technology or sector matures and commercializes the associated above-market costs generally decrease and state and federal tax credits persist. Following this trend, the above-market costs for solar PV have declined over the past five years as the technology costs have fallen. Figure 7 illustrates this cost trend in Energy Trust's residential PV market. As costs decline and funding resources remain available, the above-market costs fall. However, continuation of this trend depends on the availability of all current incentives including the RETC, since the availability of current incentives is included in the calculation of the above-market cost.

⁸ A little more than 17 percent of public purpose charge funding is dedicated to renewable energy.

⁹ http://arcweb.sos.state.or.us/pages/rules/oars_800/oar_860/860_038.html Energy Trust also provides a simplified definition of above-market cost at <https://energytrust.org/shared-resources/info/above-market-costs.aspx?src=renewable-energy>

Figure 7 also demonstrates how Energy Trust constructs its incentives to provide incentive payments only on the above market costs of solar PV systems above and beyond what may be provided by other programs. This graph also demonstrates the forecasted decline of above-market costs. If the trend projected in Figure 7 continues, there may no longer be above-market cost of residential solar installations for Energy Trust to fund as early as 2018.

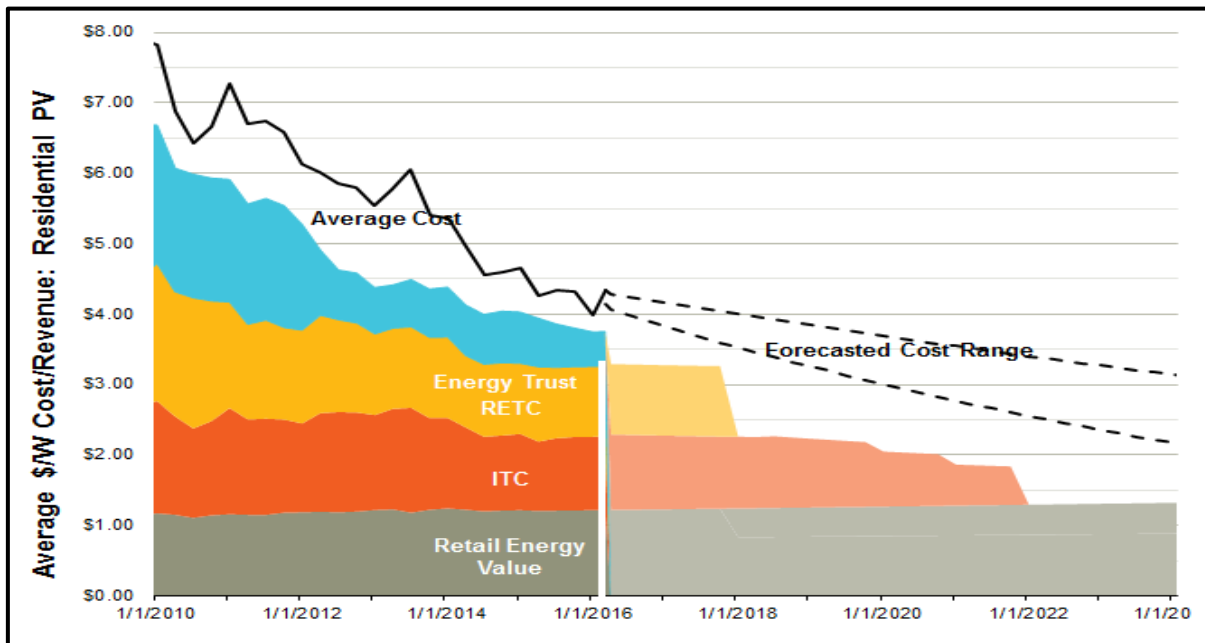


FIGURE 7: Residential Solar PV Project Historical Cost and Sources of Funding Source: Energy Trust Presentation, Renewable Energy Advisory Council, March 2016. The first (blue) section represents the amount of incentive provided by Energy Trust, the second the incentive provided by RETC, the third the incentive provided by the federal investment tax credit and the last the compensation received from the sale of electricity, likely under a net-metering agreement.

Recommendation

As the above-market costs of solar have come down, the Energy Trust use of the public purpose charge should be modified to target only solar PV applications that provide unique benefits to the utility system or help to reduce the “soft costs” of solar energy. Unique benefits to the utility system could include promoting the installation of solar PV systems to help support and improve the utility’s electric system through the selected placement of solar arrays to improve system reliability or voltage regulation. Public purpose charge funds could continue to be used for programs designed to reduce “soft costs” such as permit fees, permitting, sales tax, transaction costs, installer/developer

profit, indirect corporate costs, customer acquisition, installation labor, and supply chain costs.

The Commission recommends a multi-year ramp down on the use of the public purpose charge for the solar above-market cost of solar. The Commission, in conjunction with stakeholders and staff, will evaluate the appropriate ramp down period. This stakeholder process should develop recommendations for the end date of the program based on the impact of the sunset of the RETC and the shift to the Solar Metering Program recommended in this report. Within this process, utilities should work with Energy Trust to identify ways in which high value solar PV projects, capable of addressing location specific utility system needs that lower total costs for ratepayers, can be identified and supported by Energy Trust. This transition period will send a clear signal to the market on the expected expiration of the incentive, reducing market uncertainty.

Taxpayer Programs

Taxpayer funded programs are those that are provided through a grant (which can be funded from the auction of tax credits or an allocation from the General Fund) or take the form of a tax-credit either on income or property tax. Taxpayer funded programs have been used to fund alternative energy systems and available to all Oregonians regardless of which utility's service territory they reside in.

Based on its identified principles, the Commission finds that the taxpayer funded programs such as RETC, the property tax exemption for alternative energy systems, and the RED grant are best suited to incentivize social and economic development benefits. The Commission does not make specific recommendations on the structure of these programs given its limited role in the design and distribution of tax funds, but provides the following information on the impact of the programs to date for reference for the Legislature.

We divide this section of the report into programs currently administered by ODOE and those administered by other state agencies or local jurisdictions.

Oregon Department of Energy Programs

Currently, ODOE is undergoing a programmatic review by the Governor and Legislature. This review includes all incentive programs currently administered by the Department, including RED, RETC, and SELP. It is expected that the Legislature will

report on its findings in the middle of the Fall. In light of this, the Commission limits its recommendations on the RETC, SELP, and RED programs.

Residential Energy Tax Credit

The ODOE administered RETC program has promoted the installation of solar PV in Oregon with nearly 8,000 projects installed statewide. These projects account for more than 30,000 kW of installed capacity, reducing the amount of capacity that must be otherwise acquired by the state’s utilities.

These projects likely also received additional funding from Energy Trust, state and federal programs. These numbers represent the total size of the projects and not the proportional share funded by RETC.

Program Overview

The RETC program began in 1978 and was designed to promote energy conservation and renewable energy resource development. Under RETC, ODOE issues personal income tax credits to Oregon homeowners, renters, and landlords who purchase energy efficient equipment/devices and renewable energy systems for their homes.

Year	Number of Projects	Capacity Installed kW	Annual Energy kWh	Total Installed Cost	One-Time Incentive
2001	4	6		\$ 28,934	\$ 5,922
2002	35	30		\$ 320,563	\$ 46,566
2003	149	270		\$ 1,905,539	\$ 216,264
2004	153	278		\$ 1,886,435	\$ 217,826
2005	120	217		\$ 1,606,166	\$ 207,751
2006	227	535		\$ 4,287,086	\$ 1,157,828
2007	244	647	Not Available	\$ 5,333,414	\$ 1,300,318
2008	221	611		\$ 5,067,312	\$ 1,203,668
2009	606	1,857		\$ 14,709,410	\$ 3,534,287
2010	1,173	3,474		\$ 22,279,420	\$ 6,783,192
2011	1,470	5,780		\$ 35,312,885	\$ 8,484,309
2012	1,037	4,101		\$ 20,970,010	\$ 6,027,268
2013	1,091	5,438		\$ 25,444,198	\$ 6,415,879
2014	1,362	7,521		\$ 34,191,644	\$ 8,022,064
2015	32	156		\$ 699,808	\$ 176,540
Total 2001-15	7,924	30,921		\$ 174,042,824	\$ 43,799,682

Figure 8: RETC tax credits from 2001-2015. Source: Oregon Department of Energy

Increasingly, solar photovoltaic systems have become a larger share of qualified RETC devices. In 2015, the cumulative number of projects in the RETC solar PV program surpassed 10,000.^{10,11}

Tax credit amounts vary based on the alternative energy device and the amount of energy saved or produced; credits can range from about \$100 to \$6,000. The types of devices and appliances eligible for the tax credit are reviewed each year and have changed over time. In 2005, the Legislature increased the solar electric tax credit to \$6,000, which is \$1,500 taken over four years. The program is scheduled to sunset for tax years on or after January 1, 2018.

Renewable Energy Development Grant

The ODOE administered Renewable Energy Development (RED) grant has promoted the installation of solar PV in Oregon by providing funding to 11 projects installed statewide. These projects account for more than 427 kW of installed capacity. These projects likely also received additional funding from state and federal programs, and in some instances are enrolled in NEM. These numbers represent the total size of the projects and not the proportional share funded by RED.

Year	Number of Projects	Capacity Installed kW	Annual Energy kWh	Total Installed Cost	One-Time Incentive
2013	4	92	108,300	\$ 373,327	\$ 117,103
2014	1	35	34,000	\$ 130,180	\$ 25,250
2015	6	299	384,383	\$ 834,492	\$ 159,420
Total 2013-15	11	427	526,683	\$ 1,337,999	\$ 301,773

Figure 9: RED Grants distributed 2013-2015. Source: Oregon Department of Energy

Program Overview

RED is a competitive grant which promotes investment in renewable energy development across the state. It began in 2010 and is administered by ODOE. Eligible recipients include Oregon businesses, organizations, public bodies, nonprofits, tribes and residential rental properties that install and operate a renewable energy production system that produces electricity. Eligible projects include systems that use biomass,

¹⁰ The data in the table does not represent the entirety of the program.

¹¹ Due to the timing on this report, the 2015 data is not fully representative of the 2015 fiscal year.

solar, geothermal, hydroelectric, wind, landfill gas, biogas or wave, tidal or ocean thermal energy technology to produce energy.

RED grants are awarded through a competitive selection process and can total up to 35 percent of eligible project costs, with a cap of \$250,000 per project. Funding for the grants comes from tax credit auctions administered by the Oregon Department of Revenue.

Funding for the grants comes from tax credit auctions administered by the Oregon Department of Revenue. Over five rounds of funding since the program's inception, the majority of the grants have gone to solar photovoltaic systems. Further, the majority of these projects have been located in central and eastern Oregon regions, which tend to be sunnier and more rural. In the most recent round of funding, every application received was for a proposed PV system.

Small-Scale Energy Loan

The ODOE administered Small-Scale Energy Loan program provides loans for conservation, renewable energy, and other energy projects. Making its first loan in 1981, SELP is one of the nation's oldest green-lending programs. Since that time SELP has issued 874 loans worth more than \$611 million. Currently, the program has approximately \$214 million in its active portfolio.

Program Overview

SELP provides access to funding for eligible energy projects, from installing photovoltaic and hydropower systems to more efficient furnaces and lighting systems. SELP loans can be provided to individuals, businesses, non-profit organizations, schools, and local, state, federal and tribal governments.

Year	Number of Projects	Total Loaned
1999	4	\$ 97,307
2000	2	\$ 347,317
2001	1	\$ 18,000
2002	1	\$ 19,999
2003	1	\$ 400,000
2004	7	\$ 1,207,021
2005	3	\$ 159,200
2006	2	\$ 1,529,193
2007	5	\$ 824,383
2008	3	\$ 44,970
2009	2	\$ 191,800
2010	4	\$ 1,294,221
2011	5	\$ 1,930,380
2012	1	\$ 55,000
2013	1	\$ 20,000
2014	2	\$ 261,500
2015	1	\$ 40,560
Total 1999-2015	45	\$ 8,440,851

Figure 10 SELP Loans granted 1999-2015

The program issues four types of bonds:

1. Governmental Purpose, for energy projects in publicly owned and operated facilities.
2. Private Activity, for projects that use renewable resources to produce energy or
3. For energy projects for non-profit organizations.
4. Federally Taxable, for energy-saving projects in homes and businesses.
5. Qualified Energy Conservation Bonds, for energy conservation projects for states, tribes, and local governments.

Programs Managed by other States Agencies or Local Jurisdictions

Property Tax Exemption for Alternative Energy Systems

The Department of Revenue administered property tax exemption for alternative energy systems has promoted the installation of solar PV in Oregon with more than 5,000 projects claiming the exemption since 2011. These exemptions amount to \$237 million in exemptions being granted.

Program Overview

In 2011, the Oregon passed HB 2536 which provided a property tax exemption for any changes in the real market value of a property due to installing a qualifying renewable energy system. This exemption means that any increase in a property value due to the installation solar photovoltaics would be exempt from the property's tax assessment. Projects must be net-metered or provide an offset to on-site electricity use. The property tax exemption will expire in 2018.

Alternative Tax Exemption Projects in Oregon

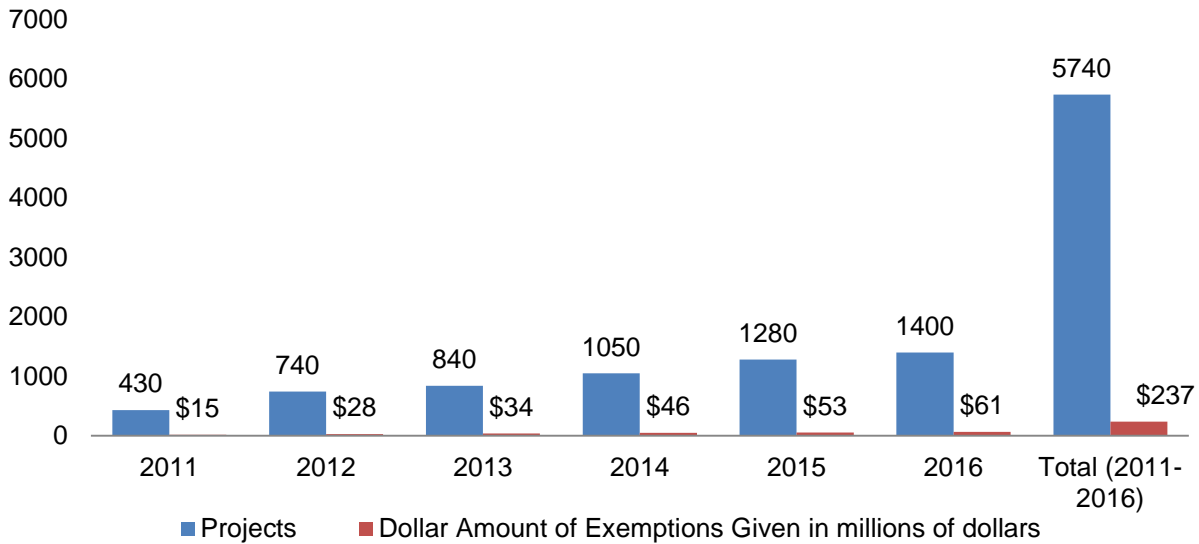


Figure 11 Alternative Tax Exemption Projects 2011-2016

Fee in Lieu of Property Tax

The owner of a solar project may enter into an agreement with a county or city (if a project is within city limits) to pay a fee in lieu of property taxes. This structure effectively waives property taxes for solar facilities.

Program Overview

The governing body of a local jurisdiction can enter into an agreement with any solar project to exempt it from property taxes for up to 20 years. This agreement is contingent on annual payment to the county/city of a fee equal to \$7,000 per MW of the project's nameplate capacity. The project cannot also receive another tax exemption.

Rural Renewable Energy Development Zone Program Overview

A Rural Renewable Energy Development Zone (RRED Zone) offers an incentive to encourage new investments that utilize wind, geothermal, solar, biomass, or other forms of alternative energy in Oregon to generate electricity; or produce, distribute or store any of a wide variety of biofuels. A city, county, or several contiguous counties can set

up a RRED Zone that covers all the territory in the jurisdiction(s) outside the urban growth boundary of any large city or metropolitan area.

The total amount of property (among one or more projects) that can qualify is subject to a locally-set cap with each RRED Zone designation of \$250 million or less in initial market value. Since 2013, the local government sponsor (county) may waive the requirement to create full-time employment with a new project, if the cost of the investment is \$5 million or more. This is like the \$25 million waiver in an enterprise zone, except that local additional conditions may not be imposed.

Recommendation for all Taxpayer Funded Programs

If the Legislature wants to capture the full social and economic development benefits of solar PV, adopt taxpayer-funded incentive programs. Further, if the Legislature sees value in promoting the development of Solar PV in Oregon, it should considering adopting incentives available to all Oregonians. At this time, the Commission offers no specific recommendation on the form of incentives that should be offered.

However, it notes that in order to continue the property tax exemption for alternative energy projects, RETC, or RED the programs must be extended by the Legislature. Currently, the exemption, RED, and RETC are scheduled to sunset in 2018.